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Staff:	Robert S. Merrill
Staff Report:	November 4, 2004
Hearing Date:	November 19, 2004
Commission Action:	

STAFF REPORT: REGULAR CALENDAR

APPLICATION NO.:	**1-04-010**
APPLICANT:	**Pacific Gas and Electric**
PROJECT LOCATION:	At Freshwater Slough, at the east end of Park Street, east of Eureka, Humboldt County.
PROJECT DESCRIPTION:	Replace a 1,200-foot-long section of 8-inch diameter high-pressure natural gas pipeline beneath Freshwater Slough and in adjoining pastureland.
LOCAL APPROVALS RECEIVED:	None required.
OTHER APPROVALS RECEIVED:	(1) Army Corps of Engineers Nationwide Permit 12 Verification; (2) Regional Water Quality Control Board 401 Water Quality Certification; and

	(3) Department of Fish & Game Streambed Alteration Agreement.
OTHER APPROVALS REQUIRED:	None
SUBSTANTIVE FILE DOCUMENTS:	Humboldt County Local Coastal Program

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SUMMARY OF STAFF RECOMMENDATION:

Staff recommends that the Commission approve with conditions the coastal development permit for replacement of an approximately 1,200-foot-long section of 8-inch diameter high-pressure natural gas transmission pipeline which traverses beneath Freshwater Slough, just east of the City of Eureka, in Humboldt County.

Staff believes that the project, as conditioned by the 12 special conditions set forth below, is the least environmentally damaging alternative, will provide feasible mitigation for the temporary and permanent impacts to seasonal wetlands, and will minimize the chances of an accidental spill of horizontal directional drilling fluids that could discharge into Freshwater Slough and adjoining wetland areas. As conditioned, staff believes that the proposed project is fully consistent with the Coastal Act.

The Motion to adopt the Staff Recommendation of Approval with Conditions is found on page 3.

STAFF NOTES:

1. Standard of Review

The proposed project is located in the Commission's retained jurisdiction. Humboldt County has a certified LCP, but the site is within an area shown on State Lands Commission maps over which the state retains a public trust interest. Therefore, the standard of review that the Commission must apply to the project is the Chapter 3 policies of the Coastal Act.

2. Commission Action Necessary

The Commission must act on the application at the November 19, 2004 meeting to meet the requirements of the Permit Streamlining Act.

3. Addendum

Portions of Finding 3, "Filling and Dredging in Coastal Waters and Wetlands," were not completed prior to the mailing of the staff report. Staff will present the recommended findings for approval of the project as part of an addendum at the Commission meeting.

I. MOTION, STAFF RECOMMENDATION AND RESOLUTION:

The staff recommends that the Commission adopt the following resolution:

Motion:

I move that the Commission approve Coastal Development Permit No. 1-04-010 pursuant to the staff recommendation.

STAFF RECOMMENDATION OF APPROVAL:

Staff recommends a **YES** vote. Passage of this motion will result in approval of the permit as conditioned and adoption of the following resolution and findings. The motion passes only by affirmative vote of a majority of the Commissioners present.

RESOLUTION TO APPROVE THE PERMIT:

The Commission hereby approves a coastal development permit for the proposed development and adopts the findings set forth below on grounds that the development as conditioned will be in conformity with the policies of Chapter 3 of the Coastal Act. Approval of the permit complies with the California Environmental Quality Act because feasible mitigation measures and/or alternatives have been incorporated to substantially lessen any significant adverse effects of the development on the environment.

II. STANDARD CONDITIONS: **See Attachment A.**

III. SPECIAL CONDITIONS:

1. Horizontal Directional Drilling Bore Trajectory Plan

A. **PRIOR TO ISSUANCE OF THE COASTAL DEVELOPMENT PERMIT,** the applicant shall submit for review and approval of the Executive Director, a plan that shows the planned trajectory of the horizontal directional drilling bore to be drilled under Freshwater Slough.

(1) The plan shall include, at a minimum, the following components:

(a) A narrative report indicating the depth of the bore and demonstrating how the proposed trajectory and drilling depths comply with the requirements of Special Condition No. 7, below that that the horizontal drilling shall be conducted as much as possible at depths greater than 35 feet;

(b) A site plan showing the end points and path of the proposed directional bore; and

(c) An elevation of the proposed directional bore showing the trajectory and depth of the bore below the surface.

B. The permittee shall undertake development in accordance with the approved plan. Any proposed changes to the approved final plan shall be reported to the Executive Director. No changes to the approved final plan shall occur without a Commission amendment to this coastal development permit unless the Executive Director determines that no amendment is legally required.

2. Drilling Fluid Spill Contingency Plan.

A. **PRIOR TO ISSUANCE OF THE COASTAL DEVELOMENT PERMIT,** the applicant shall submit, for review and written approval of the Executive Director, a final revised horizontal directional drilling ("HDD") fluid monitoring and spill contingency plan that substantially conforms with the 23 July, 2004 HDD Fluid Release Contingency Plan prepared by Matrix Environmental Planning entitled *"HDD Fluid Release Contingency Plan G/L 137B Crossing of Freshwater Slough Project,"* except that Material Safety Data Sheets for all materials that will be used in the horizontal directional drilling operation shall be attached to the plan.

B. The permittee shall undertake horizontal directional drilling activities in accordance with the approved final plan. Any proposed changes to the approved final plans shall be reported to the Executive Director. No changes to the approved final plan shall occur without a Commission amendment to this coastal development permit unless the Executive Director determines that no amendment is required.

C. In the event that a spill or accidental discharge of drilling fluids occurs during horizontal directional drilling operations, all construction shall cease and shall not recommence except as provided in subsection (D) hereof:

D. Following discovery of the spill or accidental discharge of drilling fluids, the permittee shall submit to the Executive Director a revised project and restoration plan prepared by qualified professional(s) that provides for (1) necessary revisions to the proposed project to avoid further spill or accidental discharge of drilling fluids, and (2) restoration of the area(s) affected by the spill or accidental discharge to pre-project conditions. The revised project and restoration plan shall be consistent with any applicable requirements of the State Water Resources Control Board and the California Department of Fish & Game. The revised project and restoration plan shall be processed as an amendment to the coastal development permit unless the Executive Director determines that no amendment is required. Construction may nor recommence until after any necessary amendment to this permit is approved by the Commission or the Executive Director has determined that no amendment is legally required.

