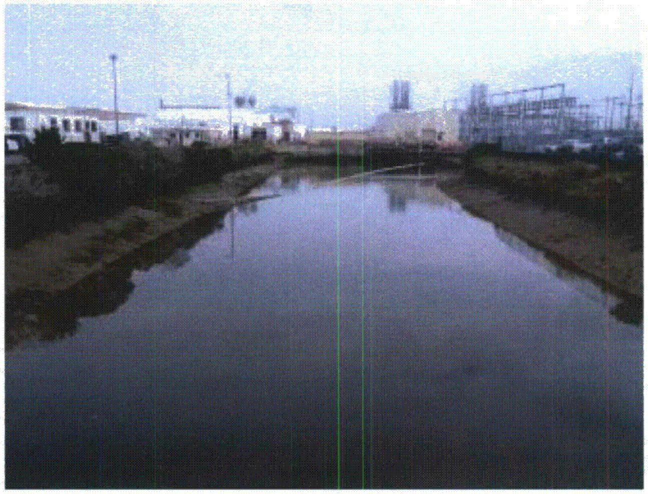
DECEMBER 2013

Biological Mitigation and Monitoring Plan for the Humboldt Bay Power Plant Canal Remediation Project

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1 INTRODUCTION AND BACKGROUND

1.1 Project Description

Pacific Gas and Electric Company (PG&E) is proposing to remove contaminated sediment from the intake and discharge canals (Project) located on the 58-hectare (ha; 143-acre [ac]) Humboldt Bay Power Plant (HBPP) property in King Salmon, CA (unincorporated Humboldt County) and to prepare the canals for final site restoration after remediation (Figures 1 and 2). PG&E has determined that the HBPP intake and discharge canals are contaminated with low levels of radionuclides from past operations. The discharge canal also contains other chemical contaminants associated with past operations. PG&E is additionally seeking authorization for temporary use of the remediated discharge canal for storage of clean soils generated by HBPP decommissioning. The scope of this Project is limited to remediation and interim use of the canals before final restoration. The PG&E HBPP property is located entirely within the California Coastal Zone and zoned Industrial/Coastal-Dependent.

In general, the Project will require:

- rescue and relocation of estuarine species;
- isolation of work areas in the intake and discharge canals from Humboldt Bay;
- dewatering of the intake and discharge canal work areas;
- re-routing all water currently flowing into the discharge canal (e.g., storm water drainage, groundwater treatment system outfall, etc.) directly into Humboldt Bay or other appropriate drainage area;
- excavation of contaminated sediment;
- transportation of contaminated sediment to a properly licensed landfill;
- demolition of the intake and discharge structures;
- removal of a portion of the HBPP levee and discharge canal outfall culverts;
- restoration of the levee between the discharge canal and Humboldt Bay;
- removal of a portion of the Alpha Road parking area;
- removal of the water isolation structures;
- removal of a portion of the contractor parking area on King Salmon Road; and
- temporary use of the remediated discharge canal for the storage of clean, reusable soil generated by the decommissioning project.

Following site preparation and rescue and relocation of estuarine species, construction is planned to begin with installation of the water control structure in the discharge canal in spring 2014. The discharge canal dredging, removal of the discharge canal outfall structure and pipes, preparation of the discharge canal for interim soil storage, remediation of the intake canal, and creation of the Alpha Road parking and Mit-6 mitigation areas will follow. Project activities are anticipated to be completed in 2018.

Clean soil temporarily stored in the discharge canal will be removed from the canal at the conclusion of the decommissioning project and may be used to establish final site restoration conditions. A more detailed project description is provided in the Project's draft Initial Study and Mitigated Negative Declaration (IS/MND; CH2M HILL 2013) and the Habitat Assessment (Stillwater Sciences 2013).

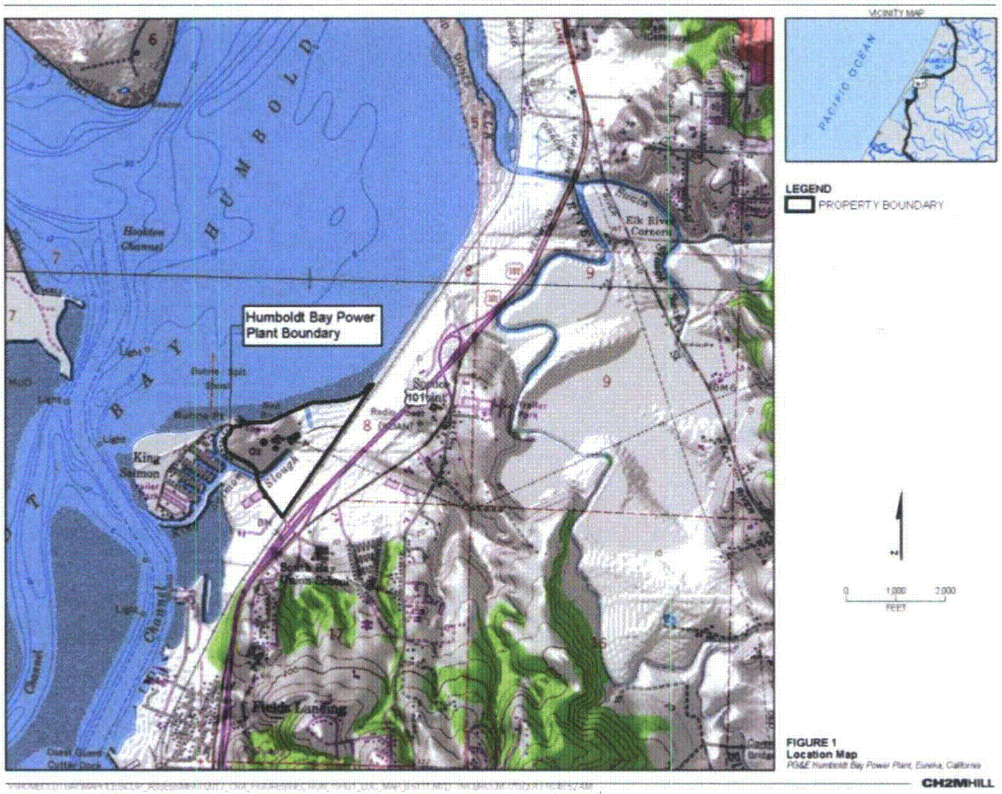

Figure 1. Project location. Source: Canal Remediation Project Description (CH2M Hill 2013).

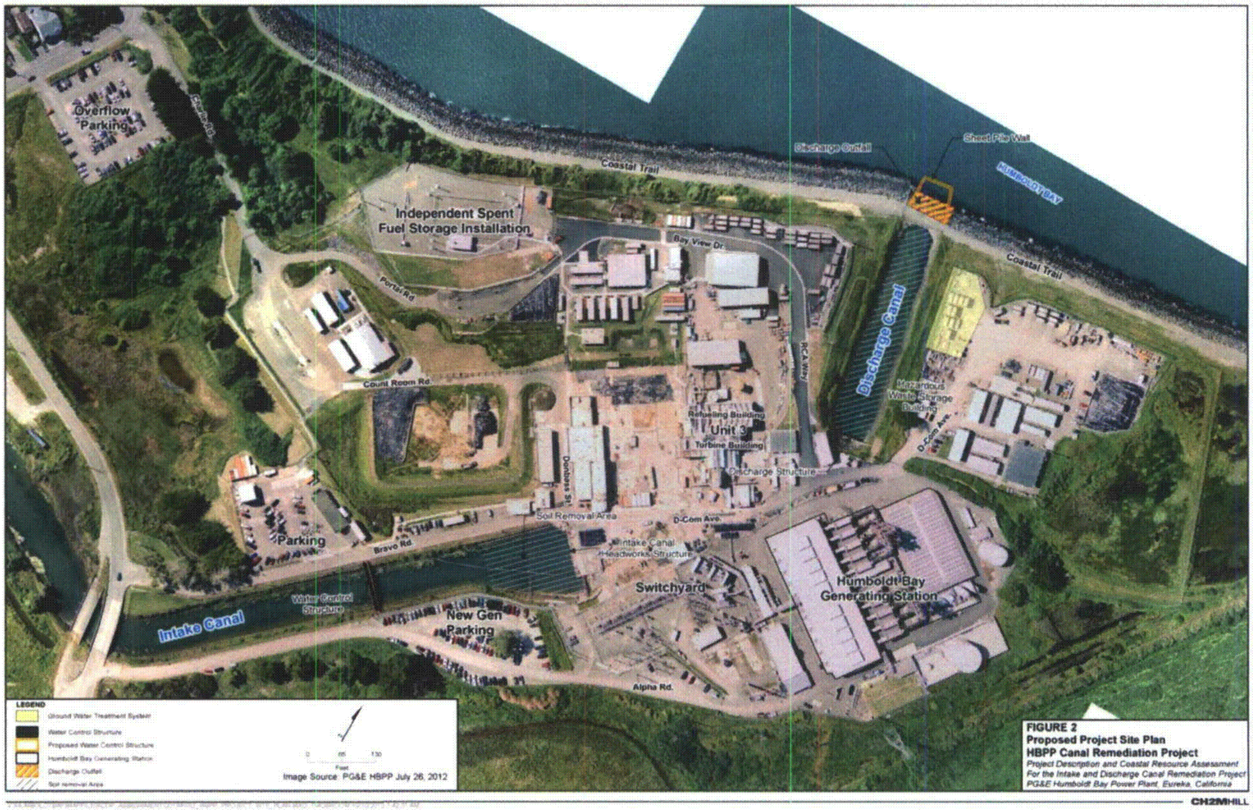

Figure 2. Project area and proposed soil removal areas. Source: Canal Remediation Project Description (CH2M Hill 2013).

Portions of this Project have the potential to impact jurisdictional wetlands and special-status species, requiring mitigation measures. The purpose of this mitigation and monitoring plan is to describe the fish rescue and relocation plan for minimizing impacts to special-status fish species, identify the amount of jurisdictional wetlands that require mitigation, identify potential locations available for completing the wetland and special-status species mitigation requirements, outline wetland mitigation conceptual designs and implementation steps, define performance criteria, describe the monitoring and reporting protocols, and describe the maintenance and remedial action plans. The fish rescue and relocation plan coupled with the mitigation measures proposed in this plan will fully mitigate potential take of listed species.

1.1.1 Fish rescue and relocation plan

PG&E is proposing to implement a fish rescue and relocation plan to minimize project-related impacts on any special-status fish species that may be present in the intake and discharge canals and Humboldt Bay prior to initiation of excavation activities. The differences in physical conditions within the intake and discharge canals will require slightly different fish rescue approaches.

There are two pumping options that could be employed to accomplish the initial dewatering of the canal work areas. It is possible that a combination of both would be deployed. Whatever method is used will comply with appropriate screening and approach velocity criteria.

The first pumping option consists of deploying a double-filter/screen pumping system during the initial dewatering activities to avoid take of special-status species by either impingement or entrainment into the pump. The screen system will consist of covering the pump head with 1.6-mm (1/16-inch) screen and placing that inside a 1.2 x 1.2 x 1.2 meter (4 x 4 x 4 ft) box covered with 3.2-mm (1/8-inch) screen. The 1.6-mm (1/16-inch) screen will satisfy the U.S. Fish and Wildlife Service (USFWS) requirement to minimize entrainment of tidewater goby larvae. The screened box will set on the bottom of the canal, be weighed down with sand bags (if it has a wood frame), and be moved toward deeper water as the canals are being drawn down. The purpose of the box is to prevent the pump head from getting clogged with debris and reduce the approach velocity toward the pump.

The second pumping method would consist of mounting the pump hosing and head on floats that would stay suspended in mid-canal. The pump heads would be surrounded by low-velocity screening. The screened pump heads would be placed within a screened box once the canal water levels drop to the point where the floating system is no longer efficient.

After the initial dewatering and completion of the fish rescue and relocation, the contractor will use submersible pumps in well casings with gravel packs to keep the excavation area dewatered.

All fish removal and relocation efforts described below will be conducted in a manner that ensures the safety of construction and biological work crews. If workers suspect unsafe or unexpected conditions at any time during this work, adjustments will be made to remedy the situation or remove themselves from harm's way.

Unexpected changing conditions (tides, wind, wave action, or contamination risk) at the excavation sites may require unanticipated modifications to the proposed plan below. The contractor will make the necessary changes and ensure that modifications to the plan will minimize the risk of take of special-status fish species to the greatest extent practicable. Any modifications will be reported in a dewatering and fish rescue report following completion of the canal remediation project.

1.1.1.1 Intake canal

The fish removal effort within the intake canal will begin just prior to low tide by using seine nets with 3-mm (1/8-inch) mesh to sweep the fish from the headworks in a down-channel direction to a point where dewatering and excavation-related injuries would not occur. This point will be outside and down-channel of the water control structure (bladder dam) location. A 3-mm (1/8-inch) mesh blocknet will be placed at the down-channel end of the swept area to restrict reentry by fish into the project impact area. A second seine sweep will then be conducted from the headworks and run down-channel to the location of the block net. The block net will be removed and placed immediately up-channel of the seine net. A third and final seine sweep will then be conducted down to the block net. The seine and block net will remain in place during the entire period that the bladder dam is being constructed. The seine and block net will be removed once the dam is completed. It is expected that these seine sweeping activities will remove nearly all of the special-status fish species, if they occur in the affected area and especially young anadromous salmonids, eulachon, and longfin smelt, from the excavation areas without the need to physically handle them.

Given the life history of longfin smelt, it is expected that no adults will be in the intake canal during the fish removal effort. This is because adult longfin smelt would either be spawning in freshwater streams or have most likely died following spawning during the period that the fish removal would be taking place. Therefore, juveniles or yearling longfin smelt would most likely be the only life stages present. Juvenile longfin smelt primarily occupy the middle or bottom of the water column (CDFG 2009), so it is expected that the seine sweeps will be effective at moving any that are present out of the work area. Similarly, anadromous salmonids and eulachon occupy the higher locations in water column and should respond well to the sweeps.

Tidewater goby are more benthic-oriented and may be a little more difficult to move down the channel and out of the work area, if present. However, use of seines is a USFWS-recommended survey technique for tidewater goby (USFWS 2005) and should prove effective for this species.

Once the bladder dam is installed in the intake canal, the remaining individual fish and crustacean species will be collected by beach seining and dip netting during the excavation area dewatering phase. The dewatering process will include the use of the double-filter screen pumping system described above. The USFWS protocol-level tidewater goby sampling methodology (USFWS 2005) will be used to capture any remaining tidewater goby and other fish species. The tidewater goby protocol includes, but is not limited to, use of specific seine mesh size (3 mm [1/8 inch]) to minimize mortality of larvae and juvenile fish, and specific reporting requirements. All captured individuals will be held in aerated buckets or live boxes prior to being relocated into the unaffected portion of the intake canal or other locations with suitable habitat as agreed upon with California Department of Fish and Wildlife, National Marine Fisheries Service, and USFWS.

As the initial dewatering continues, any remaining fish will become concentrated in low points in the canal. The fish rescue will be conducted by hand and dip net during this part of the initial dewatering period. All captured individuals will be held in aerated buckets prior to release into the unaffected portion of the intake canal or other agreed-upon location.

Agency-approved biologists and/or those that hold federal ESA Section 10(a)(1)(a) permits for tidewater goby and anadromous salmonids will be on site during all fish rescue and relocation operations. The fisheries biologists conducting the rescue operations will record the number and species of all special-status fish species handled during the rescue operation. In addition, the fish rescue team will identify and record (not enumerate) all non-special-status species handled during the rescue operation. These will be reported to PG&E and the state and federal agencies as required.

1.1.1.2 Discharge canal

The fish rescue and relocation effort in the discharge canal will be conducted in a similar manner to that in the intake canal, but with a few minor differences due to site-specific considerations. First, the sand deposit in the discharge canal reduces the potential habitat area for fish and the area that needs to be swept with a seine net. Second, the potential for special-status fish species to be present in the discharge canal is less than for the intake canal due to the access restrictions created by the partially filled-in outfall pipes and limited amount of habitat. Third, it is important that this operation be conducted during a receding tide because the herded fish will need to follow the ebb current through the outfall pipes that lead to the bay. Finally, any tidewater goby that may be captured would need to be relocated to an off-site area, possibly the intake canal outside of the work area.

