PG&E Project Refinements to Ravenswood-Cooley Landing 115 kV Reconductoring Project

4. Project Description

Pacific Gas & Electric Company (PG&E) proposes to reinforce a portion of the Southeastern Peninsula Area 115 kV transmission system that provides electrical service to San Mateo and Santa Clara counties by replacing the conductors (a process referred to as reconductoring) on the approximately 1.6-mile Ravenswood-Cooley Landing 115 kV power line (Ravenswood-Cooley Landing Line). The Ravenswood-Cooley Landing Line is a double-circuit tower line (DCTL) design supported by nine lattice steel towers between PG&E's Ravenswood Substation and Cooley Landing Substation in the cities of Menlo Park and East Palo Alto on the southeastern portion of the San Francisco Peninsula.

4.1 Project Title

The Ravenswood-Cooley Landing 115 kV Reconductoring project (Ravenswood Project) would replace the existing conductors with new steel-supported aluminum conductors, modify existing lattice steel towers, add a new optical fiber ground wire (OPGW) to the system, and reinforce select tower footings.

4.2 Lead Agency Name and Address

California Public Utilities Commission
Energy Division
505 Van Ness Avenue, Fourth Floor
San Francisco, California 94102

4.3 Lead Agency Contact Person and Phone Number

Billie Blanchard, Project Manager
(415) 703-2068

4.4 Project Components

The components of the proposed Ravenswood Project would include:

- Reconductoring the two 115 kV Ravenswood-Cooley Landing Line circuits with new 477 kcmil steel-supported aluminum conductors (ACSS);
- Reinforcing existing foundations at four towers to support the new conductors;
- Modifying four lattice steel towers to support the new conductors and provide required minimum conductor clearance;
- Installing a new OPGW to increase communication reliability between the two substations; and,
- Installing new Tubular Steel Poles (TSPs), and modifying and replacing certain related equipment at Ravenswood Substation and Cooley Landing Substation.

The proposed project consists of modifications to existing facilities within an existing utility corridor. No material changes in maintenance and operations activities are anticipated with implementation of the project. **Figures 2.7 1A** and **1B** illustrate the project location.

4.5 Project Sponsor's Name and Address

Pacific Gas & Electric Company
245 Market Street
San Francisco, CA 94105

4.11 Existing System Project Components

Power Line Reconductoring

The approximately 1.6-mile Ravenswood-Cooley Landing Line was placed into operation in 1970 to serve peak winter loads of the San Francisco Peninsula and part of a PG&E trend of increasing reliability and interconnectivity of the electrical grid. Composed of 0.974-inch-diameter 715.5 kcmil AAC, the 115 kV DCTL is capable of carrying 703 amps under normal conditions and 802 amps under emergency conditions. To reduce the risk of overloading the Ravenswood-Cooley Landing Lines during peak demand, the project would replace the existing conductors with 0.846-inch-diameter standard 477 kcmil ACSS, which is rated to handle 1,144 amps. The 115 kV conductors are arranged in a vertical configuration, with three conductors on each side of the tower. The new conductors would be replaced in the same configuration as the existing 115 kV conductors. Insulators would be replaced along the entire line. The span distances between structures vary from approximately 680 feet to 1,200 feet.

The project would add an OPGW between Ravenswood and Cooley Landing substations. The OPGW would be used for communication between the two substations and would be attached to new OPGW peaks installed at the top of each tower. The OPGW would terminate at a new TSP installed at each substation, then would continue within new underground conduit to the existing control building. The OPGW proposed for the project would be a .675-inch diameter DNO-6580 AlumaCore-48/48/675 or equivalent type fiber.

In accordance with CPUC General Order (GO) 95, the lowest conductor would be installed a minimum of 27 feet above the ground. The minimum ground-to-conductor clearance above SR 84 would be 27 feet. For open water areas considered suitable for sailing, a minimum conductor clearance of 47 feet would be established.