3. **Final Wetland Mitigation Plan**

A. **PRIOR TO ISSUANCE OF THE COASTAL DEVELOPMENT PERMIT,** the applicant shall submit for review and written approval of the Executive Director, a final wetland mitigation plan for all wetland impacts associated with the proposed project. The program shall be developed in consultation with the California Department of Fish & Game and at a minimum shall include:

1. A detailed revised site plan of the wetland impact areas. The final plan must delineate all impact areas (such as on a map that shows elevations, surrounding landforms, etc.), the types of impact, and the exact acreage of each impact so identified.

2. A detailed final site plan of the mitigation areas.

3. The following goals, objectives, and performance standards for the mitigation areas:

    a. Areas of temporary disturbance within seasonal wetlands including the construction corridor and any other disturbed sites, including any construction access routes within the grazed seasonal wetlands not following established roadways shall be (i) restored to before-impact elevations in a manner that does not result in depressions, ridges, or mounds, (ii) decompacted, and (iii) replanted with locally with a commercially available seed mixture composed of the same grass species that dominate the perennial grasslands at the present time to a level of coverage and density equivalent to vegetation coverage and density of the surrounding undisturbed areas

4. The final design and construction methods that will be used to ensure the mitigation site achieves the defined goals, objectives, and performance standards.

B. The permittee shall undertake development in accordance with the approved final plans. Any proposed changes to the approved final plans shall be reported to the Executive Director. No changes to the approved final plans shall occur without a Commission amendment to this coastal development permit unless the Executive Director determines that no amendment is legally required.

4. <u>Erosion and Sedimentation Control Plan</u>

A. **PRIOR TO ISSUANCE OF THE COASTAL DEVELOPMENT PERMIT,** the applicant shall submit for review and approval of the Executive Director, a plan for erosion and sedimentation control.

(1) The erosion control plan shall demonstrate that:

(a) During construction, erosion on the site shall be controlled to avoid adverse impacts on adjacent properties and coastal resources;

(b) Temporary erosion control measures shall be implemented during construction including, but not limited to: preserving existing vegetation surrounding the construction areas as much as possible; installing silt fences, fiber rolls, weed free rice straw barriers or similar barriers on the down slope side of the construction areas

and maintaining these barriers in place throughout the construction period; stabilization and containment of stockpiles; and replanting or seeding any disturbed areas with a commercially available seed mixture composed of the same grass species that dominate the perennial grasslands in the seasonal wetlands at the present time

(2) The plan shall include, at a minimum, the following components:

(a) A narrative report describing all temporary runoff and erosion control measures to be used during construction;

(b) A site plan showing the location of all temporary erosion control measures; and

(c) A schedule for installation and removal of the temporary erosion control measures.

B. The permittee shall undertake development in accordance with the approved plan. Any proposed changes to the approved final plan shall be reported to the Executive Director. No changes to the approved final plan shall occur without a Commission amendment to this coastal development permit unless the Executive Director determines that no amendment is legally required.

5. <u>Hazardous Materials Management Plan</u>

A. **PRIOR TO ISSUANCE OF THE COASTAL DEVELOPMENT PERMIT,** the applicant shall submit, for the review and written approval of the Executive Director, a plan to reduce impacts to water quality from the use and management of hazardous materials on the site. The plan shall be prepared by a licensed engineer with experience in hazardous material management.

1. The plan, at a minimum, shall provide for the following:

(a) Equipment fueling shall occur only during daylight hours in designated fueling areas;

(b) Oil absorbent booms and/or pads shall be on site at all times during project construction. All equipment used during construction shall be free of oil and fuel leaks at all times;

(c) Provisions for the handling, cleanup and disposal of any hazardous or non-hazardous materials used during the construction project including, but not limited to, paint, asphalt, cement, equipment fuel and oil, and contaminated sediments;

(d) A schedule for maintenance of containment measures on a regular basis throughout the duration of the project;

(f) Provisions for the containment of rinsate from the cleaning of equipment and methods and locations for disposal off- site. Containment and handling shall be in upland areas and otherwise outside of any environmentally sensitive habitat area;

(g) A site map detailing the location(s) for hazardous material storage, equipment fueling and maintenance, and any concrete wash-out facilities; and

(h) Reporting protocols to the appropriate public and emergency services agencies in the event of a spill.

B. The permittee shall undertake development in accordance with the approved final plan. Any proposed changes to the approved final plan shall be reported to the Executive Director. No changes to the approved final plan shall occur without a Commission amendment to this coastal development permit unless the Executive Director determines that no amendment is legally required.

6. **Debris Disposal Plan**

PRIOR TO ISSUANCE OF THE COASTAL DEVELOPMENT PERMIT, the applicant shall submit, for the review and approval of the Executive Director, a plan for the disposal of excess construction related debris, including excess soil from the horizontal directional drilling and trenching operations. The plan shall describe the manner by which the material will be removed from the construction site and identify a disposal site that is in an upland area where materials may be lawfully disposed.

The permittee shall undertake development in accordance with the approved final plan. Any proposed changes to the approved final plan shall be reported to the Executive Director. No changes to the approved final plan shall occur without a Commission amendment to this coastal development.

7. Conformance of Horizontal Directional Drilling Activities to Geotechnical Report

A. The permittee shall undertake the horizontal directional drilling activities for the proposed fiber optic cable installation development in accordance with all recommendations contained in the following Engineering Geologic Report:

> Kleinfelder July 9, 2003, "Geotechnical Engineering Investigation, replacement of Gas Line 137-B at Freshwater Slough Crossing, Eureka, California," and signed by John L. Finnigsmier (R.G., CEG) Traver E Metcalf, Jr. (CE, GE), and Kris Johnson (RG, CEG),

except that the horizontal drilling shall be conducted as much as possible a depths greater than 35 feet.

B. Any proposed changes to the horizontal directional drilling activities shall be reported to the Executive Director. No changes shall occur without a Commission amendment to this coastal development permit unless the Executive Director determines that no amendment is legally required.

8. Notification of Work and Coastal Commission Staff Inspections

At least one week prior to performing any horizontal directional drilling boring, the permittee shall submit written notice to the Eureka office of the California Coastal Commission of the specific dates when the horizontal directional drilling boring will be performed. The notice shall indicate which boring(s) are to be performed, the dates the work will occur, and a map indicating the precise locations where boring would be performed. The permittee shall promptly notify Commission staff of any changes to the schedule for performing horizontal directional drilling for which notice has previously been given. The permittee shall permit the Coastal Commission staff to enter and inspect the project area for purposes of determining compliance with Coastal Development Permit No. 1-04-010.