The seine sweeps will begin at the discharge structure at the southern end of the discharge canal and continue toward the outfall pipes that drain to the Humboldt Bay. A small channel exists along the east side of the sand deposit. This channel will contain flowing water during the ebb tide and help funnel the herded fish directly toward the outfall pipes. A block net will be placed at the down-channel end of the swept area and up against the outfall pipe inlets to restrict reentry by fish into the discharge canal. This sweeping process will be repeated two more times to ensure maximum removal of fish from the discharge canal. No fish will be handled during this process.

Once the seine sweeping is done, the contractor will place plugs in the outfall pipes to prevent tidal flow and fish from reentering the discharge canal. Initial dewatering through the double-filter screen pumping system described above will commence once the plugs are in place. The remaining individual fish and crustaceans will be collected by beach seining and dip netting during the excavation area dewatering phase. All captured individuals will be held in aerated buckets or live boxes prior to being relocated into the bay, or in the case of tidewater goby, the intake canal outside of the work area. As the initial dewatering continues, any remaining fish will become concentrated in low points in the canal. The fish rescue will be conducted by hand and dip net during this part of the initial dewatering period. The USFWS protocol-level sampling methodology and required sampling gear (USFWS 2005) will be followed to capture tidewater goby and other fish species.

Agency-approved biologists and/or those that hold federal ESA Section 10(a)(1)(a) permits for tidewater goby and anadromous salmonids will be on site during all fish rescue and relocation operations. The fisheries biologists conducting the rescue operations will record the number and species of all special-status fish species handled during the rescue operation. In addition, the fish rescue team will identify and record (not enumerate) all non-special-status species handled during the rescue operation. These will be reported to PG&E and to the state and federal agencies as required.

1.1.1.3 Humboldt Bay Coffer Dam area

The four outfall pipes draining the discharge canal pass underneath the coastal trail levee. The bay-side end of the outfall pipes are set on a rock apron that projects about 20 feet beyond the bay side of the levee (Figure 3). Removal of the discharge canal outfall pipes will require isolation of the worksite from Humboldt Bay and as such will require removal of any fish that will be in the isolated construction area.

Clearing the work area on the Humboldt Bay side of the levee and discharge canal outfall pipes will be challenging due to the dynamic environment in that location. This site is very exposed and subject to significant tidal, wind, and wave action. However, it is open water and devoid of eelgrass and as such does not have the habitat characteristics favored by salmon, steelhead, tidewater goby, green sturgeon, longfin smelt, and eulachon. These habitat characteristics reduce the potential for special-status fish species to be present.

Given the physical challenges at the site, fish rescue and relocation actions will need to be tailored to the wind and wave conditions on the day isolation activities begin. The proposed initial dewatering and fish removal plan below may be adjusted as necessary.

The first step in isolating the site involves placement of a turbidity curtain around the area where the sheet pile wall will be installed (Figure 3). The purpose of the curtain is to contain any turbidity generated during installation of the sheet pile coffer dam. The turbidity curtain will be composed of filter fabric that is sealed on the bottom by weights, suspended from buoys, and secured in place with anchors and cables. The installation of the turbidity curtain will begin at low tide to limit the depth of the water column that needs to be cleared of fish.

The anchors and cables securing the turbidity curtain present obstacles that will interfere with fish removal efforts that use seine sweeps. Therefore, fish removal seine sweeps will commence as soon as the turbidity curtain installation begins and prior to placement of the anchors and cables. A 50-foot-long beach seine that stretches from the edge of the rock apron to the curtain will be moved through the bay perpendicular to the leading edge of the deploying curtain. At the same time, a smaller seine will be used to move fish off of the rock apron, which will be significantly shallower (Figure 3). This will help push fish out of the way into open water as the curtain is being deployed. The seine will continue to create a barrier for fish and prevent reentry into the area between the turbidity curtain and shoreline. This action will occur up to the point where the curtain is attached to the levee at the other end of the work area. It is expected that the combination of seine herding and disturbance of the area during curtain installation will be sufficient to move the vast majority of fish out of the area.

Beach seining efforts will commence on the inside of the turbidity curtain once it is in place. Any fish collected during the beach seining will be placed in aerated buckets and released into the bay beyond the turbidity curtain. Seining operations will cease once they fail to catch special-status fish species in two successive sweeps. Sheet pile coffer dam installation operations will not begin until beach seining efforts have been completed.

The sheet pile panels will be installed using either vibratory or impact hammers. It is expected that this effort will take at least a week. Initial dewatering activities will commence once the sheet pile wall is complete. Hand and dip net fish rescue activities will occur as the water inside the coffer dam is being drawn down. All fish collected will be placed in aerated buckets and released into the bay beyond the turbidity curtain.

A second method for removing fish may not require beach seine sweeps during deployment of the turbidity curtain. It may be possible to deploy the turbidity curtain by first running it along the levee, anchoring the ends, and then gradually pulling it seaward into place by use of boats and/or staff in wetsuits. There would be no need to conduct beach seining efforts if this deployment technique is used. This is because the turbidity curtain would clear any fish from the area as it is moved into place. Fish rescue efforts during initial coffer dam dewatering activities would remain the same. Use of this method would depend on wind and tidal conditions.

Agency-approved biologists and/or those that hold federal ESA Section 10(a)(1)(a) permits for tidewater goby and anadromous salmonids will be on site during all fish rescue and relocation operations. The fisheries biologists conducting the rescue operations will record the number and species of all special-status fish species handled during the rescue operation. In addition, the fish rescue team will identify and record (not enumerate) all non-special-status species handled during the rescue operation. These will be reported to PG&E and to the state and federal agencies as required.

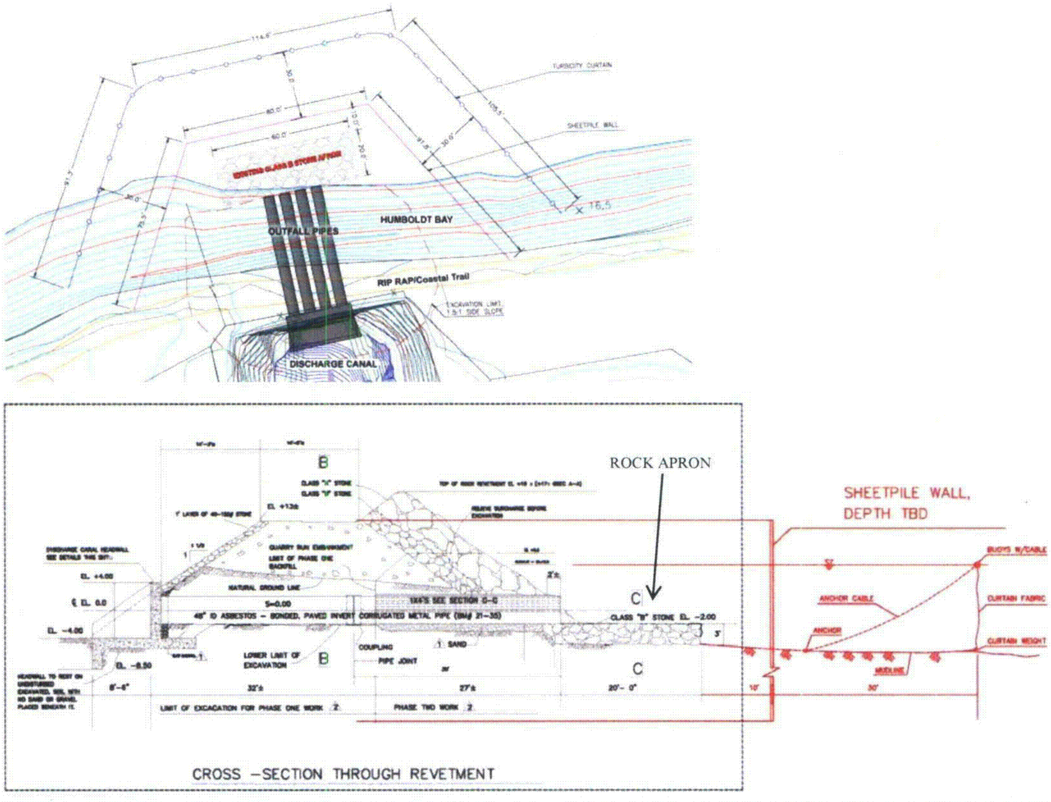

Figure 3. Plan view and cross-section of proposed sheet pile wall installation in Humboldt Bay. Source: Adapted from Parsons 2013.

1.2 Impacts on the Existing Wetlands and Eelgrass Beds

Project impacts on the jurisdictional wetlands and eelgrass (*Zostera marina*) beds, proposed areal mitigation ratios, and proposed mitigation locations are described below and summarized in Table 1. More detail is available in the Project's draft IS/MND (CH2M HILL 2013) and the Habitat Assessment (Stillwater Sciences 2013).

1.2.1 Intake canal

Approximately 0.37 ha (0.90 ac) of Waters of the United States in the intake canal are likely to be directly impacted by project activities. There are no wetlands that will be affected by remediation of the intake canal. The banks of the intake canal contain a narrow band of northern coastal salt marsh at or near the high-high tide line. This vegetation type is considered a sensitive natural community. The northern coastal salt marsh in the Project area is located in the area delineated as Waters of the U.S.

A California Rapid Assessment Method (CRAM) evaluation was conducted for the northeast side of the intake canal, an area that would be impacted by both dredging and dewatering (Figure 4), and it scored a 61. Other estuarine wetlands assessed in Humboldt County had an average CRAM score of 78 (n=27) (www.ecoatlas.org). This relatively low score was a result of the wetland's low structural and topographic complexity, altered hydrology, narrow buffer area, moderately impacted buffer condition, and presence of invasive plant species.[1]

There will be a temporary or permanent loss of 0.03 ha (0.07 ac) of eelgrass habitat in the intake canal as a result of Project activities (Figure 4), depending on the final depth of the canal following remediation dredging. Any locations with a final depth of 3 m (10 ft) below sea level would no longer be suitable habitat for eelgrass (Gilkerson 2008). This area is based on an eelgrass survey conducted by Stillwater Sciences in July 2013 (Stillwater Sciences 2013). Another eelgrass survey will be conducted within 30 days before the start of disturbance. If the area of eelgrass to be impacted has increased, the eelgrass mitigation amounts will be modified accordingly.

1.2.2 Discharge canal

A total of 0.42 ha (1.03 ac) of Waters of the U.S. in the discharge canal portion of the Project area are likely to be directly impacted by Project activities. Of this, 0.32 ha (0.78 ac) in the discharge canal will be permanently impacted and up to 0.10 ha (0.25 ac) in Humboldt Bay will be temporarily impacted (Figure 4).

The discharge canal has not been considered jurisdictional wetland habitat until recently. Prior to HBPP shut-down in 2009, the discharge canal was considered as a wastewater conveyance structure and not a Waters of the U.S. The planned end state of this Project would be an empty depression with no connection to Humboldt Bay.

[1] A CRAM score represents the overall wetland condition or the heath/quality of a wetland. CRAM scores are repeatable and range from 25 to 100, with 100 representing the best available wetland condition statewide. The CRAM assessments in the intake canal and wetlands adjacent to the discharge canal were conducted in September 2013 by two trained CRAM practitioners, Emily Teraoka and Stephanie Morrissette, using the Perennial Estuarine Wetlands Field Book (Version 6.1) and the Depressional Wetlands Field Book (Version 6.1). www.cramwetlands.org

Table 1. Project impacts, proposed mitigation ratios, and proposed mitigation locations.

Affected habitat type, location, and duration	Anticipated impact timing	Affected area ha (ac)	Proposed mitigation ratio	Affected area times ratio ha (ac)	Mitigation location (Figure 5)	Anticipated mitigation timing	Mitigation action
California Coastal Commission (CCC) jurisdictional wetlands – adjacent to discharge canal (permanent; CCC1 & CCC2 on Figure 4)	Spring 2014	0.04 (0.10)	1:1	0.04 (0.10)	Mit-6	Following decommissioning; concurrent with creation of Mit-1 - 2018	Creation: Create 0.04 ha (0.10 ac) of CCC jurisdictional wetland
United States Army Corps of Engineers (USACE) jurisdictional wetlands – adjacent to discharge canal (permanent; W1 & W2 on Figure 4)	Spring 2014	0.06 (0.14)	1:1	0.06 (0.14)	Mit-6	Following decommissioning; concurrent with creation of Mit-1 - 2018	Creation: Create 0.06 ha (0.14 ac) of USACE jurisdictional wetland
Waters of the U.S. – intake canal surface water (temporary – five months)	2018 or sooner[1]	0.37 (0.90)	1:1	0.37 (0.90)	Intake canal	Immediately following disturbance – 2018 or sooner[1]	Restoration: Restore to pre-project conditions or better
Waters of the U.S. – Humboldt Bay coffer dam surface water (temporary – five months)	Summer 2014	0.10 (0.25)	1:1	0.10 (0.25)	Humboldt Bay	Immediately following disturbance – Fall 2014	Restoration: Restore to as close as possible to pre-project conditions

Affected habitat type, location, and duration	Anticipated impact timing	Affected area ha (ac)	Proposed mitigation ratio	Affected area times ratio ha (ac)	Mitigation location (Figure 5)	Anticipated mitigation timing	Mitigation action
Eelgrass – intake canal (temporary – five months)	2018 or sooner[1]	0.03 (0.07)	4:1	0.12 (0.30)	Intake canal/ Alpha Road parking area	Immediately following disturbance – 2018 or sooner[1]	Restoration: Plant 0.12 ha (0.30 ac) of eelgrass in the intake canal; creation of 0.04 ha (0.10 ac) of unplanted eelgrass habitat
Eelgrass – discharge canal (permanent)	Spring 2014	0.008 (0.019)	4:1	0.03 (0.08)	Intake canal/ Alpha Road parking area	2018 or sooner[1]	Restoration: Plant an additional 0.03 ha (0.08 ac) of eelgrass in the intake canal; creation of 0.04 ha (0.10 ac) of unplanted eelgrass habitat
Waters of the U.S. – discharge canal surface water (permanent)	Spring 2014	0.32 (0.78)	1:1	0.32 (0.79)	Intake canal/ Alpha Road parking area	2018 or sooner[1]	Creation: Create deep water, northern coastal salt marsh, mudflat, and eelgrass habitat connected to the intake canal
Temporary impacts and temporal loss of wetlands, waters, and eelgrass – intake and discharge canal, discharge canal wetlands, and Humboldt Bay coffer dam area surface waters (temporary impacts and temporal loss)	Spring 2014	0.76 (1.88)	3.3:1	2.51 (6.20)	Buhne Slough Salt Marsh	Immediately following disturbance – Summer 2014	Enhancement: Implement an invasive *Spartina densiflora* (denseflower cordgrass) eradication program

[1] Depending on the parking needs during decommissioning, construction timing, and permitting, the intake canal and Alpha Road parking area mitigation site could begin construction prior to the end of decommissioning.