4.12 Temporary Structures

Guard Structures

Temporary wood poles would be used as guard structures at locations where the Ravenswood-Cooley Landing Line cross roads, recreational trails, or other utility lines (see **Figure 2.4-3**). Guard structures typically consist of a pair of temporary vertical wood poles that are direct buried with a horizontal cross-arm or netting. Guy wires may be installed to provide tension support for netting. Guard structures are installed as a safety precaution to prevent the conductor from falling to the ground should it be dropped or sag excessively during reconductoring. These structures would typically extend approximately 30 - 50 feet aboveground and approximately 5 - 7 feet belowground.

In lieu of installing temporary wood poles as guard structures, bucket or line trucks may be staged at crossings to minimize ground disturbance or to accommodate other construction-related needs.

The guard structures installed at the SR 84 crossing would include netting to provide additional protection against falling or sagging conductor (see Attachment). The poles used for netted guard structures would be guyed for stability. It is anticipated that a combination of temporary lane closures and rolling road blocks would be required to install the nets onto the guard structures.

Snub Poles

Snub poles are temporary wood poles used to facilitate pulling operations. Approximately two temporary snub poles may be required at each pull site where the conductor cannot be attached directly to the structure because of structure design. Snub poles typically extend approximately 30 - 50 feet aboveground and approximately 5 - 7 feet belowground. Snub poles would be removed upon completion of each wire pull.

Substation Modifications

A new TSP would be installed at both Ravenswood and Cooley Landing substations to provide termination points for the overhead OPGW line. The TSP installed at Ravenswood Substation would be approximately 55-feet tall, and the TSP at Cooley Landing Substation would be approximately 80-feet tall. Each TSP would be approximately two-feet in diameter at the base and would be set on a concrete pile cap installed over Tubex pile foundations. The OPGW line would be installed in new underground conduit from the TSP to the existing substation control building and interconnected with new telecom processing equipment to be installed within the existing control building. The installation of the OPGW line would reinforce the telecom infrastructure to minimize risks of over-tripping for communication failure between Ravenswood and Cooley Landing substations. At Cooley Landing Substation, the project would reconfigure existing Circuit Breaker 122 (CB 122) to operate normally closed. At Cooley Landing Substation, line relays between the communication building and CB 122 will be replaced in existing conduit. This would allow for a balanced loading on both circuits and reduce potential overloads on either circuit. All work would occur within the existing fence lines of Cooley Landing and Ravenswood substations.

Right-of-Way Requirements

PG&E currently has permanent existing easement rights along the entirety of the existing alignment to accommodate the proposed project. PG&E's easement rights include ingress and egress to the power lines, vegetation removal, tower installation, and reconstruction. PG&E may update or clarify its existing easement rights, as needed, prior to construction. Temporary construction easements may be obtained to accommodate pull sites, staging areas, or other work areas located outside of permanent easements.

Land entitlement issues are not part of this regulatory proceeding in which the CPUC is considering whether to grant or deny PG&E's application for a permit to upgrade existing electrical facilities. Rather, any land rights issues would be resolved in subsequent negotiations and/or condemnation proceedings in the proper jurisdiction, following the decision by the CPUC on PG&E's application (see, for example, the Jefferson-Martin 230 kV Transmission Project, A.02-04-043, D.04-08-046, p. 85).

4.13 Construction

The following discussion is preliminary and based on typical construction practices and anticipated construction needs. Final design may require modifications to the expected work areas described herein; however, impacts associated with potential refinements are not anticipated to differ.

Power Line Construction

Reconductoring

During reconductoring activities, the existing power line would be taken out of service. To replace a conductor, the existing conductor would be detached from its support structure and temporarily lifted. Rollers then would be installed at the conductor's attachment point and the conductor would be placed onto the rollers. The rollers would allow the existing conductor to be pulled through each structure until the new conductor is ready to be pulled up to the final tension position. Installing rollers and detaching the existing conductor would be accomplished using a helicopter to transport workers and materials to each tower.