9. Assumption of Risk, Waiver of Liability and Indemnity Agreement

By acceptance of this permit, the applicant, on behalf of (1) itself; (2) its successors and assigns and (3) any other holder of the possessory interest in the development authorized

by this permit, acknowledges and agrees (i) that the directional drilling activities proposed by the applicant may subject the project area to hazards from accidental spills of drilling fluids; (ii) to assume the risks to the applicant and the property that is the subject of this permit of injury and damage from such hazards in connection with this permitted development; (iii) to unconditionally waive any claim of damage or liability against the Commission, its officers, agents, and employees for injury or damage from such hazards; (iv) to indemnify and hold harmless the Commission, its officers, agents, and employees with respect to the Commission's approval of the project against any and all liability, claims, demands, damages, costs (including costs and fees incurred in defense of such claims), expenses, and amounts paid in settlement arising from any injury or damage due to such hazards; and (v) to agree to include a provision in any assignment of the development authorized by this permit requiring the sublessee or assignee to submit a written agreement to the Commission, for the review and approval of the Executive Director, incorporating all of the foregoing restrictions identified in (i) through (iv).

10. Construction Access, Materials, and Equipment Staging.

(a) All construction materials and equipment staging areas shall be limited to the locations and sizes specified in the permit application.

(b) Access routes and the watercourse crossing shall be limited to the routes mapped and described in the permit application. Portions of access routes within wetlands that are excessively wet or soft shall be covered with: (a) heavy synthetic mats or other acceptable non-toxic material that can be readily laid down along equipment access routes and immediately removed following construction and (b) shall be the minimum width and length necessary to allow movement of equipment to and from the project site.

11. Construction Methods

All pipeline construction shall be performed consistent with the following provisions:

A. The top six to eight inches (6-8") of excavated material within grazed seasonal wetlands (which contains the root masses, rhizomes, seeds, and accumulated organic material of the vegetation that dominates these seasonal wetlands) shall be separately stockpiled by the contractor, and the contractor shall assure that this stockpiled soil material is kept moist and that the material is reintroduced as soon as possible to excavation as the top fill material.

B. Prior to the commencement of construction, the work area would be delineated, limiting the potential area affected by construction and workers shall be educated about the limitations on construction;

C. A qualified biologist shall monitor the site during all ground disturbing activities to avoid impacts to sensitive species. All occurrences of special status plants will be delineated and entry to areas containing such plants shall be restricted;

D. All vehicles and equipment shall be restricted to pre-established work areas and established or designated access routes;

E. Soil compaction from heavy equipment travel in wetland areas will be alleviated through mechanical soil aeration where appropriate.

F. All trash and waste items shall be contained;

G. The contractor shall implement erosion control techniques around the temporarily stored spoil material.

H. All construction activities in the vicinity of the south bank of Freshwater Slough shall be conducted after the Humboldt Bay owl's-clover and the western sand spurry have set seed as verified by a qualified biologist.

12. Grazed Seasonal Wetland Vegetation Monitoring

The permittee shall submit a vegetation monitoring report for the review and written approval of the Executive Director within 18 months after completion of construction of the replacement gas line approved under CDP No. 1-04-010. The monitoring report shall be prepared by a qualified biologist or botanist and shall evaluate whether the objective of reestablishing vegetation in all of the grazed seasonal wetland areas impacted by project construction to a level of coverage and density equivalent to vegetation coverage and density of the surrounding undisturbed areas has been achieved. If the report indicates that the revegetation of any of the disturbed areas including the construction corridor and staging areas has not been successful, in part, or in whole, the permittee shall submit a revised revegetation program to achieve the objective. The revised revegetation program shall require an amendment to this coastal development permit.

IV. FINDINGS AND DECLARATIONS

The Commission hereby finds and declares:

1. Site Description

Pacific Gas and Electric Company (PG&E) proposes to replace 1,200 lineal feet of natural gas pipeline that extends under Freshwater Slough and adjoining pasturelands Freshwater Slough is a tributary of Eureka Slough, which flows into Humboldt Bay at the northeastern edge of Eureka (See Exhibits 1-3).

The proposed project includes the installation of a new segment of pipeline under the slough using horizontal directional drilling techniques. Freshwater Slough is subject to tidal action in this location, and the south bank of the slough contains salt grass and pickelweed vegetation. Two sensitive plant species, Humboldt Bay owl's-clover and western sand spurry, have been identified within this salt/brackish marsh habitat. Above the salt/brackish marsh habitat, riparian and upland species can be found, including coyote brush, scotch broom, berries, and ornamental cypress and pine trees

The adjoining pastureland to the north of the slough where trenching operations would be conducted consists of grazed seasonal wetlands. These diked former tidelands are used for livestock grazing and other agricultural purposes. Vegetation in the grazed seasonal wetland area is dominated by exotic perennial grasses such as sweet vernal grass, orchard grass, velvet grass, tall fescue and perennial ryegrass.

Ruderal vegetation, typical or roadsides and disturbed areas, make up the sparse forbs cover within the proposed horizontal directional drilling entry pit staging area on the south bank of the slough.

2. Project Description

The development involves the rerouting of a 1,200-foot-long section of exposed, existing pressurized natural gas line that crosses beneath Freshwater Slough at the east end of Park Avenue east of Eureka. The existing section of line that crosses beneath the slough has become exposed and is at risk of rupture. The exposed section of line would be by-passed by the new crossing and abandoned in place (See Exhibit 3).

Beginning at the southern tie-in point, the applicant proposes to install 700 feet of new pipe under the slough using the Horizontal Directional Drilling (HDD) method and install approximately 500 feet of new pipe in the pasture on the north side of the slough up to the northern tie-in point by open cut trench. The new alignment would remove a dog-leg in the existing alignment and provide the correct configuration and position to string the pipe for pullback under the slough. Once the new pipe is tied in, the applicant would remove the segment of the bypassed pipeline between the bank and the low tide level.

The remaining sections of the bypassed line would be pigged for their entire length to remove and trapped liquids, capped, filled with nitrogen, and retired in place.

Construction access to the south bank of the slough where an HDD set-up area and entrance pit would be installed would be via Park Street. Access to the receiving pit and north tie-in point would be through private property from Myrtle Avenue, north on Devoy Road, northwest along an abandoned railroad right-of-way, then southwest along farm roads and the pipeline easement strip to the work site.