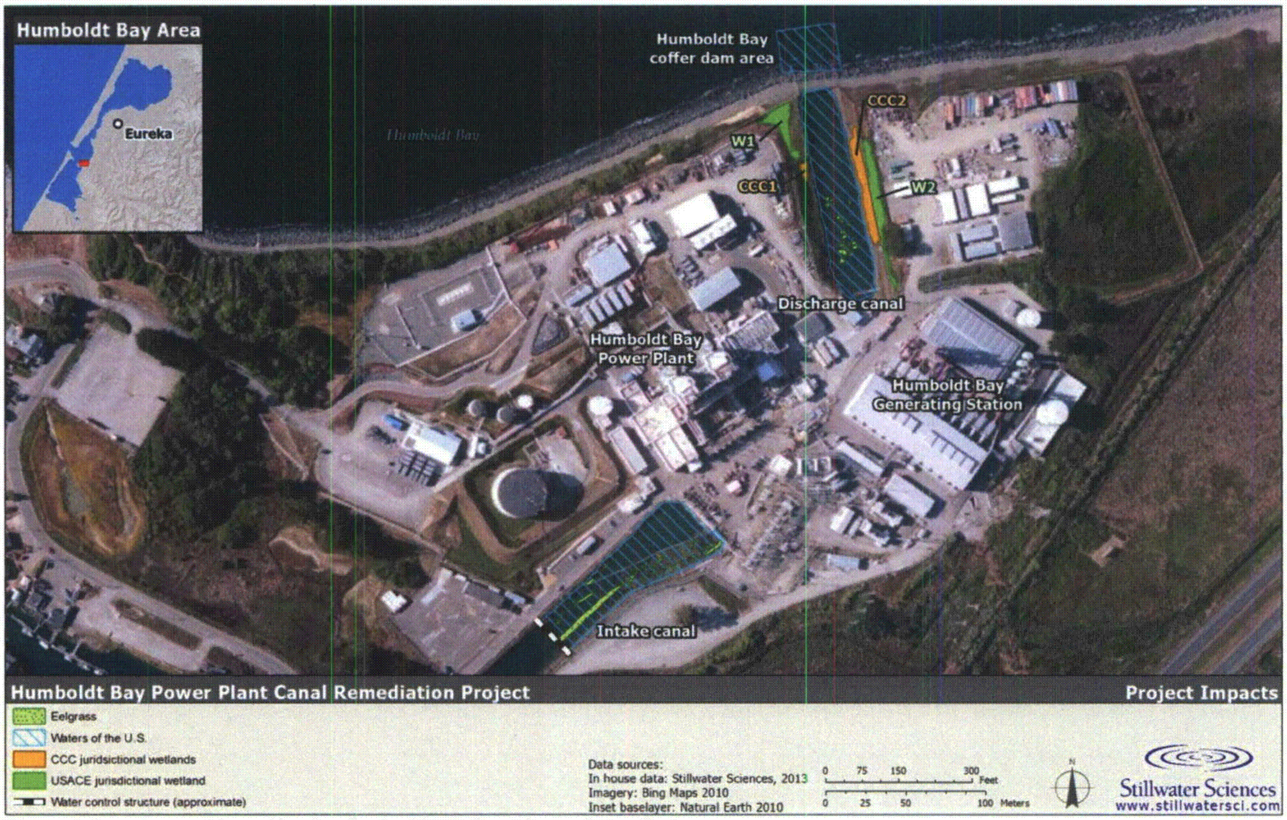

Figure 4. Impacts requiring mitigation for the HBPP Canal Remediation Project.

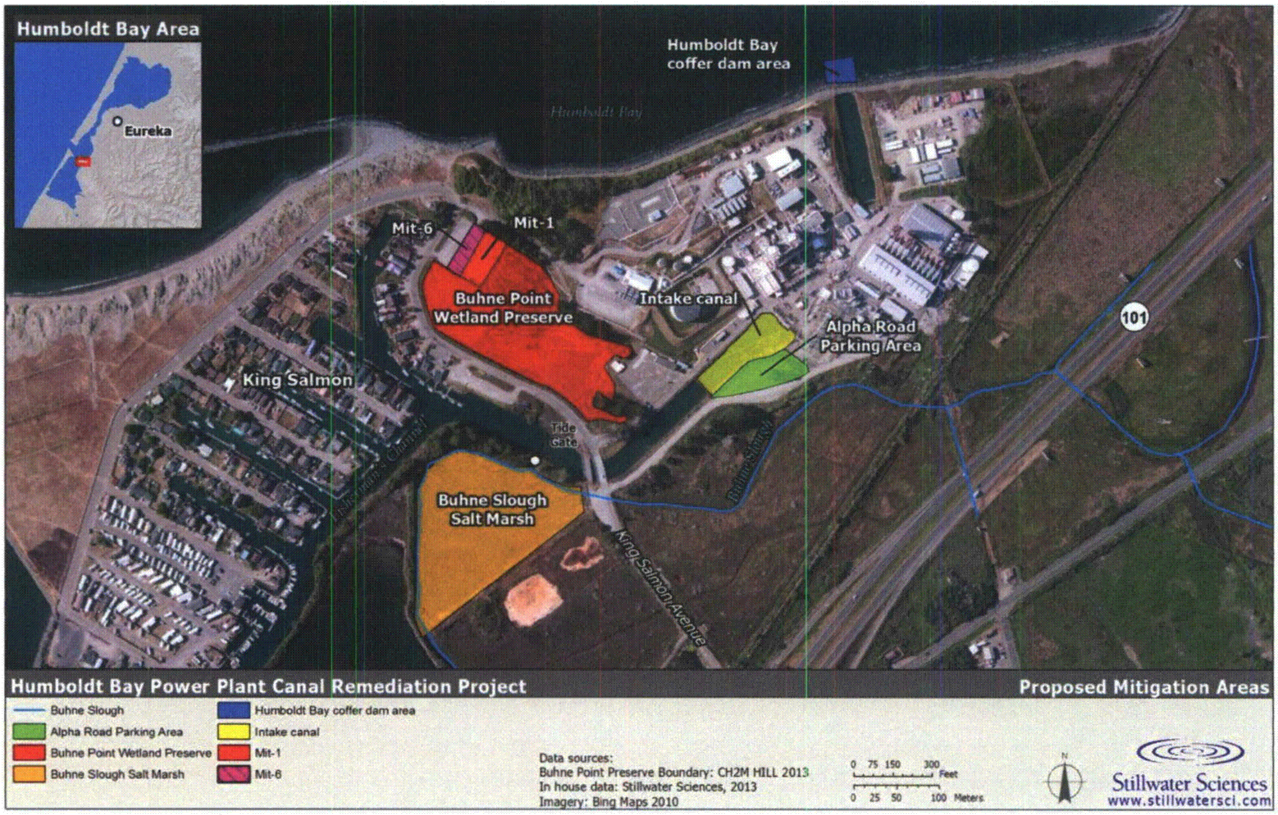

Figure 5. Potential mitigation locations at the Humboldt Bay Power Plant and adjacent PG&E-owned properties.

Seasonal wetlands adjacent to the discharge canal will be subject to permanent impacts from the Project. Wetlands in this area that are under the jurisdiction of the United States Army Corps of Engineers (USACE) total 0.14 ha (0.06 ac) (areas W1 and W2 on Figure 4). Wetlands in this area solely under the jurisdiction of the California Coastal Commission (CCC) total an additional 0.04 ha (0.10 ac) (areas CCC1 and CCC2 on Figure 4). Impacts will occur during the dredging work and/or when the bank revetment (i.e., riprap) is removed from the sides of the discharge canal. In order to remove the riprap and re-grade the sides of the discharge canal to a gentle, stable slope, these wetlands will likely be permanently impacted.

The wetlands adjacent to the discharge canal that will be impacted by Project activities are of relatively low ecological value compared with other depressional wetlands in the Humboldt Bay area. These wetlands are small, isolated, surrounded by development, and provide low-quality habitat for wildlife. A CRAM evaluation was conducted for the USACE jurisdictional wetland on the west side of the discharge canal (W2 on Figure 4) and it scored a 66. Other depressional wetlands assessed in Humboldt County had an average CRAM score of 81 (n=5) (www.ecoatlas.org). This low score for the wetland adjacent to the discharge canal was primarily a result of the wetland's small size, narrow buffer area, altered hydrology, and low structural and topographic complexity.

There will be a permanent loss of 0.008 ha (0.019 ac) of eelgrass habitat in the discharge canal as a result of Project activities (Figure 4). This area is based on an eelgrass survey conducted by Stillwater Sciences in July 2013 (Stillwater Sciences 2013). Another eelgrass survey will be conducted within 30 days before the start of disturbance. If the area of eelgrass to be impacted has increased, the eelgrass mitigation amounts will be modified accordingly. No loss of eelgrass habitat is anticipated on the Humboldt Bay side of the coastal levee as a result of the outfall pipe removal because high wave and tidal action in that area already prohibits eelgrass establishment.

1.3 Impacts on Special-status Species

1.3.1 Intake canal

As stated above, approximately 0.37 ha (0.90 ac) of waters of the U.S. in the intake canal are likely to be directly impacted by project activities (Figure 4). Although fish surveys have not been conducted, these waters may be occupied by special-status fish species including Chinook and coho salmon, steelhead, eulachon, longfin smelt, green sturgeon, and tidewater goby. The project has the potential to impact these species and designated critical habitat of federally listed species.

The potential take of listed species would result from the dewatering of the excavation area and the removal of contaminated sediment. Take of designated critical habitat would result from the removal of eelgrass (as described above), which provides valuable rearing areas for juvenile and adult fish species.

It is expected that given the low quality and quantity of habitat present in the construction area, relatively few individuals of these species are present. In addition, as stated in Section 1.1.1.1, it is expected that juveniles or yearling longfin smelt would most likely be the only life stages of this species present. It is also expected that the other special-status fish species will respond well to the fish rescue and relocation activities.

1.3.2 Discharge canal

As stated above, 0.32 ha (0.78 ac) of Waters of the U.S. in the discharge canal will be permanently impacted (Figure 4). Similar to the intake canal, these waters may be occupied by special-status fish species; however, with the exception of tidewater goby, the potential for occupancy is relatively low. This is due to the restricted connection to Humboldt Bay through four nearly plugged culverts. Nonetheless, the project has the potential to impact these species and designated critical habitat of federally listed species.

The potential take of listed species would result from the dewatering of the excavation area and the removal of contaminated sediment. Take of designated critical habitat would result from the removal of eelgrass (as described above), which provides valuable rearing areas for juvenile and adult fish species.

Northern red-legged frogs (California species of special concern) may be seasonally present in the USACE jurisdictional wetland W2 (Figure 4). This species may be impacted during the excavation and grading activities associated with the proposed discharge canal operations.

1.3.3 Humboldt Bay coffer dam area

As stated above, up to 0.10 ha (0.25 ac) of Waters of the U.S. in Humboldt Bay will be temporarily impacted during the dismantling of the coastal trail levee and removal of the discharge canal outfall structure (Figure 4). With the exception of tidewater goby, this area has the potential to be occupied by special-status fish species. However, the heavy wave action and lack of eelgrass habitat reduces the likelihood that these species are present.

Potential take of listed species would result from installation of the sheet pile coffer dam installation in the bay and dewatering of the outfall structure work area.

1.4 Permitting and Mitigation Needs

The Project requires a permit under Section 404 of the Clean Water Act from the USACE, Section 401 Water Quality Certification from the Regional Water Quality Control Board (RWQCB), a Coastal Development Permit from the CCC, and a development permit from the Humboldt Bay Harbor, Recreation, and Conservation District. The Project is also subject to regulation under the California Environmental Quality Act (CEQA), National Environmental Policy Act (NEPA), and the state and federal Endangered Species Acts. The Humboldt Bay Harbor, Recreation, and Conservation District will act as lead agency for CEQA and the USACE is lead agency for NEPA. A draft IS/MND was developed in August 2013 (CH2M HILL 2013). Mitigation requirements outlined in the draft IS/MND include the following:

1. Permanent and temporary impacts on Waters and Wetlands affected by Project activities would be mitigated by restoring or creating additional Waters of the U.S. or jurisdictional wetlands in a ratio to be determined through consultation with the appropriate agencies.
2. Permanent and temporary impacts on the northern coastal salt marsh affected by Project activities would be mitigated for as part of the wetland mitigation for the Project.

3. Permanent and temporary impacts on the eelgrass habitat affected by Project activities would be mitigated for by restoring or creating additional eelgrass beds in a ratio that will be determined through consultation with the appropriate agencies.
4. Risk of impacts on special-status species would be reduced by the implementation of the rescue and relocation plan (Section 1.1.1), as well as items 1–3 above.

Mitigation for permanent and temporary impacts on the northern coastal salt marsh affected by Project activities will be incorporated into the wetland mitigation for the Project and are not discussed further as separate items in this report. PG&E will be responsible for implementing this mitigation plan including the monitoring and reporting program, maintenance during the monitoring period, and any remedial action(s) determined necessary to achieve performance criteria.

1.4.1 Proposed mitigation ratios

The acreage of various types of wetlands and waters affected by the Project and the proposed mitigation ratios for these impacts are summarized in Table 1. Mitigation requirements have not been finalized for this Project; this will happen in consultation with appropriate agencies. Once the exact ratio and mitigation requirements have been finalized, this mitigation and monitoring plan will be revised accordingly. The implementation of each mitigation area will begin as soon as the Project schedule allows. Table 1 indicates the anticipated timing of performing each mitigation action. Monitoring in each mitigation area will begin as soon as the mitigation action is complete.

The mitigation measures for the intake and discharge canals described above will be implemented in conjunction with constructing the Alpha Road parking mitigation area (Section 2.2) and will result in development of deep water, mudflat, and eelgrass habitat in the intake canal within a year and a half of excavation. This would result in a 13.5:1 mitigation to impact ratio for potential take of special-status fish species and their habitat (i.e., juvenile salmonids, rockfish, longfin smelt, and tidewater goby).

Mitigation ratios are not established for the potential impacts on individuals of listed species because the number that may actually be affected is unknown at this time. Mitigation ratios for impacts on designated critical habitat, eelgrass, and Waters of the U.S. are the same as those described in Table 1.

1.4.2 Sea level rise

The Humboldt Bay area is and will continue to be affected by sea level rise. The CCC has taken steps to incorporate considerations of sea level rise its Coastal Development Permit process and has recently issued guidance on doing so (CCC 2013). In California north of Cape Mendocino, the rate of sea level rise over the next 100 years is expected to range from 10 to 143 cm (0.3 to 4.69 feet) (National Research Council 2012). Locally in the Humboldt Bay/Eel River estuary area, however, subsidence counteracts the effects of tectonic uplift that are occurring elsewhere north of Cape Mendocino. The CCC's guidance document recommends replacing the estimates of tectonic uplift that apply in this region with a local sea level rise factor for the Humboldt Bay area of 4.14 mm/year.

The CCC draft sea-level rise policy guidance document (CCC 2013) was used to estimate the amount of sea-level rise that may occur in the project area so that the effects could be evaluated for the proposed mitigation areas. The projected sea-level rise in Humboldt Bay by 2030 and 2050 was calculated using the sea-level rise rates and formulas in the guidance document (CCC 2013) for north of Cape Mendocino and then adjusting for Humboldt Bay subsidence per CCC (2013) by subtracting the North of Cape Mendocino factor and then adding the Humboldt Bay subsidence-per-year factor times the number of years (Table 2). The mitigation areas for this project were designed with sea-level rise in mind and are expected to be able to withstand the predicted changes. The impacts of sea-level rise on each mitigation area are described in more detail below.

Table 2. Projected sea-level rise[1] in Humboldt Bay, per CCC 2013

Projection	2030		2050	
	cm	in	cm	in
Low range	5.6	2.2	12.7	5.0
Projected	9.9	3.9	21.8	8.6
High range[2]	31.8	12.5	63.0	24.8

[1] Adjusted for Humboldt Bay subsidence per CCC (2013) by subtracting the North of Cape Mendocino factor and then adding the Humboldt Bay subsidence-per-year factor times the number of years.

[2] The high range was used for evaluating the impact of sea-level rise on the mitigation areas.

2 PROPOSED WETLAND MITIGATION

PG&E proposes to fulfill the wetland mitigation requirements outlined in items 1 and 2 in Section 1.4 by restoring, creating, and/or enhancing wetland habitat on the HBPP property and/or on adjacent lands owned by PG&E (Figure 5). Restoration is defined as returning the impacted area as close as possible to pre-construction (current) conditions. Enhancement involves changing the quality of wetland (e.g., removing invasive plant species). Enhancement is often used to mitigate for temporary disturbances to wetlands (in addition to restoring the impacted areas) or for a temporal lag between impacts and mitigation ("temporal loss"). Creation is making a new wetland in an upland area. Creation of new wetland habitat is typically required as mitigation for permanent impacts. Each proposed mitigation area is described below.