A sock line would then be attached to the existing conductor, and a line truck with a drum puller and empty conductor reel will pull the old conductor onto the reel where it will be collected for salvage. The pulling through each structure would be done under controlled tension to keep the conductor elevated and away from obstacles. As a safety precaution during conductor removal, guard structures would be placed where the conductor crosses public roads, recreations trails, or other utility lines to prevent injury or damage if the

Foundation Improvements

Foundation work at Towers 1, 2, 8, and 9 would consist of installing two Tubex soil displacement piles adjacent to each existing tower footing for a total of eight piles per tower. The installation starts with screwing in an approximately 16-inch-diameter pile, 80- to 100-feet-deep, using a track mounted drill rig. Steel casing is advanced by the drill rig and grout is injected into the void created by the pile casing as the drill progresses. Once the pile is installed to depth, a steel rebar cage is lowered into the casing and the casing is filled with concrete. Any groundwater that accumulates within the pile casing would be dewatered into a baker tank or equivalent for characterization, then disposed of in accordance with the project Storm Water Pollution Prevention Plan (SWPPP) and applicable state and federal regulations as described in **Section 3.8, Hazards and Hazardous Materials**, and **Section 3.9, Hydrology and Water Quality**. With the Tubex pile system there are no spoils generated during installation; the soil is displaced laterally and compacted as the drill bit is advanced. No backfill would be needed for this work, and any incidental drill spoils would be stockpiled on plastic for characterization, then removed from the site for transport to an approved disposal facility in accordance with **Section 3.8, Hazards and Hazardous Materials**.

Once the Tubex piles are in place, a horizontal concrete pile cap would structurally tie the new piles to the existing tower footings. The new concrete pile cap would be formed above the ground surface; no excavation would be required to tie the new piles to the existing foundations.

Substation Improvements

A new TSP would be installed within each substation to provide a termination point for the overhead OPGW line. Each TSP would be installed using a Tubex pile foundation following the process described above for the tower foundation improvements. An aboveground concrete pile cap approximately 10-feet-long by 10-feet-wide would be installed on top of the Tubex pile foundation. A line truck would be used to place the pile cap forms, anchor bolts, and rebar. The TSPs would be delivered directly to the substations for assembly, and a crane would be used to set the TSP onto anchor bolts placed within the pile cap. At each substation, the OPGW line would be installed in new underground conduit trenched from the base of the TSP to the existing control building. The trench would be approximately 12 inches wide and 36 inches deep with the work being completed using a backhoe over approximately one-half day at each substation (PGE 2018). The TSPs and anchor bolts would be galvanized, protecting them from excessive corrosion, should a flood event occur. The OPGW line would then connect with new telecom processing equipment to be installed within the control building. Electricians would use hand tools to install new line relays and reconfigure the wiring of CB 122 at Cooley Landing Substation.

Work Areas

The following discussion is preliminary and based on typical construction practices and anticipated construction needs. Final design may require modifications to the expected work areas described in the following paragraphs; however, impacts associated with potential project refinements are not anticipated to differ. **Table 2.7-1** provides a summary of proposed work areas.

Table 2.7-1: Summary of Proposed Work Areas

Work Area	Work Area Description	Access	Approximate Work Areas (acres)		
			Matted	Overland	Developed
Tower 1	Matted Tower Foundation Work Area	Matted Access Route	0.26	0	0
Tower 2	Matted Tower Foundation Work Area	Matted Access Route	0.22	0	0
Tower 3	None	Helicopter	0	0	0
Tower 4	None	Helicopter	0	0	0
Tower 5	None	Helicopter	0	0	0
Tower 6	None	Helicopter	0	0	0
Tower 7	None	Helicopter	0	0	0
Tower 8	Matted Tower Foundation Work Area	Matted Access Route	0.16	0	0
Tower 9	Overland Tower Foundation Work Area	Bay Road	0	0.30	0
Pull Site A	Pull Site	SR 84	0	0	0.56
Pull Site B	Pull Site	Bay Road	0	0	0.17

Guard Structures	Augured Area and Spoils Stockpile	SR 84, Bay Road	0	0.03	0.01
Ravenswood Substation	TSP and Conduit Installation	SR 84	0	0	0*
Cooley Landing Substation	TSP and Conduit Installation	Bay Road	0	0	0.25
Total Approximate Work Area			0.64	0.33	0.99

Note: This table is preliminary and subject to change based on CPUC requirements, final engineering, ground conditions at time of construction, and other factors.
*TSP installation will occur within the Pull Site A work area.