The directional drilling process utilizes a hydraulically-powered horizontal drilling rig. Support equipment includes a drilling mud tank and a power unit for the hydraulic pumps and mud pumps. Approximately 94,000 gallons of drilling fluid would be utilized, with bentonite additive at a concentration of 9 pounds per gallon of water. A drilling fluid spill contingency plan has been prepared for the project that includes procedures for monitoring for discharges of drilling fluids, stopping the HDD if a discharge is detected, containing the spill, returning discharged fluids back to the pit, or disposal with vacuum trucks

Surface disturbance associated with the HDD include an entry pit and a receiving pit, each pit measure approximately 6' x 12' x 8' deep, with associated tail ditches each measuring 3' x 20' x 6' deep. The HDD set-up area would be approximately 100' by 100' to accommodate the drilling rig, mud tanks, pumps and drill stem racks.

While the bore is occurring, the special armor-coated pipe sections to be pulled through the crossing would be strung on pipe supports in the extra workspace along the edge of the 100-foot-wide temporary construction right-of-way, welded, and the joints are coated. Once the bore hole is the correct diameter, the pipe is pulled through the bore until it surfaces on the entry side. Bulldozers with side booms and slings would support the pipe as it is slowly pulled through the bore until it surfaces on the entry side. The completed bored crossing would then be connected to the section of pipeline to be installed in a trench within the pastureland and the entry and receiving pits for the HDD would be backfilled.

Open cut trenching would occur within a right-of-way through the pastureland on the north side of the slough between the tie-in with the HDD bored segment of line and the northern tie-in with the existing line. The trenching would be conducted by tracked backhoes or ditchers. The trench would be a minimum of 12 inches wide and about 5 feet deep to ensure at least 4 feet of cover over the pipeline. Stringing of the pipe is completed by trucking pipe lengths to and along the right-of-way and unloading with a crane or bulldozer with a side boom onto wood skid supports. The pipe would be lowered into the trench from the skid supports using side booms. The excavated soil will

be backfilled in layers into the trench after installation of the pipeline. The topsoil is replaced last to re-establish the preconstruction soil profile.

Hydrostatic testing is completed prior to tie-in by filling the new pipeline with water, increasing the pressure to a minimum of 125 percent of the maximum operation pressure, and holding the pressure for a period of time. Following testing, the pipe would be flushed to remove dirt and other debris. An energy dissipation device would be utilized to control the water discharged from the pipeline following hydrostatic testing and flushing and appropriate best management practices would be used to ensure no silt enters the slough from this discharge.

A number of additional mitigation measures are proposed to ensure no impacts to environmentally sensitive habitat occurs.

- Directed surveys for sensitive plant species would be repeated prior to construction;
- The HDD would be planned for late summer, consistent with a construction window recommended by NOAA Fisheries;
- All occurrences of special status plants would be delineated and access to areas containing the plants would be restricted;
- Prior to commencement of construction, work areas would be delineated to limit the area affected by construction;
- Appropriate erosion and sedimentation BMPS would be installed around the HDD receiving and entry pits, as well as the discharge structure and pipeline removal work area;
- The top 6-8 inches of topsoil from excavated areas would be separately stockpiled and reintroduced upon the completion of the pipeline installation;
- Disturbed area would be reseeded;
- Soil compaction from the use of heavy equipment would be alleviated by mechanical soil aeration where possible;
- A pre-project worker education program would be held for construction crews involved;
- Qualified biological monitors would be present on the site during all ground disturbing activities;
- All vehicles would be restricted to pre-established work areas and roads.

3. Filling and Dredging in Coastal Waters and Wetlands

The proposed project includes various activities that are a form of filling and dredging in wetlands. The main portion of the project that affects wetlands involves the trenching activity on the north side of Freshwater Slough, connecting the segment of pipeline to be installed under the slough using horizontal directional drilling with the northern tie-in

point with the existing gas line. Because the pipeline will be buried under pasturelands or installed under the slough using HDD, there is no permanent above ground wetland fill associated with the project. However, the project would temporarily disturb 2.75 acres of grazed seasonal wetland during construction. The affected area includes a 100-foot wide construction working strip along the approximately 600 feet of pastureland between the slough and the tie in point with the existing pipeline where most of the activity will be concentrated, and an additional 100-foot-wide by 600-foot-long strip north of the tie-in point where activities will generally be limited to the stringing and welding of the pipe segment to be pulled back through the bore under the slough

Coastal Act Section 30233 allows filling and dredging in wetlands only where there is no feasible less environmentally damaging alternative, where feasible mitigation measures have been provided to minimize adverse environmental effects, and where the project is limited to one of eight specified uses. Additionally, Coastal Act Sections 30230 and 30231 address protection of the biological productivity and water quality of the marine environment from the impacts of development.

Section 30233 of the Coastal Act provides as follows, in applicable part:

> *(a) The diking, filling, or dredging of open coastal waters, wetlands, estuaries, and lakes shall be permitted in accordance with other applicable provisions of this division, where there is no feasible less environmentally damaging alternative, and where feasible mitigation measures have been provided to minimize adverse environmental effects, and shall be limited to the following:*
>
> ...
>
> *(5) Incidental public service purposes, including but not limited to, burying cables and pipes or inspection of piers and maintenance of existing intake and outfall lines.*

Section 30230 of the Coastal Act states, in applicable part:

> *Marine resources shall be maintained, enhanced, and where feasible, restored. Special protection shall be given to areas and species of special biological or economic significance. Uses of the marine environment shall be carried out in a manner that will sustain the biological productivity of coastal waters and that will maintain healthy populations of all species of marine organisms adequate for long-term commercial, recreational, scientific, and educational purposes.*

Section 30231 of the Coastal Act addresses the protection of coastal water quality and marine resources in conjunction with development and other land use activities. Section 30231 states:

> *The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and the protection of human health shall be maintained and, where feasible, restored through, among other means, minimizing adverse effects of wastewater discharges and entrainment, controlling runoff, preventing depletion of ground water supplies and substantially interference with the surface water flow, encouraging, wastewater reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams.* (emphasis added)

The above policies set forth a number of different limitations on what development projects may be allowed in coastal wetlands. For analysis purposes, the limitations can be grouped into four general categories or tests. These tests are:

a. that the purpose of the filling, diking, or dredging is for one of the eight uses allowed under Section 30233;

b. that the project has no feasible less environmentally damaging alternative;

c. that feasible mitigation measures have been provided to minimize adverse environmental effects; and

d. that the biological productivity and functional capacity of the habitat shall be maintained and enhanced where feasible.