2.1 Intake Canal

The disturbance to Waters of the U.S. in the intake canal (Figure 5) will last approximately five months and will impact an area of approximately 0.37 ha (0.90 ac) (the area located behind the water control structure). The intake canal will be restored to as close to the current conditions as possible. When the intake structure headwall is removed and the canal re-sloped, it may create new salt marsh/edge habitat, which could improve habitat complexity and structure. The size and shape of the intake canal may change based on the final configuration of the shore where the intake structure headwall is currently located (i.e., there could be a potential increase in the size of the Waters of the U.S. in the intake canal).

The mitigation actions of restoring and creating eelgrass, mudflat, and deep water habitat described below represent the intake canal portion of the mitigation for excavation-related impacts on these habitat features and special-status fish species, including coho salmon and longfin smelt. The Alpha Road parking mitigation area (the other portion of the mitigation) is described below in Section 2.2. Work in both the intake canal and Alpha Road Parking area will occur simultaneously in 2018 or earlier.

2.1.1 Existing ecological conditions

Currently, the intake canal is a narrow tidal channel with steep muddy banks that are exposed at low tide, and deeper subtidal habitats (up to -3 m [-10 ft]) in the center of the channel that remain inundated even at extreme low tides (Figures 6 and 8). Eelgrass is a species of submerged aquatic plant that grows in patches along the edges of the canal and in some shallower locations towards the center of the canal (Figures 6 and 7). There is currently approximately 0.03 ha (0.07 ac) of eelgrass within the proposed intake canal work area. The substrate within which it grows is composed primarily of bay mud. The banks of the intake canal contain a narrow band of northern coastal salt marsh at or near the high-high tide line (Figure 8). As described in Section 1.2.1, the intake canal wetland including the saltmarsh on the western edge received a CRAM index score of 61 due to the wetland's low structural and topographic complexity, altered hydrology, narrow buffer area, moderately impacted buffer condition, and presence of invasive plant species. The northern end of the canal contains the intake structure headwall, which is a large vertical concrete wall that provides no floral or faunal habitat.

Until the once-through-cooling system associated with the operation of the HBPP was shut down in 2010, the intake canal had significant amounts of water drawn through the intake structure at the head of the canal. The intake canal is sheltered from high wind and wave action, and is only influenced by an unmuted tidal connection to Humboldt Bay.

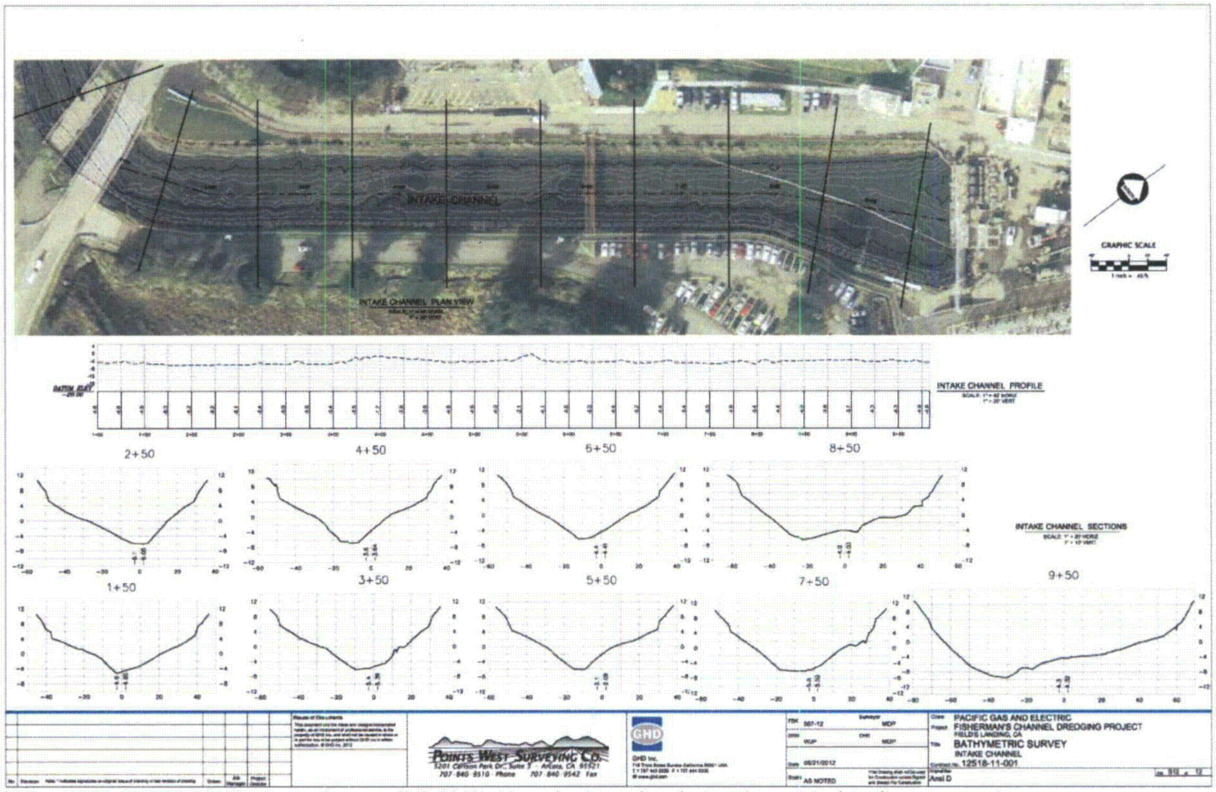

Figure 6. Intake canal bathymetry (Source: GHD 2013). Note: horizontal scale is twice vertical in the cross-sections.

Figure 7. Eelgrass with the potential to be impacted in the intake canal.

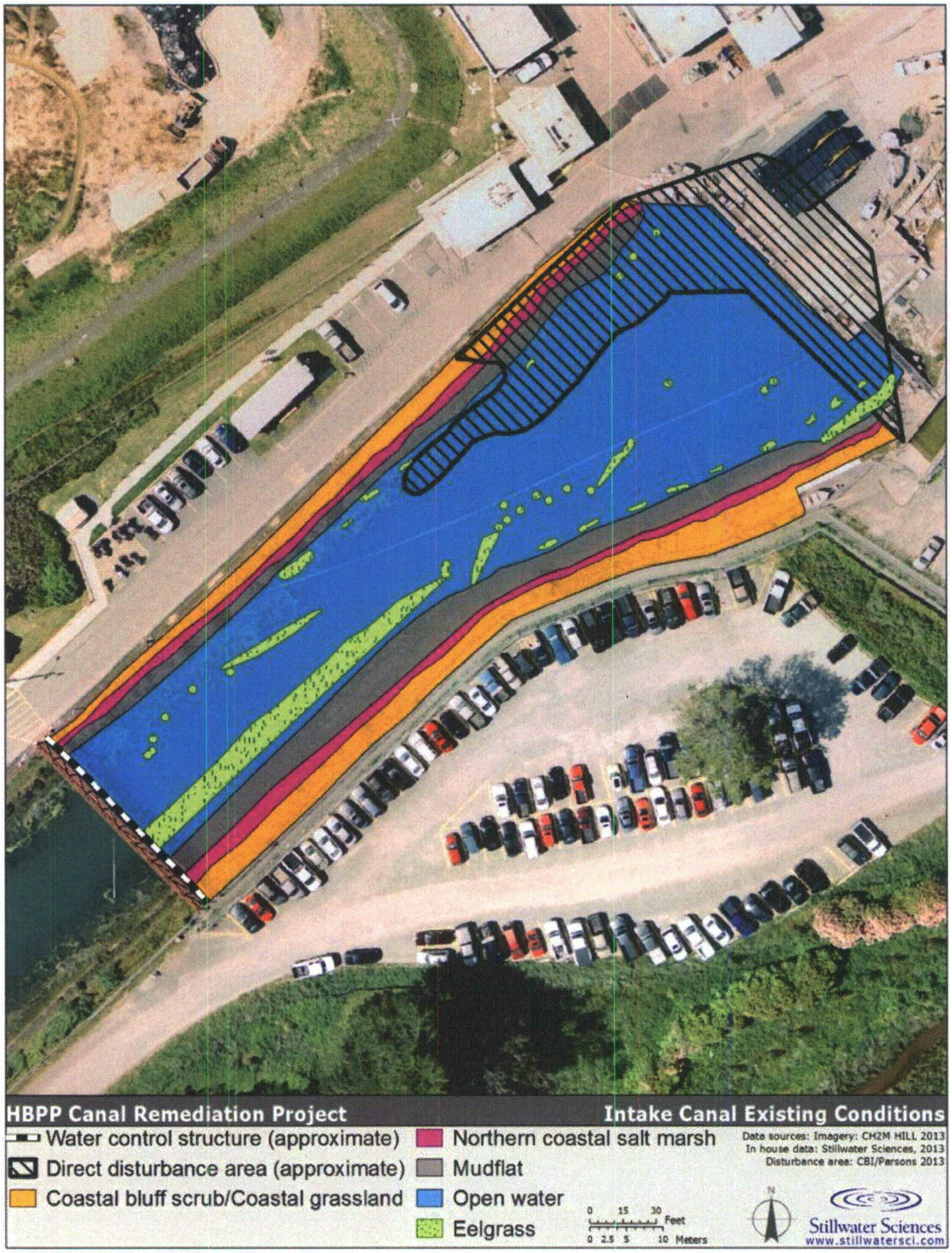

Figure 8. Existing habitat conditions and approximate area of direct disturbance in the intake canal.

2.1.2 Mitigation goals and performance criteria

The goal for mitigation in the intake canal is to restore the impacted Waters of the U.S. to existing or better than existing conditions in the intake canal by creating salt marsh habitat in the emergent portion (above the high water line) and eelgrass habitat in the 1–3 m depth range of the sub-tidal areas . This would also restore the impacted eelgrass habitat in the intake canal and mitigate for the permanent loss of eelgrass in the discharge canal. This section describes the restoration of the intake canal for impacts to Waters of the U.S. Eelgrass mitigation is described in Section 3.

The proposed design for restoring the intake canal would create northern coastal salt marsh, northern coastal bluff scrub/coastal grassland, and eelgrass habitat. The mitigation work in the intake canal will be done in conjunction with the Alpha Road parking mitigation area and the acreages are described below in Section 2.2. The design is preliminary and will need to be reconciled with the decommissioning needs of the project.

The intake canal restoration area will be considered successful and self-sustaining when cover of native wetland plants (facultative [FAC], facultative wetland [FACW], or obligate [OBL][2]) in the non-tidal areas exceeds 80% for two successive years. Annual performance criteria are summarized in Table 3. If these criteria are not met and it appears over time that the final success criteria will not be achieved, remedial action (e.g., additional planting, invasive plant species removal) will be discussed with the permitting agencies and implemented.

Table 3. Annual performance objectives for wetland restoration/creation.

	Survival	Absolute percent cover of native vegetation
Year 1	90%	25%
Year 2	85%	40–50%
Years 3–4	80%	80%
Year 5	N/A	80%

This design is expected to fully mitigate impacts on listed fish species by significantly increasing the quantity and quality of eelgrass and wetland habitats on which these species depend. It is expected that the increase in eelgrass habitat will result in improved survival rates of these species, which would further population recovery goals.

2.1.3 Mitigation implementation

2.1.3.1 Conceptual design

The intake canal will be re-sloped and stabilized as needed following removal of the contaminated sediment and intake structure headwall and prior to removal of the water control structure. Although the engineering plans have not yet been created, the conceptual design of the intake canal is shown in Figure 9 and below in Section 2.2. Detailed engineering plans will be

[2] FAC: Facultative wetland plants - Occur in wetlands and non-wetlands (Lichvar et al. 2012).
FACW: Facultative wetland plants - Usually occur in wetlands, but may occur in non-wetlands (Lichvar et al. 2012).
OBL: Obligate wetland plants - almost always occur in wetlands (Lichvar et al. 2012).
NL – UPL: Not listed – upland plants; any species not listed in this publication it is considered an upland plant - almost never occur in wetlands (Lichvar et al. 2012).

completed prior to implementation. The slope will be designed such that it can withstand daily changes in tidal elevation and support the infrastructure adjacent to the canal (e.g., Bravo Road, 60 kV switchyard). It is estimated that up to 1,500 m^3 (2,000 yd^3) of fill will be needed to achieve the desired elevations for portions of the restored area. Environmentally clean fill will be procured either on-site or from an appropriate source.

2.1.3.2 Comprehensive Vegetation Specifications

The emergent portions on the upper banks of the intake canal will be planted with native northern coastal salt marsh vegetation (Table 4) at or near the level of existing salt marsh (i.e., high tide). Any areas that were disturbed above the level of salt marsh will be replanted with coastal grassland or northern coastal bluff scrub species, as appropriate. Plantings will be at a density of one plant per square foot. The plants will be procured and installed by a qualified contractor. As much as possible, local plant stock collected from Humboldt Bay that are growing under similar ecological conditions (e.g., soils, depth to groundwater) will be used. Sub-tidal areas at the appropriate elevation will be planted with eelgrass as described in Section 3.

Table 4. Suggested native plant species for the intake canal and Alpha Road parking mitigation areas.

Scientific name	Common name	Wetland indicator[1]
Salt marsh		
Salicornia pacifica	Pacific pickleweed	OBL
Distichlis spicata	salt grass	FACW
Triglochin maritima	common arrow-grass	OBL
Juncus lesueurii	San Francisco rush	FACW
Coastal grassland		
Carex praegracilis	clustered field sedge	FACW
Carex obnupta	slough sedge	OBL
Deschampsia cespitosa	tufted hair grass	FACW
Juncus lesueurii	San Francisco rush	FACW
Juncus effusus	soft rush	FACW
Symphyotrichum chilense	Pacific aster	FAC
Hordeum brachyantherum	meadow barley	FACW
Coastal bluff scrub		
Baccharis pilularis	coyote brush	NL - UPL
Salix hookeriana	dune willow	FACW
Lonicera involucrata	twinberry	FAC
Polystichum munitum	western swordfern	FACU
Rubus ursinus	California blackberry	FACU
Morella californica	wax myrtle	FACW
Pinus contorta ssp. *contorta*	shore pine	NL - UPL

[1] Lichvar (2013);
FAC: Facultative wetland plants - Occur in wetlands and non-wetlands (Lichvar et al. 2012).
FACW: Facultative wetland plants - Usually occur in wetlands, but may occur in non-wetlands (Lichvar et al. 2012).
OBL: Obligate wetland plants - almost always occur in wetlands (Lichvar et al. 2012).
NL – UPL: Not listed – upland plants; any species not listed in this publication it is considered an upland plant - almost never occur in wetlands (Lichvar et al. 2012).

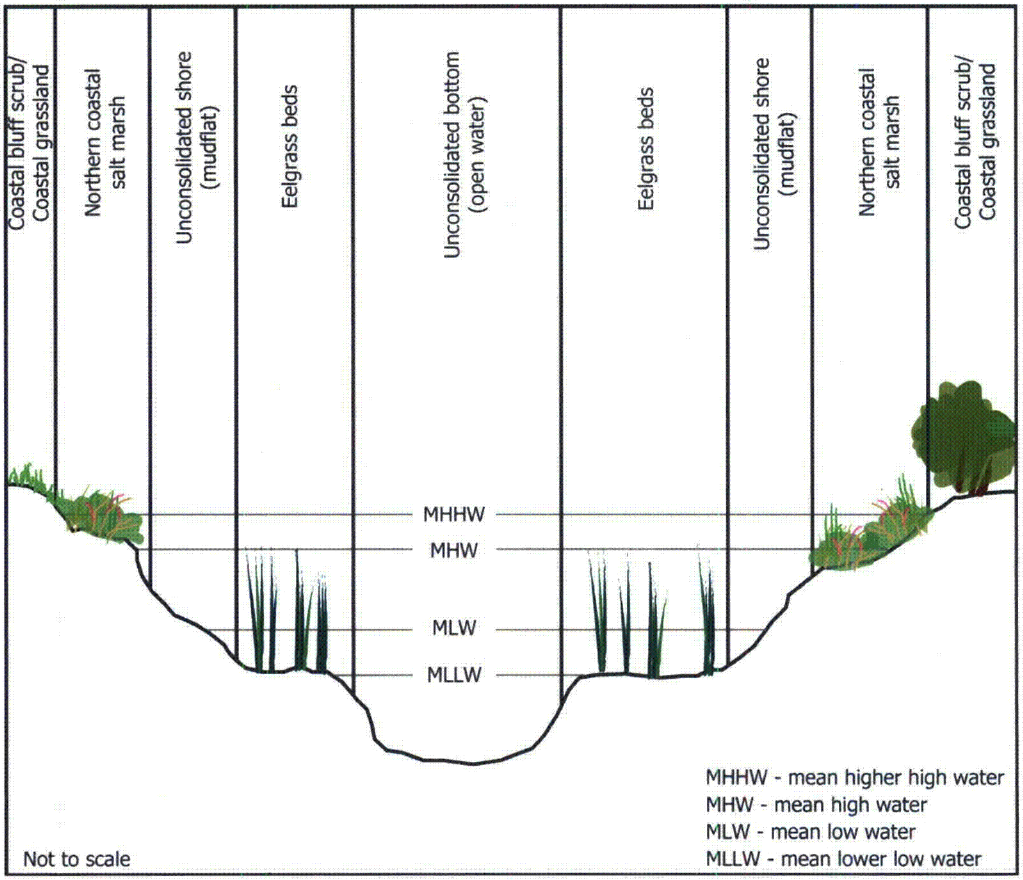

Figure 9. Proposed conceptual restoration in the intake canal (cross section; not to scale).