Tower Foundation Work Areas

To provide access and a stable work area around towers in marshlands (Towers 1, 2, and 8), access routes and tower work areas would be established by placing timber mats or equivalent protective matting over the ground surface. Towers within marshlands would require approximately 0.3 acre of matted work area around the base of the towers. Tower 9, which is in uplands, would require approximately 0.3 acre of overland work area established by mowing existing vegetation. It may be necessary to temporarily remove sections of the maintenance boardwalks to Towers 1, 2, and 8 to facilitate placement of matting. Any sections of boardwalk removed would be replaced following completion of foundation work. No grading is proposed to establish project work areas.

As detailed in **Sections 3.3, Air Quality**, **3.8, Hazards and Hazardous Materials**, and **3.12, Noise**, PG&E best management practices (BMPs) would be implemented at each landing zone to reduce potential impacts related to air quality, hazards and hazardous materials, and noise.

Construction workers using helicopters are required to be certified for helicopter safety, and must produce a certification card to the pilot before they can fly. Personnel and pilots would attend a daily tailboard meeting at the landing zone that covers safety topics for the day, including the route to be taken and work locations to be visited. Helicopter flight plans would be filed with the local Federal Aviation Administration (FAA) office regulating the local air traffic control plan within 14 days of helicopter activities.

Substation Modifications

Work to install the new TSPs and OPGW conduit would be conducted within graveled areas within the existing substation footprints. Vehicles carrying material and equipment would be parked within the substation paved or graveled areas. Vehicles and equipment and materials delivery would access the substations from the paved Bay Road and SR 84, located immediately adjacent to the substations.

Access Roads

Project work areas would be accessed using a combination of public roads, existing paved and gravel roads, overland routes, and matted temporary access routes across marshlands. No new access roads would be established for the project, no grading is anticipated, and no permanent access roads are proposed.

Equipment would access tower work areas within marshlands by placing protective matting (e.g., wooden timber mats, crane pads, swamp mats) onto the existing surface to create an approximately 10-foot-wide equipment access route. A combination of matting and steel plates would be utilized to provide equipment access at grade changes (such as when accessing mudflats or marshlands from upland areas).

Vegetation Clearance

Vegetation clearing would be limited to mowing the existing upland grassland around the base of Tower 9 and within Staging Area 3 to establish work areas, and hand removal of pickleweed prior to the placement of matting at Tower 8. For other matted work areas, matting would be placed directly over existing vegetation and no vegetation clearing is proposed.

Erosion and Sediment Control and Pollution Prevention during Construction

Construction of the project would require ground-disturbing activities associated with tower foundation work and establishment of work areas. Because these activities would result in disturbance of more than one acre, PG&E would obtain coverage under the State Water Resource Control Board (SWRCB) General Permit for Storm Water Discharges Associated with Construction Activity Order No. 2009-0009-DWQ. To obtain coverage under the permit, PG&E would develop and submit permit registration documents—including a Notice of Intent, SWPPP, risk assessment, site map, certification, and annual fee to the SWRCB prior to initiating construction activities.

PG&E would implement the SWPPP during construction to prevent the discharge of sediment and other pollutants resulting from project construction. The SWPPP would outline implementation of BMPs for each activity that has the potential to degrade surrounding water quality through erosion, sediment runoff, and discharge of other pollutants. PG&E does not obtain building permits for TSPs or their foundations, so would not be subject to local ordinances regarding floodplain construction.

4.14 Construction Workforce and Equipment

Project construction would require a foundation crew, helicopter crew, tower crew, line crew, environmental inspector, and biological monitor. Approximately 15 construction workers would be at the project site on a typical work day; however, because work activities may occur concurrently along the project, up to approximately 25 workers may be somewhere on the project site at any time.

Construction would typically take place between 7 a.m. and 7 p.m., five days per week. Because construction would progress quickly, construction activities are not expected to take place near any one structure location for more than a few days. Nighttime construction is not anticipated, except for certain construction procedures that cannot be interrupted because of safety considerations or to take advantage of line clearances during off-peak hours.