A. Permissible Use for Fill

The first test set forth above is that any proposed filling, diking or dredging in wetlands must be for an allowable purpose as specified under Section 30233 of the Coastal Act. The relevant category of use listed under Section 30233(a) that relates to the proposed construction of the water pipeline is subcategory (5), stated as follows:

> *(5) Incidental public service purposes, including but not limited to, burying cables and pipes or inspection of piers and maintenance of existing intake and outfall lines.*

To determine if the proposed fill/dredging is for an incidental public service purpose, the Commission must first determine that the proposed filling/dredging is for a public service

purpose. The project involves the replacement of 1,200 lineal feet of high pressure natural gas transmission pipeline which traverses beneath Freshwater Slough and through grazed seasonal wetlands within an existing PG&E right of way to ensure continued delivery of natural gas for a portion of the coastal communities of Humboldt County. Therefore, since the proposed project would be undertaken to ensure the continued delivery of natural gas service to the public, the Commission finds that the fill/dredging to replace the high-pressure natural gas transmission pipeline expressly serves a public service purpose consistent with Section 30233(a)(5).

The Commission must next determine if the fill/dredging is for an "incidental" public service purpose. The project would replace a segment of an existing 8-inch diameter high-pressure natural gas transmission line with a new segment of 8-inch diameter line. The project would not result in an expansion of natural gas service area. Rather, the project would replace a deterioration section of line with a new one to assure the reliability of the primary natural gas service for the region. Therefore, the Commission finds that the replacement of a segment of high-pressure natural gas transmission line is incidental to the existing natural gas transmission line as replacement of a segment of the line will serve to improve the reliability of the existing natural gas transmission line.

Therefore, the Commission finds that for the reasons discussed above, the dredging (excavation) and filling for the proposed project is for an incidental public service purpose, and thus, is an allowable use pursuant to Section 30233(a)(5) of the Coastal Act.

D. Maintenance and Enhancement of Marine Habitat Values

The fourth general limitation set by Section 30233 and 30231 is that any proposed dredging or filling in coastal wetlands must maintain and enhance the biological productivity and functional capacity of the habitat, where feasible.

As discussed above in the section of this finding on least environmentally damaging feasible alternatives and mitigation, the conditions of the permit will ensure that the project will not have significant adverse impacts on the water quality of various watercourses within the project area and will ensure that the construction of the replacement electric transmission line will not adversely affect the biological productivity and functional capacity of the wetland environments through which the replacement line will be constructed. Therefore, the Commission finds that the project, as conditioned, will maintain the biological productivity and functional capacity of the habitat consistent with the requirements of Section 30233, 30230, and 30231 of the Coastal Act.

E. Conclusion

The Commission thus finds that the proposed dredging and filling is an allowable use under Section 30233(a) of the Coastal Act, that there is no feasible less environmentally damaging alternative, that feasible mitigation is required to minimize all significant adverse impacts associated with the dredging and filling of coastal wetlands, and that wetland habitat values will be maintained or enhanced. Therefore, the Commission finds that the proposed development, as conditioned, is consistent with Sections 30233, 30230 and 30231 of the Coastal Act.

4. Geologic Hazards

Section 30253 states in applicable part:

> *New development shall:*
>
> *(1) Minimize risks to life and property in areas of high geologic, flood, and fire hazard.*
>
> *(2) Assure stability and structural integrity, and neither create nor contribute significantly to erosion, geologic instability, or destruction of the site or surrounding area or in any way require the construction of protective devices that would substantially alter natural landforms along bluffs and cliffs...*

Section 30253 states that development shall neither create nor contribute significantly to erosion, geologic instability or destruction of the site or surrounding areas.

The principal geologic concern related to the project is that horizontal directional drilling activities associated with the installation of the replacement gas line under Freshwater Slough could result in release of drilling fluids (bentonite) into the waters of the slough. Most likely is the release of bentonite as a result of a "frac-out," the propagation of fractures from the drilling bore to the surface of the ground. Frac-out results from drilling through brittle, fractured and/or poorly consolidated rocks or sediments, the maintenance of too-high fluid pressures in the bore during drilling, and drilling at too shallow a depth below the ground.

The most effective way to guard against the release of drilling fluid into the environment through frac-out is to drill in geologic strata that are least susceptible to frac-out. A site specific geotechnical analyses of the geology at the bore site is the most effective way of determining how deep the boring must be made to avoid boring through geologic strata that is susceptible to frac-out. The applicant proposes to drill a directional bore within the coastal zone as part of the proposed project.

The applicant's geotechnical engineering consultant, Kleinfelder, Inc, has performed a geotechnical analyses of the proposed Horizontal Directional Drilling (HDD) bore to determine among other things, the appropriate bore depth (See Exhibit No. 4). As part of the investigation, the consultant drilled a total of five exploratory vertical borings to provide the basis for interpretive geologic cross-sections. The geotechnical investigation includes specific recommended drilling depths for the directional bore, and includes other recommendations for the directional boring contractors to follow.

The Commission's staff geologist has reviewed the geotechnical reports prepared as part of the investigations and has determined that the reports provide adequate information for the horizontal directional drilling contractor to perform the boring in an environmentally safe manner, and recommends that the permittee be required to conduct the boring in accordance with the recommendations contained within the geotechnical report with one exception. The staff geologist notes that the geotechnical report provides data that shows that drilling conditions would be best below about 35 feet in depth, yet the recommended depth for the bore beneath the slough is only indicated at "greater than 15 feet." The staff geologist recommends that drilling be conducted as much as possible at depths greater than 35 feet. Therefore, to ensure that the project will be performed safely and not contribute to geologic hazards, the Commission attaches Special Condition Nos. 1, 2, and 7. Special Condition No. 7 requires the permittee to undertake the horizontal directional drilling activities in accordance with all recommendations contained in the geotechnical report except that the horizontal drilling shall be conducted as much as possible a depths greater than 35 feet. Special Condition No. 1 requires the permittee to submit for the review and approval of the Executive Director a plan showing the horizontal directional drilling bore and demonstrating that the bore will be conducted as much as possible a depths greater than 35 feet.

As noted above, drilling in geologic strata that are least susceptible to frac-out is the most effective way to guard against the release of drilling fluid into the environment from directional boring activities. An additional way to guard against frac-out impacts is to carefully monitor the directional drilling activity as it occurs to look for indications of a frac-out before much of the drilling fluid escapes into the environment. Besides simply observing the ground for the emergence of drilling fluids, the level and pressure of drilling fluids used in the operation can be monitored. Frac-out impacts can be further minimized by replacing drilling fluid used in the directional drilling process with water whenever conditions permit.