Plant protectors will not be installed at the outset. If herbivory damage is noted during annual monitoring and is found to be impacting seedling success to the extent that performance standards may not be attained, then plant protectors will be installed. The proposed restoration area will be inundated by high tides from the intake canal; therefore, irrigation will not be needed for newly planted vegetation.

2.1.3.3 Monitoring

This mitigation area will be monitored annually to evaluate vegetation establishment, re-vegetation success, and native and non-native plant recruitment. Monitoring will occur during the late spring or early summer so that it is coincident with the flowering periods of most herbaceous plant species to facilitate accurate species identification and precise assessments of percent vegetation cover. Sample plots or transects will be used to estimate the total plant cover and cover of the individual plant species. Total cover, percent cover by species, percent hydrophytic vegetation, and percent native versus non-native vegetation will calculated, averaged across all plots, and compared with the annual performance objectives (Table 3). To illustrate site changes over time, photographs will be taken annually at set photopoint locations established throughout the mitigation area.

2.1.3.4 Maintenance

Annual monitoring will note any invasive plant species that should be removed from the area and any plants that are not establishing, and indicate where remedial action is needed. Maintenance activities will be directed as needed based on the results of the annual monitoring.

2.1.3.5 Expectation of success

Most of the area will be restored to conditions that occurred at this location just prior to disturbance. The restoration is designed to simulate and expand upon existing conditions that occur in self-sustaining habitat. It is anticipated to be successful because it has been demonstrated that these communities exist in these location (as evidenced by the current patterns of vegetation). The restored area will connect hydrologically to the intake canal; therefore, newly planted wetland vegetation is expected to readily establish. Annual monitoring and maintenance will track the growth and establishment of the vegetation. If it appears over time that the final success criteria will not be achieved, remedial action (e.g., additional planting, invasive plant species removal) will be discussed with the permitting agencies and implemented.

2.1.4 Sea-level rise

The intake canal and Alpha Road mitigation areas have been designed with continuous gradients along the shoreline that will support a gradation of habitat types from deep water to upper saltmarsh and bluff scrub. Species composition and habitat types in the mitigation area may slowly shift up-gradient with the change in average water level, but the mitigation area does not include submerged areas of low or flat gradient that could be abruptly altered by significant shifts in water surface elevation as a result of sea level rise. This is true for both the 2030 projected high-range increase in sea level of 31.8 cm (12.5 in) and the 2050 projected rates of 63.0 cm (24.8 in).

In the intake canal and Alpha Road mitigation areas, eelgrass planting areas have been designed at the mid-range of eelgrass growth range and will slope up at the upper ranges to areas of bare mudflat. An increase in sea level would either cause a shift of the eelgrass beds towards the higher elevation mudflat areas or an increase in the size of the eelgrass beds with little or no loss of eelgrass at the lower elevations. The lower elevations of the salt marsh portions of the mitigation area may transition to bare mudflat, but this would likely be accompanied by corresponding upward shift in salt marsh elevation. It is also expected that the lower elevation coastal grassland/bluff scrub would transition to salt marsh.

The steep banks along the longitudinal sides of the intake canal mitigation area may see a more dramatic shift in species composition than the Alpha road parking mitigation area, which has been designed with larger, wider zones of contiguous sub-tidal and intertidal habitat and salt marsh.

Therefore, sea level rise would not have a significant effect on the intake canal and Alpha Road mitigation areas or significantly reduce the habitat functions and values resulting from their creation.

2.2 Alpha Road Parking Area

The Alpha Road parking area (Figure 5) is currently being used for primarily for decommissioning worker parking and contains a walking path between the pedestrian bridge across the intake canal and the decommissioning work areas. Following the HBPP decommissioning process a new parking lot for HBGS employees is planned in the area currently occupied by Units 1, 2, and 3. Once this new parking lot is approved and constructed or decommissioning staffing levels drop to where worker parking can be accommodated in other areas, the Alpha Road parking area will no longer be needed and this area will be converted into a wetland mitigation area. The conversion of the parking area to wetland will occur simultaneously with the excavation and mitigation of the intake canal (Section 2.1).

The Alpha Road parking area was originally permitted by the California Energy Commission (CEC) as part of the HBGS project. However, it was then included under Coastal Development Permit E-09-010 issued by the CCC for HBPP decommissioning, enabling it to be used by decommissioning personnel. Both the CEC and Coastal Commission required that the area be restored to pre-project conditions. However, in PG&E's HBGS Restoration Plan approved by the CEC, it stated that restoration of the parking area would occur once HBPP decommissioning is complete and that it would be restored as part of HBPP decommissioning site restoration activities governed by the Coastal Commission. The wetland creation within the Alpha Road parking area will meet the restoration obligation for the parking area. PG&E nevertheless will inform the CEC on the restoration of the Alpha Road parking area, as well as other areas that were previously approved by the CEC for HBGS and are now used for HBPP decommissioning.

2.2.1 Existing ecological conditions

The Alpha Road parking area currently consists of a gravel parking area, employee walkway along the intake canal, a narrow band of salt marsh and scrub habitat on the upper banks of the intake canal, a drainage ditch wetland on the north end of the parking are, and one large tree (shore pine [*Pinus contorta* ssp. *contorta*]; >12 in [30 cm] dbh) in the middle of the parking area. The Alpha Road parking area is bounded on the south and east by Alpha Road. The current elevation of the Alpha Road parking area is approximately 4 m (13 ft) above mean sea level. Prior to the creation of a parking area in this location, the area was an upland area consisting of managed grassland vegetation (CEC Docket 06-AFC-07).

2.2.2 Mitigation goals and performance criteria

The mitigation measures described below for the Alpha Road parking area will be implemented in conjunction with the intake canal remediation and mitigation. The goal for creating a mitigation area in the Alpha Road parking area is to create a wetland that is tidally connected to the intake channel and would therefore be considered Waters of the U.S. The habitat would include the creation of salt marsh habitat along the upper elevations and eelgrass habitat in the sub-tidal areas of approximately 1–3 m below sea level. Eelgrass mitigation is described in Section 3.

The proposed design for the intake canal and Alpha Road parking mitigation areas would create up to 0.58 ha (1.45 ac) of habitat that is connected to the intake canal and enhance an additional 0.19 ha (0.46 ac) of existing habitat (Table 5; Figure 10). Of the 0.58 ha (1.45 ac) of created habitat, 0.35 ha (0.87 ac) of eelgrass (planted and unplanted), mudflat, deep water, and reef habitat would be created in the intake canal and Alpha Road parking mitigation areas which would directly benefit special-status fish species, including coho salmon and longfin smelt. This would fully mitigate for the loss of 0.038 ha (0.089 ac) of eelgrass habitat in the intake and discharge canal from sediment excavation. The designs for these mitigation areas are preliminary at this point and will need to be reconciled with the engineering needs of the project.

Table 5. Habitats created and enhanced in the combined Intake Canal/Alpha Road parking mitigation areas.

Habitat type	Wetland creation		Wetland enhancement		Total	
	ha	ac	ha	ac	ha	ac
Waters of the U.S.[1]	0.30	0.74	0.37	0.90	0.67	1.64
Coastal bluff scrub/Coastal grassland	0.06	0.15	0.01	0.04	0.07	0.18
Eelgrass planted	0.15	0.38	-	-	0.15	0.38
Eelgrass unplanted habitat	0.08	0.19	-	-	0.08	0.19
Mudflat	0.09	0.22	0.01	0.03	0.10	0.25
Northern coastal salt marsh	0.17	0.43	0.01	0.02	0.18	0.45
Deep water	0.03	0.07	0.15	0.37	0.18	0.44
Reef habitat	<0.01	0.01	-	-	<0.01	0.01
Grand Total	0.58	1.45	0.19	0.46	0.77	1.90

[1] The Waters of the U.S. that will be created in the intake canal and Alpha Road parking mitigation areas is composed of the following habitats: coastal bluff scrub/coastal grassland, eelgrass (planted and unplanted habitat), mudflat, northern coastal salt marsh, deep water, and reef habitat.

The Alpha Road parking area will be considered successful and self-sustaining when the percent of cover of the native wetland plant species (FAC, FACW, or OBL) in the non-tidal areas exceeds 80% for two successive years. Annual performance criteria are summarized in Table 3. If these criteria are not met and it appears over time that the final success criteria will not be achieved, remedial action (e.g., additional planting, invasive plant species removal) will be discussed with the permitting agencies and implemented. The sub-tidal eelgrass area performance criteria are identified in Section 3.

2.2.3 Mitigation implementation

2.2.3.1 Conceptual design

The Alpha Road parking mitigation area will be implemented once the area is no longer needed for decommissioning employee parking. The Alpha Road parking area will be converted to upland, wetland, eelgrass, mudflat, and deep water habitat by removing the gravel road surface and grading the ground surface down to the elevations appropriate to create the desired mitigation features. Engineering plans have not yet been created, but the conceptual design is shown in Figures 10 and 11. Detailed engineering plans will be completed prior to implementation. The slope will be designed such that it can withstand daily changes in tidal elevation and support the infrastructure adjacent to the canal (e.g. Alpha Road, 60 kV switchyard). Any clean fill from the removal of the parking area will be re-used on site or taken off-site to an appropriate facility.

The addition of smaller dendritic channels throughout the mitigation area will improve salt marsh ecological function by increasing the amount of margin habitat, which will promote increased habitat complexity. The creation of 0.16 ha (0.38 ac) of eelgrass, mudflat, deep water, and reef habitat will increase the productivity and survival of target species (i.e., juvenile salmonids, rockfish, longfin smelt, tidewater goby, benthic macroinvertebrates, and crustaceans) and fully mitigate for impacts on these species from the proposed excavation and dewatering activities. These kinds of modifications can also increase channel volume, which increases the amount of marine nutrients cycling through the ecosystem. Furthermore, the addition of anchored large wood and native Olympia oyster (*Ostrea lurida*) reef habitat (i.e., rock and shellfish piles) can also increase habitat complexity, physical structure, and provide habitat for juvenile rock fish and other species.

2.2.3.2 Comprehensive Vegetation Specifications

The Alpha Road parking area will be converted to areas of coastal bluff scrub/coastal grassland, salt marsh, eelgrass, mudflat, and deep water habitat and will be planted with native vegetation (Table 4) appropriate for each elevation and the physical conditions. Plantings will be at a density of one plant per square foot. Plants will be procured and installed by a qualified contractor. As much as possible, local plant stock collected from Humboldt Bay and growing under similar ecological conditions (e.g., soils, depth to groundwater) will be used. Sub-tidal areas at the appropriate elevation will be planted with eelgrass as described in Section 3.

2.2.3.3 Monitoring

This mitigation area will be monitored annually to evaluate vegetation establishment, re-vegetation success, and native and non-native plant recruitment. Monitoring will occur during late spring or early summer, which is coincident with the flowering periods of most herbaceous plant species to facilitate accurate species identification and precise assessments of the percent of vegetation and species cover. Sample plots or transects will be used to estimate the total plant cover and cover of individual plant species. Total cover, percent cover by species, percent hydrophytic vegetation, and percent of native versus non-native vegetation will calculated, averaged across all plots, and compared with the annual performance objectives (Table 3). To illustrate site changes over time, photographs will be taken annually at set photopoint locations established throughout the mitigation area.

2.2.3.4 Maintenance

Annual monitoring will note any invasive plant species that should be removed from the area and any plants that are not establishing, and indicate where remedial action is needed. Maintenance activities will be directed as needed based on the results of the annual monitoring.

2.2.3.5 Expectation of success

The wetland creation is anticipated to be successful because the newly created area will be connected hydrologically to the intake canal; therefore, newly planted wetland plants are expected to readily establish and fish and marine invertebrates are expected to rapidly colonize the new habitat. Annual monitoring and maintenance will help track the growth and establishment of the vegetation. If it appears over time that the final success criteria will not be achieved, remedial action (e.g., additional planting, invasive plant species removal) will be discussed with the permitting agencies and implemented.

2.2.4 Sea-level rise

See section 2.1.4 above for a discussion of the effects of sea-level rise on the Alpha Road parking mitigation area.

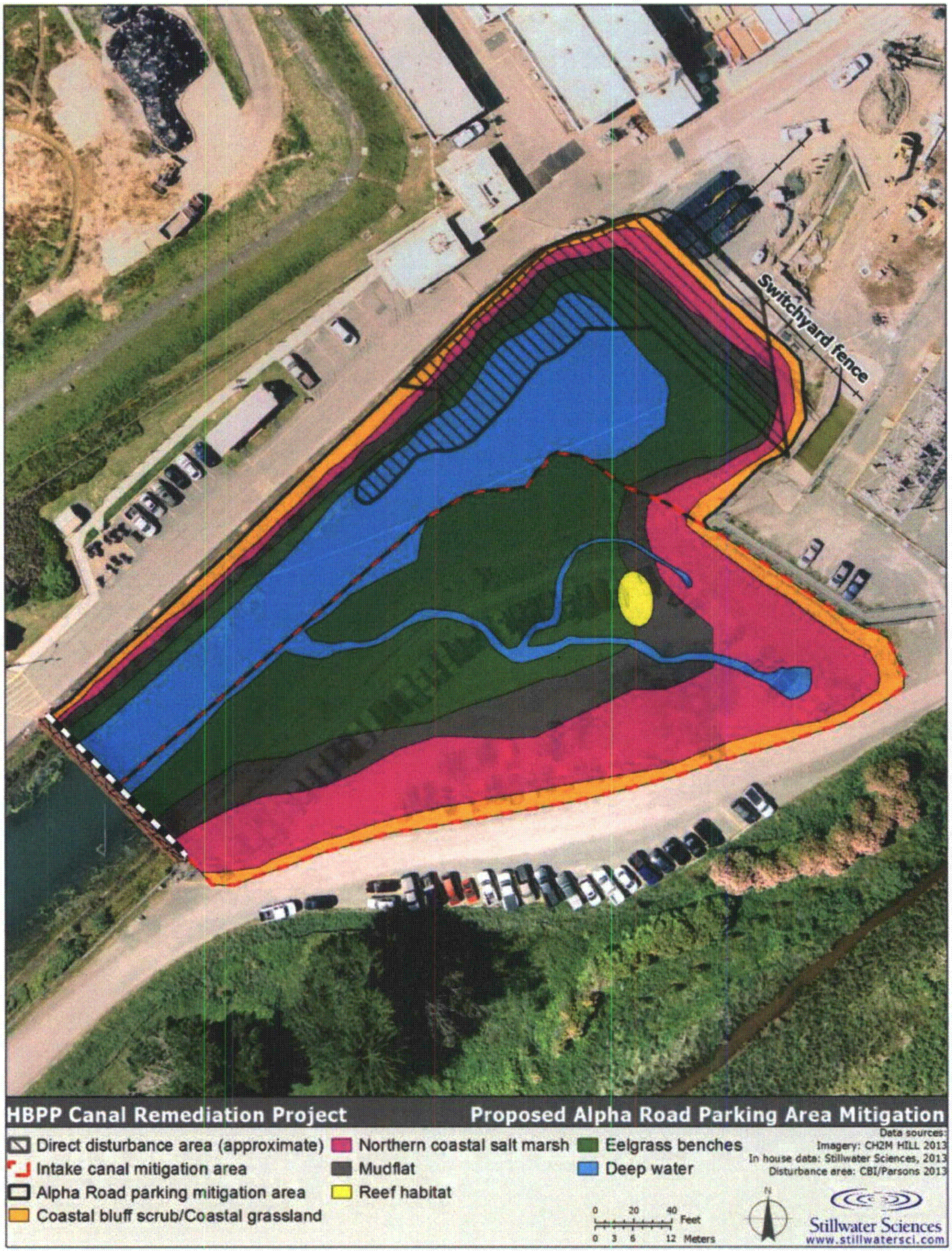

Figure 10. Proposed conceptual mitigation design for the Alpha Road parking area (plan view; shown with proposed intake canal restoration).