Equipment typically used during project construction is identified in **Table 2.7-3: Typical Construction Equipment and Duration of Use**. **Table 2.7-3** also describes a breakdown of estimated duration of use during construction, including hours or miles per day of operation, and the total duration of use (in days).

Table 2.7-4: Anticipated Construction Equipment details the equipment that is planned for use. Not all equipment may be used during all stages of the activity.

Table 2.7-3: Typical Construction Equipment and Duration of Use

Activity	Estimated Quantity and Type of Equipment		Typical Crew Size	Typical Hours or Miles per Day of Operation	Estimated Duration of Use (days)
Staging Area – Receiving, Distribution	1	Boom truck	4	6 miles	20
	1	Rough terrain forklift		3 hours	20
	2	Generators		2 hours	20
	2	Light-duty pickup truck		6 miles	80
	1	Water tender w/ pickup truck		6 miles	20
Work Area Establishment and Removal	1	Rough terrain forklift	3	6 hours	26
	1	Tractor with mower		3 hours	1
	1	Boom truck		3 hours	26
	1	Light-duty pickup truck		6 miles	26
Foundation Work (Tower reinforcement and TSPs)	1	Drill rig	4	8 hours	26
	1	Rough terrain forklift		5 hours	30
	1	Skid steer		1 hour	26
	1	Concrete truck		20 miles	10
	2	Light-duty pickup truck		6 miles	30
	1	Grout injector (concrete pump)		4 hours	14
	1	Generators		4 hours	26
Tower Modifications (Top - cage Extensions, OPGW Peaks, Body Mods)	1	Helicopter (medium) Bell Twin Ranger	4	3 hours	10
	1	Light-duty pickup truck		6 miles	10
Guard Structures	1	Line Truck	3	6 miles	8
	1	Pickup		6 miles	8
	1	Bucket truck		6 miles	8
Conductor Installation, OPGW Installation, TSP Installation, and CB 122 Reconfiguration (includes old conductor removal)	2	Helicopter (small) MD-500	15	3 hours	26
	1	Tensioner		8 hours	3
	1	Puller		8 hours	3
	1	Line truck w/ wire reel		4 hours	2
	1	Boom truck		1 hour	28
	2	Bucket truck		2 hours	30
	1	Man lift		2 hours	26
	3	Light-duty pickup truck		6 miles	30
	1	Dump Truck		20 miles	3
	1	Crane		4 hours	2
Right-of-Way Cleanup	1	Skid steer	2	4 hours	4
	1	Light-duty pickup truck		6 miles	4
Environmental Monitoring	2	Light-duty pickup truck	1	6 miles	80

Activity	Estimated Quantity and Type of Equipment		Typical Crew Size	Typical Hours or Miles per Day of Operation	Estimated Duration of Use (days)
Project Management/Inspection	1	Light-duty pickup truck	1	6 miles	80
Worker Commute	15	Light-duty auto/pickup truck	N/A	25 miles	80

Table 2.7-4: Anticipated Construction Equipment

Type of Equipment	Use
Bucket truck	Lift and transport workers
Skid steer	Remove excavation spoils
Concrete truck	Mix and deliver concrete
Pickup truck	Transport personnel, tools, and materials
Compressor	Operate tools
Crawler dozer	Pulling lines and sagging conductors
Drill rig	Excavate foundation holes
Rough terrain forklift	Lift and transport heavy construction items; set crane mats
Generator	Provide temporary power
Light-duty helicopter	Use for pulling operations; also transport crew and materials
Medium-duty helicopter	Set cage-top extensions and OPGW peaks
Man lift	Lift crews to structures
Mobile offices	Use as supervision and clerical office
Line truck w/ puller	Pull line in stringing operation
Line truck w/ wire reel	Transport reels of conductor
Line truck w/ tensioner	Hold tension against a pulling line during the stringing phase
Tractor trailer (semi-truck)	Haul materials, equipment, tools, etc.
Boom truck	Lift materials
Water truck	Provide dust control
Crane	Lift TSPs onto foundations