With the geotechnical investigation performed by the applicant at proposed drilling sites under Freshwater Slough and with the precautionary measures required by Special

Condition Nos. 1 and 7, the chances that a damaging frac-out would result from the proposed directional drilling activity have been minimized and such an event is unlikely to occur. However, because of the uncertainties about the exact soil conditions existing at each drilling location and the potential for human error in the directional drilling process, it cannot be guaranteed that no damaging frac-out would ever occur. Therefore, the applicant has prepared a contingency plan detailing precautions and cleanup methods that would be employed in the event of release of drilling fluids into the environment be developed (See Exhibit No. 5).

The Commission's staff geologist has reviewed the contingency plan and has determined that the contingency plan is comprehensive and generally will provide the drilling contractor with the needed information for responding to any potential inadvertent return of drilling fluids to the surface. The staff geologist recommends, however, that Material Safety Data Sheets for all materials that will be used in the HDD operation be attached to the contingency plan. Therefore, Special Condition No. 2 requires that a final revised horizontal directional drilling ("HDD") fluid monitoring and spill contingency plan be submitted for the review and approval of the Executive Director that substantially conforms with the previously submitted plan except that Material Safety Data Sheets for all materials that will be used in the horizontal directional drilling operation shall be attached to the plan. In addition, the condition requires that in the event of a spill or accidental discharge of drilling fluids during drilling operations, the permittee must cease all construction and the permittee must submit a revised project and restoration plan that provides for (1) necessary revisions to the proposed project to avoid further spill or accidental discharge of drilling fluids, and (2) restoration of the area(s) affected by the spill or accidental discharge to pre-project conditions. Construction cannot commence until any necessary amendment for the plan to be incorporated into the project has been approved. These requirements will ensure that necessary adjustments to the project to prevent further spills will be made and that the impacts of the approved development on coastal resources will be fully mitigated.

Additionally, the Commission attaches Special Condition No. 9, which requires the applicant to assume the risks of accidental spills of drilling fluids during the proposed directional drilling activities and waive any claim of liability on the part of the Commission. Given that the applicant has chosen to implement the project despite these risks, the applicant must assume the risks. In this way, the applicant is notified that the Commission is not liable for damage as a result of approving the permit for development. The condition also requires the applicant to indemnify the Commission in the event that third parties bring an action against the Commission as a result of the failure of the development to withstand hazards. In addition, the condition ensures that any future assignees of the permit will be informed of the risks, the Commission's immunity from liability, and the indemnity afforded the Commission.

Therefore, the Commission finds that as conditioned, the proposed project is consistent with the requirements of Coastal Act Section 30253 that development shall neither create nor contribute significantly to geologic instability or destruction of the site or surrounding areas.

5. Public Access

Section 30210 of the Coastal Act requires that maximum public access shall be provided consistent with public safety needs and the need to protect natural resource areas from overuse. Section 30212 of the Coastal Act requires that access from the nearest public roadway to the shoreline be provided in new development projects except where it is inconsistent with public safety, military security, or protection of fragile coastal resources, or adequate access exists nearby. Section 30211 requires that development not interfere with the public's right to access gained by use or legislative authorization. Section 30214 of the Coastal Act provides that the public access policies of the Coastal Act shall be implemented in a manner that takes into account the capacity of the site and the fragility of natural resources in the area. In applying Sections 30210, 30211, 30212, and 30214 of the Coastal Act, the Commission is also limited by the need to show that any denial of a permit application based on these sections, or any decision to grant a permit subject to special conditions requiring public access, is necessary to avoid or offset a project's adverse impact on public access.

Although the project is partially located between the first public road and a tidal slough, an inlet of the sea, it would not adversely affect public access. The project site is within a rural, agricultural area used primarily for cattle grazing. There are no trails or other public roads that provide shoreline access within the vicinity of the project that would be affected by the project. Furthermore, the proposed project would not create any new demand for public access or otherwise create any additional burdens on public access.

Therefore, the Commission finds that the proposed project does not have any significant adverse effect on public access, and that the project as proposed without new public access is consistent with the requirements of Coastal Act Sections 30210, 30211, 30212, and 30214.

6. California Environmental Quality Act

Section 13906 of the California Code of Regulation requires Coastal Commission approval of a coastal development permit application to be supported by findings showing that the application, as modified by any conditions of approval, is consistent with any applicable requirements of the California Environmental Quality Act (CEQA).

Public Resources Code Section 21080.5(d)(2)(A) of CEQA prohibits a proposed development from being approved if there are feasible alternatives or feasible mitigation measures available, which would significantly lessen any significant effect that the activity may have on the environment.

The Commission incorporates its findings on conformity with Coastal Act policies at this point as if set forth in full. These findings address and respond to all public comments regarding potential significant adverse environmental effects of the project that were received prior to preparation of the staff report. As discussed herein in the findings addressing the consistency of the proposed project with the Coastal Act, the proposed project has been conditioned in order to be found consistent with the policies of the Coastal Act. As specifically discussed in these above findings which are hereby incorporated by reference, mitigation measures which will minimize all adverse environmental impact have been required. As conditioned, there are no feasible alternatives or feasible mitigation measures available, beyond those required, which would substantially lessen any significant adverse impact that the activity would have on the environment. Therefore, the Commission finds that the proposed project, as conditioned to mitigate the identified impacts, can be found consistent with the requirements of the Coastal Act and to conform to CEQA.

EXHIBITS:

1. Regional Location Map
2. Vicinity Map
3. Site Plan
4. Excerpts of Geotechnical Report
5. Spill Contingency Plan
6. Excerpts of Biological Assessments