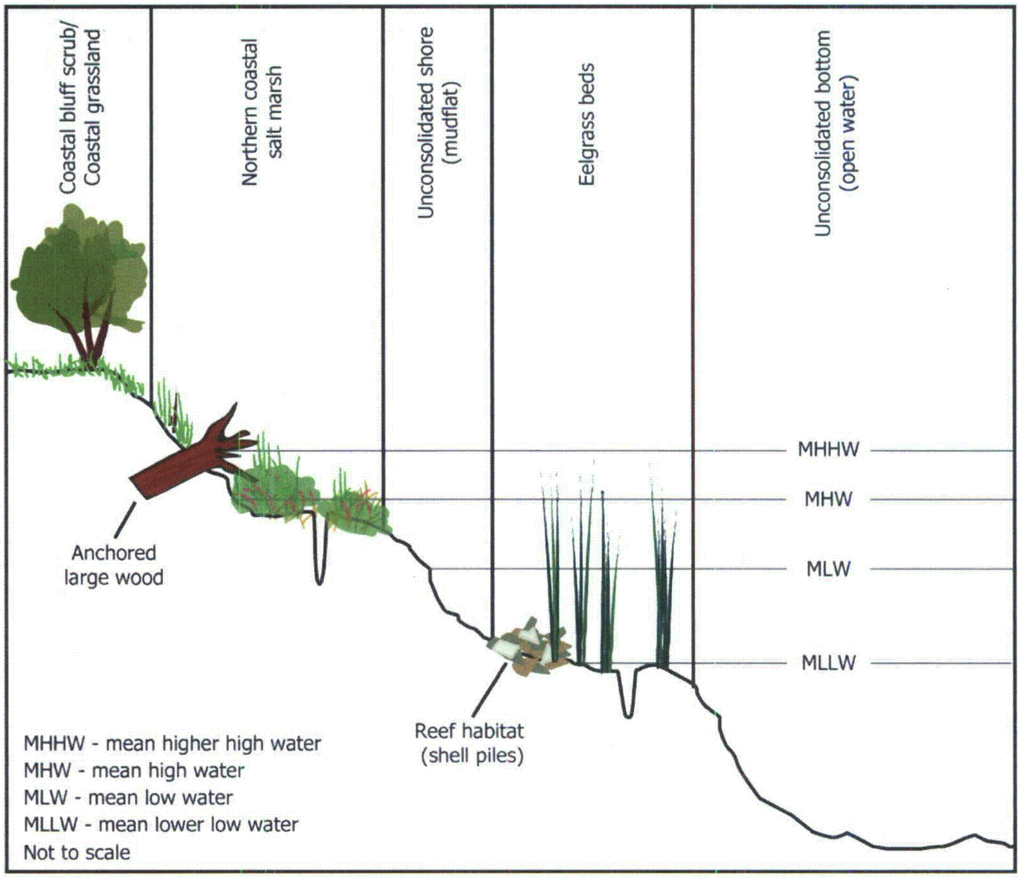

Figure 11. Proposed conceptual mitigation design for the Alpha Road parking area (cross section; not to scale).

2.3 Humboldt Bay Coffer Dam

The disturbance in Humboldt Bay where the coffer dam will be installed (Figure 5) will last approximately five months and will impact 0.10 ha [0.25 ac]. This area experiences heavy wave action, does not have any permanent vegetation, and is expected to return quickly to pre-disturbance conditions.

2.3.1 Existing ecological conditions

The area of potential impact in Humboldt Bay is located across from the mouth of the Bay. It experiences diurnal tides and heavy wave and wind action. The existing shoreline consists of large riprap on the coastal levee, and the substrate is composed of silty bay mud. There is no eelgrass or other permanent vegetation present in this area.

2.3.2 Mitigation goals and performance criteria

Once the outfall pipes have been removed and backfilled, the protective riprap levee will be restored, the coffer dam will be removed, and pre-project conditions along the Bay front will become naturally re-established. There aren't any performance criteria established for this area and therefore it will not be monitored.

2.3.3 Mitigation implementation

No mitigation measures are proposed for this site other than containment of construction-related turbid water behind a turbidity curtain. This site will also be subject to the fish rescue and relocation plan described in Section 1.1.1.3.

2.3.4 Sea-level rise

There is no existing vegetation in this area that could potentially be affected by sea-level rise. The project will restore the Humboldt Bay levee and breakwater to pre-project conditions after removal of the outfall pipes. The Humboldt Bay Shoreline Inventory, Mapping and Sea-Level Rise Vulnerability Assessment (Laird et al. 2013) looked at levee and shoreline conditions and elevations around the entire perimeter of Humboldt Bay. The assessment found that the levees surrounding the HBPP were high enough to withstand sea-level rise of greater than 61 cm (2 ft) (Laird et al. 2013). Therefore, it is believed that the levee in this area will not require reinforcement due to sea level rise in the near-term. If necessary, this work would presumably take place in future decades and be planned based on a comprehensive engineering analysis of the Humboldt Bay levee system.

2.4 Buhne Point Wetlands Preserve

The Buhne Point Wetlands Preserve (Preserve; Figure 12) was established in 2008 to mitigate for impacts on the USACE and CCC wetlands resulting from the construction of the Humboldt Bay Generating Station (HBGS) and several phases of decommissioning of the HBPP. The Preserve consists of 2.467 ha (6.098 ac) of wetland and upland habitat in the western portion of the PG&E property along King Salmon Road (Figure 5). Most of the Preserve has been established for a number of years and is composed of a mosaic of coastal grassland, riparian scrub/forest, and freshwater marsh. Though it is still in its five-year monitoring period, many of the performance standards have been achieved and it is on track to meet most of the remaining performance standards before the end of the monitoring period (Stillwater Sciences and Dains 2013). Mit-1 is scheduled to be created following HBPP decommissioning, when the contractor parking area is no longer needed.

PG&E proposes to create a new mitigation area in the Preserve (Mit-6) as mitigation for impacts to 0.06 ha (0.14 ac) of the USACE jurisdictional wetlands and 0.04 ha (0.10 ac) of the Coastal Commission wetlands located adjacent to the discharge canal. Mit-6 will be designed to effectively increase the size of Mit-1 and therefore be incorporated into the rest of the Preserve (Figure 12). Incorporation into the Preserve would provide higher quality wetland habitat than the smaller, isolated wetlands adjacent to the discharge canal that will be impacted by Project activities. In addition, the development of the freshwater marsh will create suitable breeding, rearing, and dispersal habitat for California red-legged frogs.

2.4.1 Existing ecological conditions

Mit-6 is a 0.11-ha (0.27-ac) site currently occupied by a gravel-surfaced temporary parking area that is located adjacent to the Preserve (Figure 12). The eastern portion of the parking area will become Mit-1 when the HBPP decommissioning is completed. There is no vegetation on the site at this time.

The water for this area is derived entirely from surface water runoff from rainfall, with the greatest precipitation in the winter (November–February) and lowest in the summer (June–September). The average annual amount of precipitation from July 1948 through March 2013 was 100.3 cm (39.5 in) (WRCC 2013).

The soils in the area are overlain by gravel over leveled fill material. The most recent soil survey conducted in this area (McLaughlin and Harradine1965) includes Mit-6 as 'residential, business and industrial area' miscellaneous land type. Subsurface investigations (PG&E 1985, 1987–1989; Woodward-Clyde Consultants 1985) at the HBPP property confirm that the underlying native soil is primarily Hookton silty clay loam, eroded, 3 to 8 percent slope (PG&E 2002) with some areas of Bayside very silty clay loam, very poorly drained, 0 to 3 percent slope.

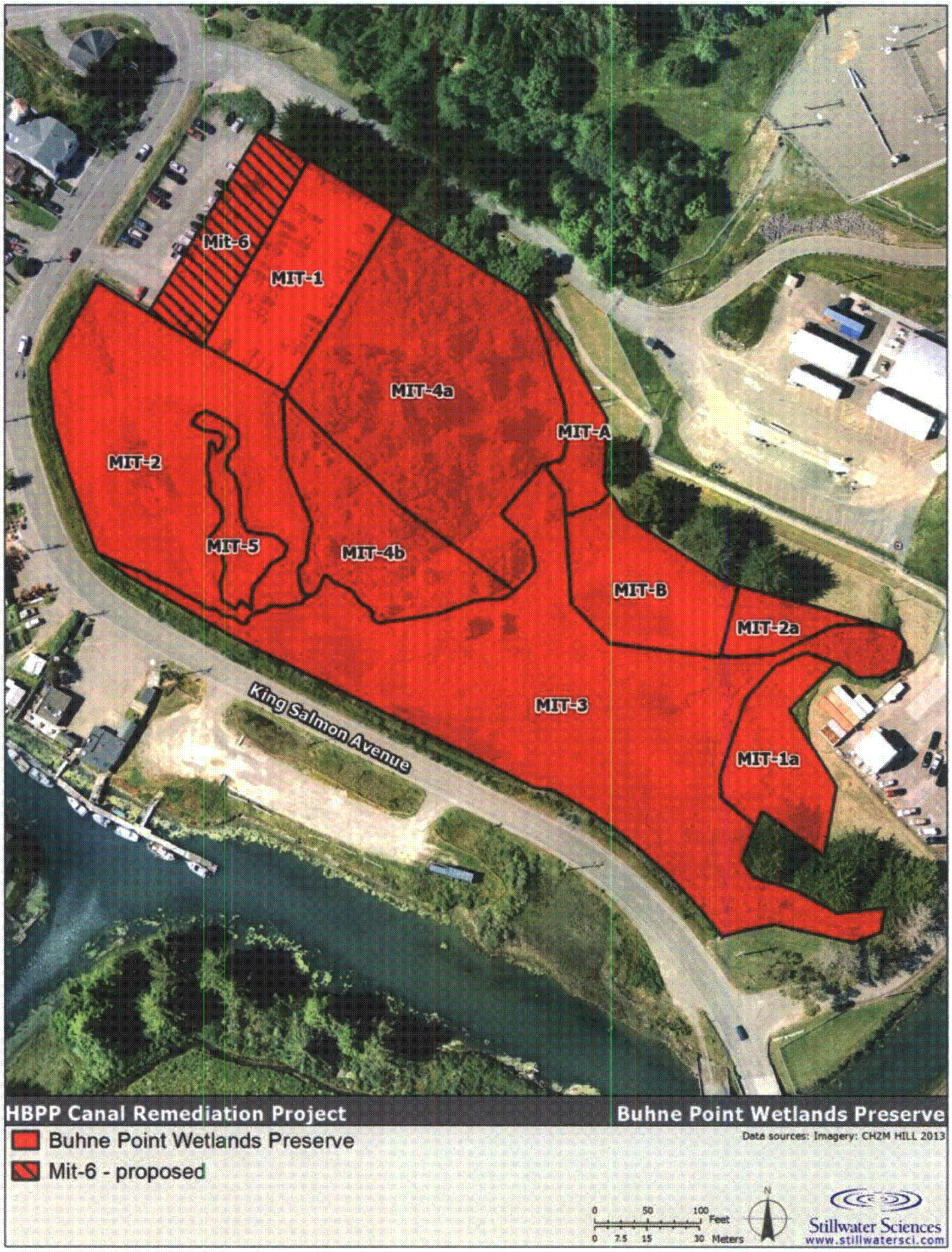

Figure 12. Buhne Point Wetlands Preserve mitigation areas and proposed Mit-6 mitigation area.

2.4.2 Mitigation goals and performance criteria

Mit-6 will utilize the applicable goals and performance criteria that have already been established for Mit-1 as part of the Preserve Mitigation and Monitoring Plan (Dains and CH2M HILL 2009). The applicable goals, objectives, and performance criteria are as follows:

Goal 1: Establish a natural drainage pattern of swale and seasonal ponds

Objective 1: Creation of depressions to increase ponding and runoff retention

Performance criterion: Long-duration (approximately 21 days) ponding or saturation in 0.06 ha (0.14 ac) in Mit-6 by year five.

Objective 2: Increase the percent cover in perennial wetland vegetation

Performance criteria:

- 70% cover by perennial plants by year five; and
- 50% cover by hydrophytic plants (FAC, FACW, or OBL) in 0.05 ha (0.12 ac) in Mit-6 by year five

Objective 3: Create a vegetated perennial pond

Performance criterion: Create 0.06 ha (0.14 ac) of seasonal or perennial wetlands in Mit-6 and with at least 50% cover dominated by hydrophytic plants (FAC, FACW, OBL) by year five.

Objective 4: Promote wildlife use

Performance criterion: 20% of wildlife species common in the adjacent riparian and marsh communities will be observed using (i.e., nesting, foraging, resting) the mitigation area by year five.

2.4.3 Mitigation implementation

2.4.3.1 Conceptual design

Mit-6 will be converted into a wetland by removing the gravel parking area surface and grading the ground level down to intercept the water table. Engineering plans have not yet been created, but the conceptual design is shown in Figures 13 and 14. Detailed engineering plans will be completed prior to implementation. The mitigation area will be graded to (a) increase the area draining to the deeper freshwater marsh areas, (b) lower the main freshwater marsh area to maximize inundation potential, and (c) remove any surficial hydrocarbon-impacted soil from the areas currently underlying the gravel parking area. The main freshwater marsh area should be graded to a level as near as possible to the existing groundwater table. Existing or imported clean fill will be used as needed to achieve the desired elevations in the mitigation area. Any additional clean fill from removal of the parking area will be re-used on site or taken off-site to an appropriate facility. The grading work will be performed in the summer to early fall months when there is little chance of rain. Best Management Practices (BMPs) will be utilized to prevent the soil from impacting the adjacent wetlands.

Following grading, the exposed soils will be tested for salinity and nutrients, and soil conditioning will be prescribed as needed. Infiltration rates of the exposed soils will be measured and compared with the requirements for long-duration ponding, which is estimated using hydrologic models. If the soil infiltration rates are higher than anticipated, it is recommended that clean bentonite clay soil amendment be mixed in with the existing soils to achieve the desired infiltration rates.

Development of Mit-6 will require establishment of a new access route from the parking lot to the public areas along the shoreline or to the overlook on Buhne Point. In addition, a second access to the parking area from King Salmon Ave may be required. These associated site elements will be included in the final plan for Mit-6.