APPENDIX A

STANDARD CONDITIONS

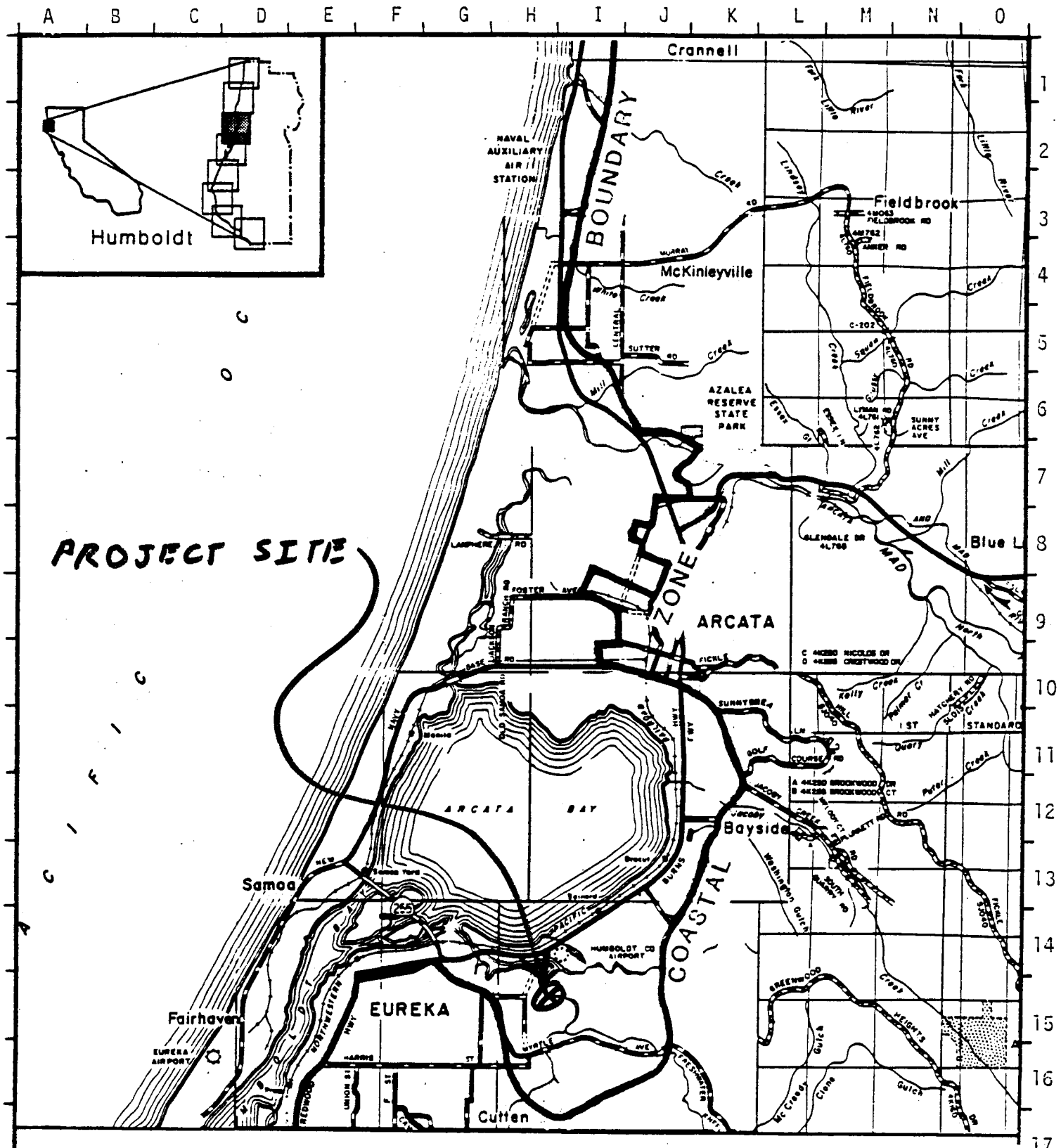
1. Notice of Receipt and Acknowledgment. The permit is not valid and development shall not commence until a copy of the permit, signed by the permittee or authorized agent, acknowledging receipt of the permit and acceptance of the terms and conditions, is returned to the Commission office.

2. Expiration. If development has not commenced, the permit will expire two years from the date on which the Commission voted on the application. Development shall be pursued in a diligent manner and completed in a reasonable period of time. Application for extension of the permit must be made prior to the expiration date.

3. Interpretation. Any questions of intent of interpretation of any condition will be resolved by the Executive Director or the Commission.

4. Assignment. The permit may be assigned to any qualified person, provided assignee files with the Commission an affidavit accepting all terms and conditions of the permit.

5. Terms and Conditions Run with the Land. These terms and conditions shall be perpetual, and it is the intention of the Commission and the permittee to bind all future owners and possessors of the subject property to the terms and conditions.