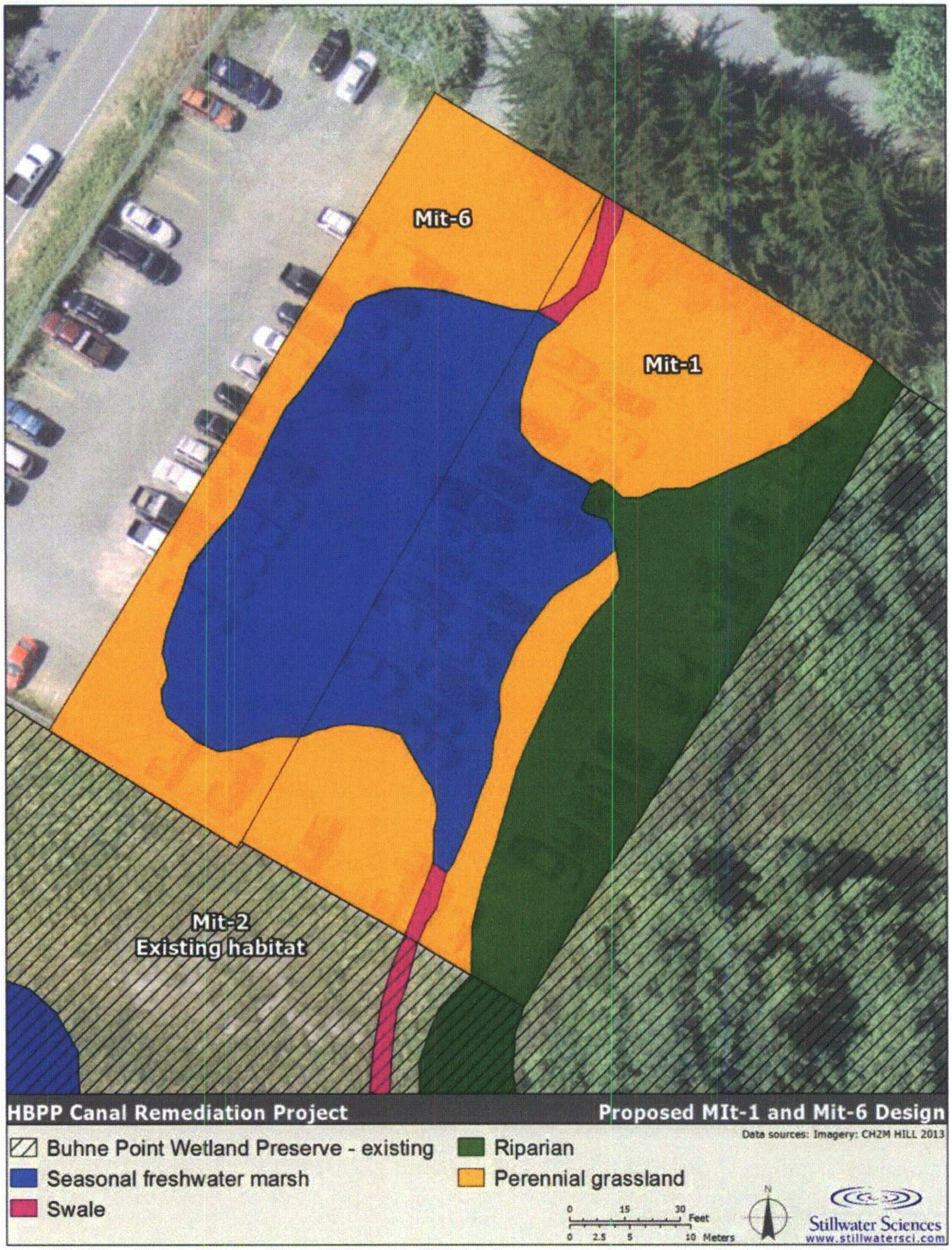

Figure 13. Proposed conceptual mitigation design for the Mit-1 and Mit-6 mitigation areas.

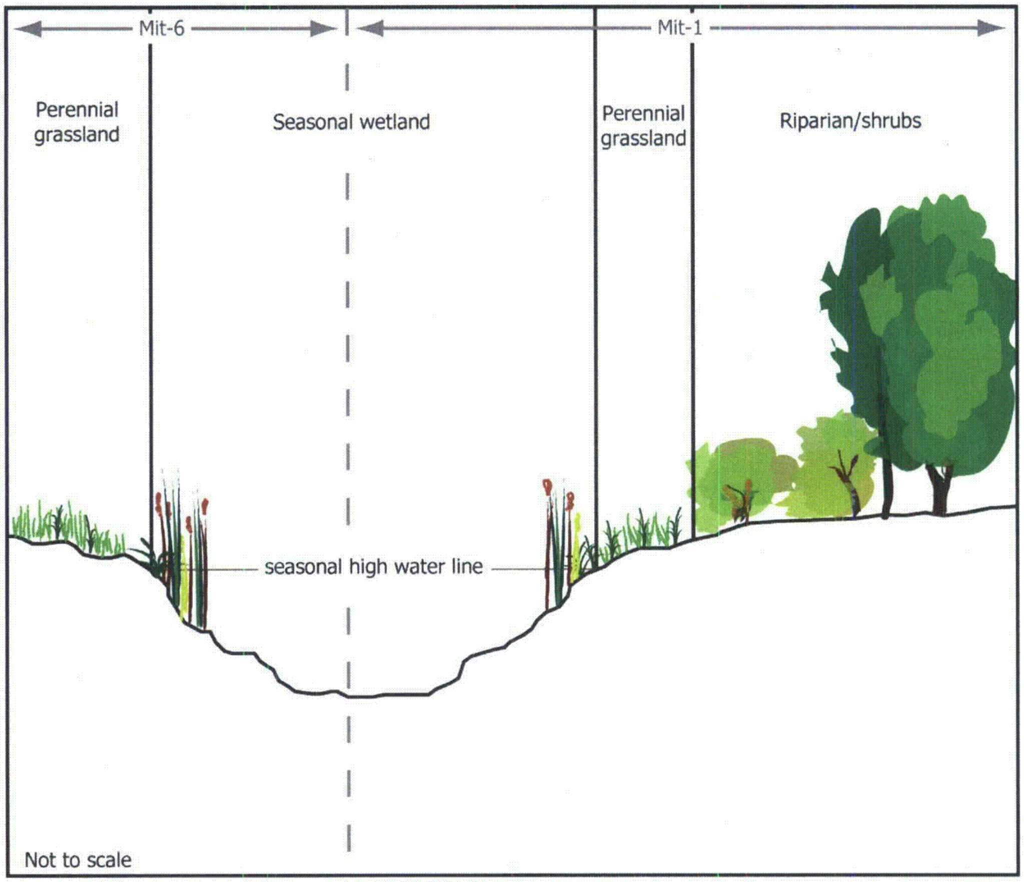

Figure 14. Proposed conceptual mitigation design for the Mit-1 and Mit-6 mitigation areas (cross section; not to scale).

2.4.3.2 Comprehensive Vegetation Specifications

Mit-6 will be converted to a perennial grassland similar to the Coastal Terrace Prairie described by Holland (1986) and a seasonal freshwater marsh similar to the Coastal Freshwater Marsh described by Holland (1986) planted with native plant species appropriate for each habitat (Table 6). The planting zones will be defined by soil and hydrology that is based on the initial soil testing and hydrologic monitoring. Planting spacing around the wetland will be designed with the intent to maximize sun exposure to benefit amphibians. Vegetation will be propagated either through seed or seedlings. Planting densities will range from one plant per 0.1 m^2 (1 ft^2) to one plant per 0.8 m^2 (9 ft^2), depending on the species. Seedlings and seed will be procured and installed by a qualified contractor. As much as possible, the local plant stock collected from Humboldt Bay and growing under similar ecological conditions (e.g., soils, depth to groundwater) will be used.

Table 6. Suggested native plant species for Mit-6.

Scientific name	Common name	Wetland indicator[1]
Perennial grassland		
Armeria maritima	thrift seapink	FAC
Bromus carinatus	California brome	NL - UPL
Calamagrostis nutkaensis	*Pacific reedgrass*	FACW

Scientific name	Common name	Wetland indicator[1]
Carex praegracilis	clustered field sedge	FACW
Carex obnupta	slough sedge	OBL
Deschampsia cespitosa	tufted hair grass	FACW
Festuca rubra	red fescue	FAC
Hordeum brachyantherum	meadow barley	FACW
Juncus lesueurii	San Francisco rush	FACW
Juncus effusus	soft rush	FACW
Symphyotrichum chilense	Pacific aster	FAC
Seasonal freshwater marsh		
Bolboschoenus robustus	seacoast bulrush	OBL
Cyperus eragrostis	tall flatsedge	FACW
Oenanthe sarmentosa	water parsley	OBL
Schoenoplectus acutus	common tule	OBL
Scirpus microcarpus	panicled bulrush	OBL

[1] Lichvar (2013):
FAC: Facultative wetland plants - Occur in wetlands and non-wetlands (Lichvar et al. 2012).
FACW: Facultative wetland plants - Usually occur in wetlands, but may occur in non-wetlands (Lichvar et al. 2012).
OBL: Obligate wetland plants - almost always occur in wetlands (Lichvar et al. 2012).
NL – UPL: Not listed – upland plants; any species not listed in this publication it is considered an upland plant - almost never occur in wetlands (Lichvar et al. 2012).

Plant protectors will not be installed initially. If herbivory damage is noted during the annual monitoring and is found to be impacting seedling success to the extent that the performance standards may not be attained, then plant protectors will be installed. Herbaceous vegetation will be planted immediately prior to the wet season; therefore, irrigation will not be planned initially for newly planted vegetation. However, if it appears that vegetation is not establishing due to dry hydrologic conditions, the plants may be watered during the first few years after planting to help them establish.

2.4.3.3 Monitoring

Mit-6 will be monitored annually at the same time as the Preserve to evaluate vegetation establishment, re-vegetation success, native and non-native plant recruitment, and wildlife use. Sample plots or transects will be used to estimate total plant cover and the percent of cover of individual plant species. Total cover, percent cover by species, percent hydrophytic vegetation, and percent native versus non-native vegetation will calculated, averaged across all plots, and compared with the annual performance objectives (Section 2.4.2). To illustrate site changes over time, photographs will be taken annually at set photopoint locations established throughout the mitigation area.

2.4.3.4 Maintenance

Annual monitoring will note any invasive plant species that should be removed from the area and any plant species that are not establishing in areas where remedial action is needed. Maintenance and annual monitoring activities will be directed as needed.

2.4.3.5 Expectation of success

A conceptual Hydrologic Assessment conducted for the Preserve (Falzone and Frank 2007) indicates that wetland inundation in this area is highly sensitive to soil infiltration rates. Falzone and Frank (2007) stated their expectations that soil inundation in this area is very low (~0.05–0.5 in/day), and accordingly that "site hydrology is sufficient to support the desired mitigation wetlands at the site." However, the soil infiltration rates have not been verified. Prior to grading and creation of the wetland areas, soil infiltration testing will be performed and the soil will be amended as needed to achieve the desired infiltration rates. Falzone and Frank (2007) also state that lower elevations would best achieve sufficient wetland inundation; therefore, the conceptual design includes grading to a level as near to the groundwater table as possible.

The wetland creation is anticipated to be successful because the newly created area will be adjacent to existing wetland areas in the Preserve, the hydrology will be consistent with that seen in the wetlands of the Preserve, and native wetland vegetation will be able to spread from these areas. Annual monitoring and maintenance will help track the growth and establishment of the vegetation. If it appears over time that the final success criteria will not be achieved, remedial action (e.g., additional planting, invasive plant species removal) will be discussed with the permitting agencies and implemented.

2.4.4 Sea-level rise

The inlet to Mit-1 and Mit-6 is located approximately 275 m (900 ft) from the tidal connection with the intake canal (at the southeastern corner of the Preserve). There is a potential that a 63.0-cm (24.8-in) sea-level rise (2050 prediction) or even a 31.8-cm (12.5-in) (2030 prediction) rise could have a minor influence on the mitigation area. However, the likelihood of this is small because of the ponded areas in the adjacent mitigation area (Mit-2 to the south) and the wide area of salt marsh in Mit-3 closer to the inlet that would allow for tidal water to spread out and keep it from reaching Mit-1 and Mit-6 (Figure 12). If salt water did reach this mitigation area, it would likely only cause a shift to brackish marsh conditions similar to that in Mit-B and would still provide habitat value and ecological function. The mitigation area would not fail or be eliminated by sea-level rise of either the 2030 or 2050 predicted high-range values.

2.5 Buhne Slough Salt Marsh

The Buhne Slough Salt Marsh is 2.5 ha (6.24 ac) of salt marsh bordered by bluff scrub habitat, which is owned by PG&E and located across King Salmon Avenue from the HBPP property (Figure 5). Enhancement of this area will mitigate for temporary impacts and temporal losses to wetland and eelgrass habitats in the intake and discharge canals and the Humboldt Bay coffer dam area surface waters as a result of the Project. This area will be enhanced by removing invasive denseflower cordgrass (*Spartina densiflora*).

2.5.1 Existing ecological conditions

The Buhne Slough salt marsh is a mix of northern coastal salt marsh surrounding Buhne Slough and northern coastal bluff scrub vegetation that is present in the higher elevations. Buhne Slough is connected to Humboldt Bay via a tide gate with the Fisherman's Channel (Figure 5). The tide gate prevents most of the tidal influence in Buhne Slough. The tide gate malfunctioned in approximately 2005, allowing brackish water to inundate the Buhne Slough salt marsh. A survey of the salt marsh completed in 2007 noted that the upper region of the tidal flat had an abundance of dead woody coyote brush (*Baccharis pilularis*) (Stillwater Sciences 2007). It is likely that these plants were killed when the area was inundated with brackish water. The tide gate was fixed in 2006 or 2007 and this may be contributing to a shift in conditions that favor freshwater (coyote brush and cattail [*Typha* sp.]) over salt marsh (pickleweed [*Salicornia pacifica*] and saltgrass [*Distichlis spicata*]) plant species.

The low-elevation tidal flat that is irregularly inundated with water from Buhne Slough (Figure 5) can be characterized as a northern coastal salt marsh as described by Holland (1986). Northern coastal salt marsh is categorized by highly productive, herbaceous, salt-tolerant hydrophytes that form a low-lying, moderate to dense ground cover (Holland 1986). Typical vegetation includes common pickleweed, seaside arrow grass (*Triglochin maritima*), saltgrass, and soft rush (*Juncus effusus*) mixed with patches of denseflower cordgrass throughout, in some areas representing the dominant vegetation. Portions of the salt marsh bordered by Buhne Slough flood during winter storms and/or high tide; however, the marsh surface drains almost entirely during ebb tides, leaving little to no standing water on the surface at low tide.

Some northern coastal bluff scrub vegetation type is present at the higher elevations of the Buhne Slough salt marsh. As described by Holland (1986), coastal scrub grows on marine bluffs and hills, with exposure to salt air, fog, and strong winds. Typical vegetation includes coyote brush, California blackberry (*Rubus ursinus*), western sword fern (*Polystichum munitum*), and cow parsnip (*Heracleum lanatum*).

2.5.2 Mitigation goals and performance criteria

The goal for enhancing this mitigation area is to remove denseflower cordgrass, which has been shown to have a negative effect on native plant populations and native wildlife and invertebrate communities (H. T. Harvey and Associates 2012). It is also recognized as a priority weed in Humboldt Bay and is the target of both a regional and West Coast eradication program (H. T. Harvey and Associates 2012). Removing denseflower cordgrass from these habitats would tie into both the regional and West Coast *Spartina* eradication program goals.

Denseflower cordgrass removal will be considered successful when the percent cover of denseflower cordgrass is less than or equal to 1% of the total plant cover for two successive years. Annual maintenance activities designed to facilitate this objective are described in Section 2.5.3.

2.5.3 Mitigation implementation

Denseflower cordgrass will be removed by either pulling the entire plant by hand, including the roots and rhizomes (for plants that are in or immediately adjacent to standing water) or using the "grind method" developed by the Humboldt Bay National Wildlife Refuge in which a gas-powered backpack brushcutter with a metal tri-blade is first used to remove aboveground leaves and stems by cutting them into a fine mulch (H. T. Harvey and Associates 2012). The blade is then rotated and used to grind the plant rhizomes into small fragments, effectively tilling the soil to a depth of 7–15 cm (3–6 in). All plant material that is not mulched will be either removed from the area or taken to an upland area to dry out and die. Any plants with viable seeds will be bagged and disposed of in an appropriate waste facility. The denseflower cordgrass currently in the Buhne Slough salt marsh is surrounded by native plants; therefore, it is expected that the native plants will spread to the areas previously occupied by denseflower cordgrass.

2.5.3.1 Monitoring

To document baseline conditions, the area will be monitored once in advance of any plant removal efforts and photopoints will be established. Following denseflower cordgrass removal, the mitigation area will be monitored annually during late spring or early summer, when existing denseflower cordgrass will be in flower and will be more readily identifiable.

Monitoring will be accomplished by taking photographs at each photopoint, mapping all readily discernible *Spartina densiflora* in the using handheld Global Positioning System (GPS) units, and then calculating the percent cover in a Geographic Information System (GIS). If the density of *S. densiflora* precludes a complete census, an appropriate subsampling technique will be applied. This level of effort will provide spatial information valuable for planning targeted follow-up removal activities. The Buhne Slough Salt Marsh will be walked by a two-person team in parallel lines spaced 2 m (6.6 ft) apart. At each discrete occurrence of *S. densiflora* that is encountered, which may be an individual plant or a contiguous group of plants, the center point of the occurrence will be recorded with a GPS unit, the number of individual plants in the occurrence will be counted, and the size (i.e., major and minor axes which will be used to calculate the area of an ellipse [πab, where a and b are one-half the ellipse's major and minor axes]) of the occurrence will be measured. In GIS, the size of each occurrence will be attributed to its associated center point to generate individual polygons representative of existing *S. densiflora* in the area and a map will be produced that can be used to document changes in population size in and plan targeted follow-up treatment activities. The area of all *S. densiflora* occurrences will be totaled and divided by the total size of the Buhne Slough Salt Marsh to calculate the total percent cover of *S. densiflora*.

2.5.3.2 Maintenance

Per the regional *Spartina densiflora* eradication program (H. T. Harvey and Associates 2012), the Buhne Slough salt marsh mitigation area will be visited every six months for the first two years after initial denseflower cordgrass removal and annually thereafter up to three years to remove any denseflower cordgrass sprouts or seedlings. The annual maintenance will be conducted after the annual monitoring surveys have been conducted and during periods of low tide to avoid any impacts to Buhne Slough and adjacent wetlands. If at any time during the five-year monitoring period denseflower cordgrass is found during the annual monitoring, then the maintenance crews will be notified and those plant species will be targeted for removal during the next maintenance period.

2.5.3.3 Expectation of success

The wetland enhancement effort is expected to be successful because the denseflower cordgrass removal methods have demonstrated success in the nearby Preserve (Stillwater Sciences and Dains 2012), as well as similar projects throughout the region (e.g., Humboldt Bay National Wildlife Refuge Mad River Slough project [Pickart 2005], Humboldt Bay National Wildlife Refuge Spartina eradication pilot project [Pickart 2008, 2012]). The monitoring and maintenance described will ensure that the wetland enhancement performs as anticipated and that the site is managed adaptively to ensure success.

2.5.4 Sea-level rise

The Buhne Slough salt marsh is located behind a coastal levee on the Humboldt Bay side that will likely be overtopped by the predicted 2050 rise in sea level of 63.0 cm (24.8 in), though not in 2030 (Laird 2013). Buhne Slough is connected to Humboldt Bay (via the Fisherman's Channel) by a flap-style tide gate that prevents most of the tidal influence (Figure 5). Sea-level rise could potentially have minor effects on the tide gate (e.g., increased leakage). If increased leakage or a levee breach did occur in this area due to sea-level rise, the Buhne Slough salt marsh would likely benefit from increased saline water. Most of the salt marsh is within the area that was tidally inundated in 1870 (Laird 2013), so this would be a restoration of historical conditions. The salt marsh plain is currently experiencing a shift in conditions that favor freshwater over salt marsh plant species, and increased salt water into Buhne Slough could potentially restore salt marsh function to the area. Sea-level rise should have no influence on the proposed enhancement activities, but could potentially benefit the native salt marsh species in the area.

3 PROPOSED EELGRASS MITIGATION

3.1 Existing Ecological Conditions

The existing ecological conditions of the intake canal are described in Section 2.1.1.

3.2 Mitigation Goals and Performance Criteria

PG&E proposes to fulfill the mitigation requirements outlined in Section 1.3, Item 3 by restoring or creating eelgrass habitat in the intake canal and Alpha Road parking mitigation areas. The headwall area and the slopes of the intake canal will be re-contoured following sediment removal to allow for the replanting of eelgrass disturbed during the remediation activities (Figures 9–11). A total of 0.038 ha (0.026 ac) of eelgrass habitat in the intake and discharge canal will be impacted by the excavation and dewatering activities. This mitigation effort will replace that with 0.15 ha (0.38 ac) of planted eelgrass and up to an additional 0.08 ha (0.19 ac) of unplanted habitat capable of supporting eelgrass. In addition, to the extent possible, existing eelgrass in the intake canal's work area will be collected and transplanted in the intake canal outside of the affected area. The eelgrass restoration area is designed to be a large, contiguous patch of eelgrass, which will provide greater and better quality habitat for fish than do the current smaller, isolated patches of eelgrass.

Performance standards for the eelgrass restoration are based on the goal of creating self-sustaining eelgrass beds by the end of the five-year monitoring period. The performance standards for the eelgrass restoration are:

- One year following the planting, the eelgrass percent cover in the restoration area will be ≥30–40%
- Two years following the planting, the eelgrass percent cover in the restoration area will be ≥60–85%
- Three to five years following the planting, the eelgrass percent cover in the restoration area will be ≥90–100%

3.3 Mitigation Implementation

Prior to and during dewatering activities, existing eelgrass in the intake canal work area will be collected and transplanted along the intake canal outside of the work area and closer to the King Salmon road bridge. This effort is aimed at minimizing the loss of eelgrass habitat as a result of the project.

Eelgrass will be planted during extreme low-tide events in the first appropriate planting time following completion of remediation and mitigation area construction using turions (eelgrass shoots) collected from adjacent donor eelgrass beds in the intake canal and the Fisherman's Channel (Connors 1986; USACE 1981, 1984). Eelgrass will be planted at densities approximating pre-project levels (40 to 80 turions/m^2 where present; Stillwater Sciences 2013). Eelgrass will be collected from donor beds in the form of one-gallon plugs with 2–4 clumps of turions per plug and will be transplanted in circular plots distributed throughout the planting area. Turions will be collected from approximately the same tidal elevation as the area into which they will be transplanted (F. Shaughnessey, Ph.D., Humboldt State University, pers. comm., 27 April 2009). Collections from donor beds will be spaced well apart to minimize impacts to the donor beds. No more than 10% of any eelgrass bed will be used for transplanting purposes. A letter of permission to harvest and transplant eelgrass will be obtained from the California Department of Fish and Wildlife. In addition, 1–2 seed buoys (mesh bags attached to buoys containing flowering shoots of eelgrass) will be deployed in the planting area to drop ripe seeds onto the substrate below to facilitate colonization of eelgrass in the mitigation area.

3.3.1 Monitoring

The eelgrass restoration area will be surveyed initially following planting efforts to document the full coverage of the planting units in the mitigation site. Six months following planting efforts, the mitigation area will be resurveyed to determine percent survival of the planting units. Thereafter, the eelgrass restoration area will be monitored annually for five years following the replanting effort. Monitoring will be conducted at the same time each year during the eelgrass growing season (May–August). Eelgrass percent cover will be visually estimated in quadrats placed randomly throughout the mitigation area using the seagrass percentage cover photo guide from the Manual for Scientific Monitoring of Seagrass Habitat (Short et al. 2006). Plant density will then be estimated by counting the number of eelgrass turions in a sample area. Photopoints will be established throughout the restoration area at fixed locations to monitor site changes over time. Photographs will be taken during annual monitoring efforts at all photopoint locations. To ensure consistency, photopoint locations will be recorded using a handheld GPS receiver, all photos will be taken at a standing position, and a compass bearing of the direction the camera is facing will be taken (or the compass bearing for the start and end of a panoramic series of photographs).

A control area selected in the intake canal or Fisherman's Channel closer to King Salmon Avenue will also be monitored annually to account for any seasonal changes that may be affecting eelgrass densities throughout the region. Monitoring methods will be the same for the control area as described above.

3.3.2 Maintenance

Annual monitoring will note any invasive plant species that should be removed from the area and any plants that are not establishing where remedial action is needed. Maintenance activities will be directed as needed based on the annual monitoring results.

3.3.3 Expectation of success

Eelgrass is currently present in the intake canal; restoring eelgrass to the area has a high likelihood of success. The intake canal currently has low velocity water flow, is sheltered from high wind and wave action, and has an un-muted tidal connection to Humboldt Bay. If the correct elevations are created in the mitigation area, then the likelihood of eelgrass successfully becoming establishing and surviving is high. This will significantly increase the quantity and quality of habitat for listed fish species and contribute to their survival and recovery goals.

3.3.4 Sea-level rise

As discussed above in Sections 2.1.4 and 2.2.4, eelgrass planting areas will be designed at the mid-range of eelgrass and will slope up at the upper ranges to areas of bare mudflat. Eelgrass in Humboldt Bay typically grows from +0.1 to –2.1 m (-0.3 to -6.9 ft) elevation (Gilkerson 2008), so eelgrass at the mid-range should be able to withstand changes in sea level. An increase in sea level would either cause a shift of the eelgrass beds towards the higher elevation mudflat areas or an increase in the size of the eelgrass beds. This would be the case for both the 2030 projected high-range increase in sea level of 31.8 cm (12.5 in) and the 2050 projected rates of 63.0 cm (24.8 in).

4 PROPOSED SPECIAL-STATUS SPECIES MITIGATION

4.1 Existing Ecological Conditions

The existing ecological conditions of the intake canal are described in Section 2.1.1. In addition, as stated in Section 1.3.1, a number of special-status fish species may occupy the intake canal in relatively low numbers.

The discharge canal is a narrow tidal channel with steep riprapped banks that are exposed at low tide. Eelgrass grows in a patchy distribution in the southern half of the canal (Figure 4). The bottom substrate includes bay mud with a new layer of sand that has deposited since the once-through cooling associated with the operation of the HBPP was shut down in 2010. The discharge canal is sheltered from high wind and wave action and is only influenced by a muted tidal connection to Humboldt Bay. In addition, as stated in Section 1.3.2, a number of special-status fish species may occupy the discharge canal in very low numbers.

The area of potential impact in Humboldt Bay is located almost directly across from the mouth of the bay. It experiences twice-daily tides and heavy wave and wind action. The existing shoreline consists of large riprap on the coastal levee and the bottom substrate is silty bay mud. There is no eelgrass or other permanent vegetation present in this area. The likelihood of special-status fish species being present at this location is relatively low, especially during low tide.

4.2 Mitigation Goals and Performance Criteria

PG&E will minimize the take of listed species associated with the dewatering and excavation of contaminated sediment by developing and implementing the fish rescue and relocation plan described in Section 1.1.1. The goal of this plan is to sweep as many fish as possible from the excavation areas prior to the commencement of dewatering activities (See Section 1.1.1).

PG&E also proposes to fully mitigate for take of listed species and designated critical habitat by implementing the mitigation measures described above for wetlands associated with the intake canal (Section 2.1), wetlands associated with the Alpha Road parking area (Section 2.2), and eelgrass (Section 3). Implementation of these mitigation measures will result in higher quality and quantity of wetland, eelgrass, mudflat, and deep water habitat than currently exists on site. This is expected to significantly increase the quantity of rearing habitat for listed estuarine species, including coho salmon and longfin smelt. These habitat improvements would also result in higher quality rearing conditions, greater amount of cover from predators, and ultimately increased survival rates over the current condition. Increased survival rates will help with the recovery of these species' populations. It is believed that the increased survival rates will more than make up for the very low risk of take associated with the project, especially after fish have been herded from the work areas using net sweeps. See below for additional information regarding the proposed fish rescue and relocation plan.

4.3 Mitigation Implementation

Although not a mitigation measure, but part of the project description, the fish rescue and relocation plan described in Section 1.1.1 will be implemented immediately prior to the start of construction. It is expected that the initial seine net sweeps of the work areas will move the vast majority of the special-status fish species, if they are present, out of the excavation areas without the need to handle any individuals. Very few, if any, coho salmon and longfin smelt are expected to remain in the work areas after the sweeps are completed. Any remaining fish will be captured by seining or dip netting during the dewatering actions and relocated to appropriate habitat.

The dewatering activity has the potential to entrain special-status fish species into the pumps. Therefore, a double-filter/screen pumping system will be deployed during the dewatering activities to avoid take of special-status species through either impingement or entrainment into the pump. The screen system will consist of covering the pump head with 1.6-mm (1/16-inch) screen and placing that inside a 1.2 x 1.2 x 1.2 meter (4 x 4 x 4 ft) box covered with 6.3-mm (¼-inch) screen.

The proposed intake canal and Alpha Road parking area mitigation programs described in Sections 2.1, 2.2, and 3 will significantly increase the quality and quantity of rearing habitat for listed estuarine species, including coho salmon and longfin smelt. These habitat improvements will result in higher quality rearing conditions, greater amount of cover from predators, and ultimately increased survival rates over the current condition. Increased survival rates will help with the recovery of these species' populations. It is believed that the increased survival rates will fully mitigate for the very low risk of take associated with the project, especially after the majority of fish have been herded from the work areas using seine sweeps.

An agency-approved biological monitor or team and/or those that hold federal ESA Section 10(a)(1)(a) permits for tidewater goby and anadromous salmonids will be on site during all fish rescue and relocation operations. It is expected that the team will no longer be required to be onsite once the rescue and relocation activities have been completed.

The following proposed protection measures at the discharge canal will minimize the risk of impacts on the northern red-legged frogs and habitat in the wetlands adjacent to the discharge canal:

- Prior to construction, an amphibian rescue effort will be conducted in an attempt to 'clear' the area of individuals that are present. Eggs may be present during the breeding season (October through early March), tadpoles during the pre-metamorphosis season (March through August), and adults year-round. Any egg masses, tadpoles, or adults captured will be relocated to suitable habitat (e.g., within the existing Mit-2 pond in the Buhne Point Wetlands Preserve).
- A biological monitor will be present during activities that impact or remove wetlands and amphibian habitat adjacent to the discharge canal. Once the habitat is removed, a biological monitor will no longer be required.
- Creation of additional wetlands in the Buhne Point Wetlands Preserve, as described above in Section 2.4, will mitigate for habitat loss during project activities.

5 REPORTING

Results of the annual monitoring of the mitigation areas will be summarized in a report and distributed to the appropriate regulatory agencies. These reports will present a summary of the data collected and present conclusions regarding whether the annual performance objectives are being met and, if needed, provide recommendations for remedial action (i.e., additional planting and/or weeding). Reports will include the following sections:

- Introduction;
- Maintenance activities performed;
- Monitoring methods;
- Monitoring results (e.g., qualitative and quantitative results compared with baseline data from the initial planting, comparisons with previous years' data, etc.);
- Time series photographs;
- Achievement of performance criteria (and interim guidelines if developed); and
- Recommendations for remedial action.

Annual monitoring will occur for a minimum of three years and up to five years. If the success criteria are met for two successive years prior to the end of the five-year monitoring period (i.e., years 2 and 3, or years 3 and 4), then the annual monitoring and maintenance will cease and a final report demonstrating success of the mitigation will be prepared and submitted to the USACE and CCC.

As stated in Section 1.1 above, a report summarizing the dewatering and fish rescue activities and any modifications to the plan will be developed and submitted to the appropriate state and federal agencies.

6 REMEDIAL ACTION PLAN

If results from the annual monitoring indicate that the performance objectives have not been met, then additional maintenance and/or remedial action will be specified. Any maintenance or remedial action determined to be necessary will be initiated as soon as feasible to increase the likelihood of success. The mitigation areas are complex ecological systems, each with a unique variety of environmental influences including fluctuating hydrologic conditions, weather conditions, plant viability, and invasive weed colonization. Because of this, no set strategy is appropriate for all the areas and adaptive management is the best way to effectively plan for the success of the mitigation areas.

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