California Coastal Commission

LOCATION MAP

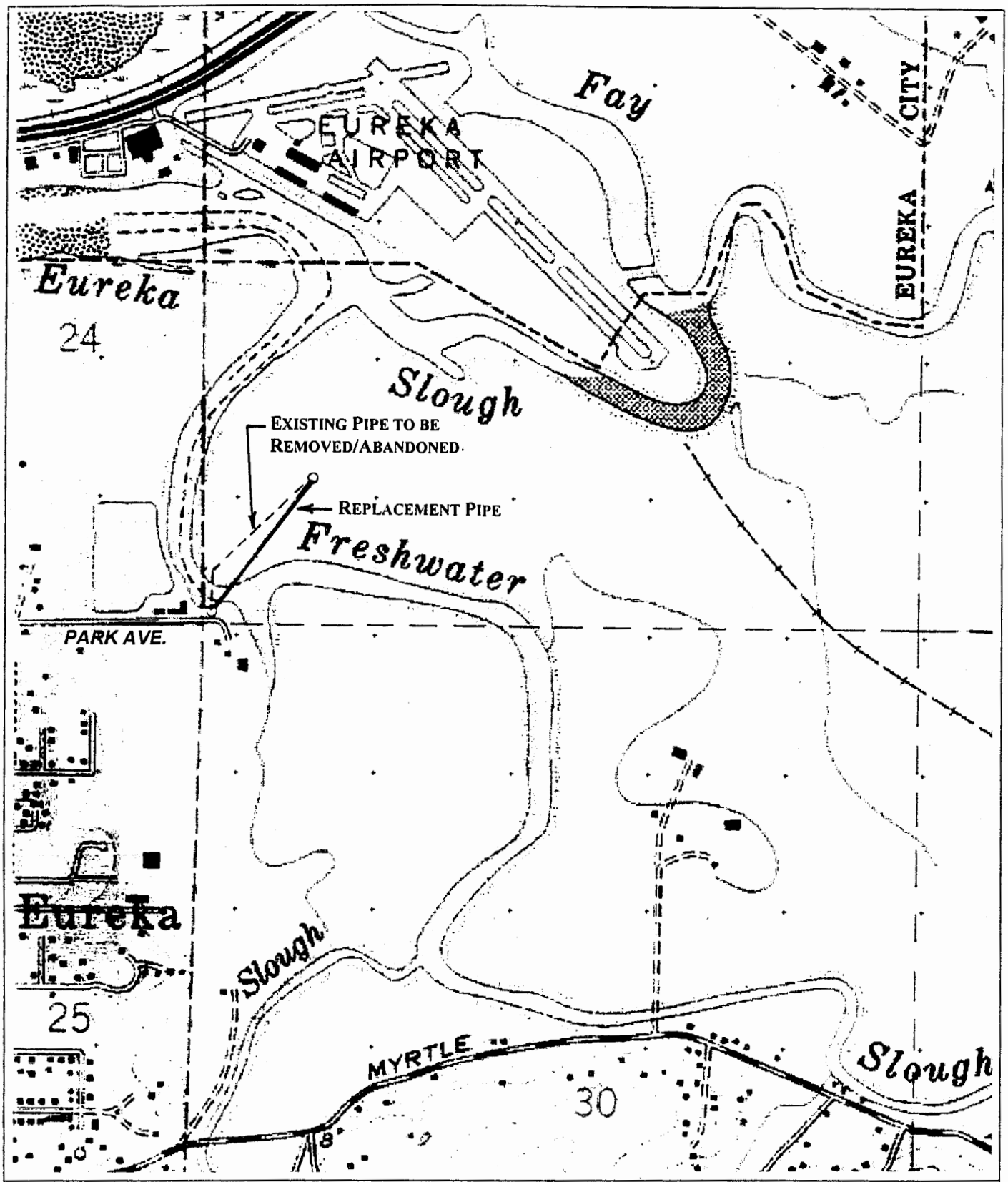
County of Humboldt

EXHIBIT NO. 1

APPLICATION NO. 1-04-010

PG&E

REGIONAL LOCATION



Vicinity Map

PG&E Gas Pipeline L137-B Replacement Project

Planning – Feb04	Arcata South USGS 7.5' Quad

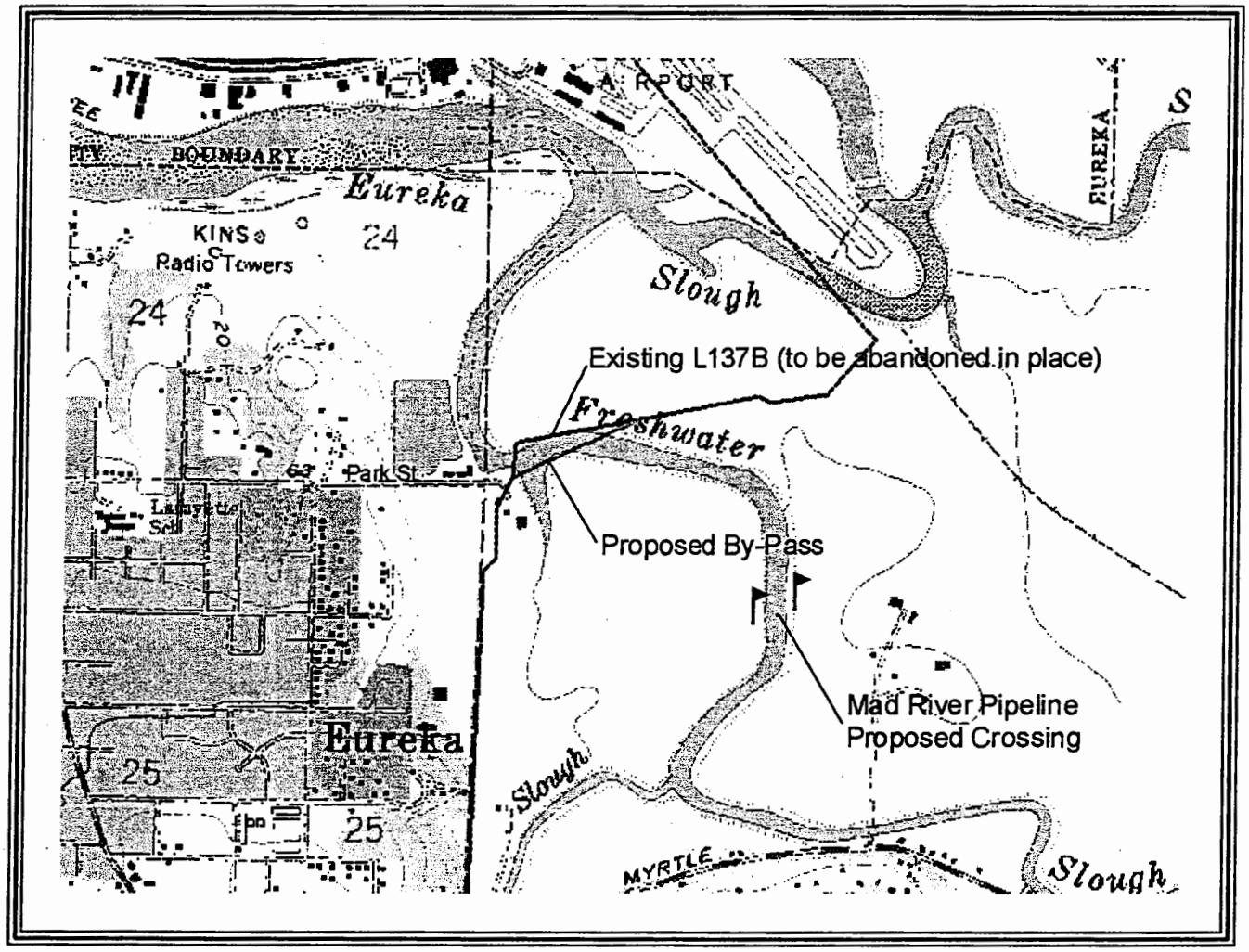
EXHIBIT NO. 2

APPLICATION NO.
1-04-010

PG&E

VICINITY MAP

Figure 1. Project Location



600 0 600 1200 1800 2400 3000 3600 4200 4800 5400 6000 Feet

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EXHIBIT NO. 3
APPLICATION NO. 1-04-010
PG&E
SITE PLAN

Prepared for **Pacific Gas and Electric Company**

GEOTECHNICAL ENGINEERING INVESTIGATION, REPLACEMENT OF GAS LINE 137-B AT FRESHWATER SLOUGH CROSSING, EUREKA, CALIFORNIA

July 9, 2003
File No.: 28524/001

KLEINFELDER
An employee owned company

July 9, 2003
File: 28524/001

James Gamble
Pacific Gas and Electric Company
Geosciences Department, Mail Code N4C
P.O. Box 770000
San Francisco, CA 94177

Subject: **Geotechnical Engineering Investigation**
Replacement of Gas Line 137B at Freshwater Slough Crossing
Eureka, California

We are pleased to submit two copies of our geotechnical investigation report for the proposed replacement of the Gas Line 137-B at the Freshwater Slough crossing in Eureka, California. Kleinfelder previously submitted a "draft" geotechnical engineering report for this project, dated September 13, 2001; however, the pipeline alignment has been modified since that report was submitted. As such PG&E requested an additional boring be drilled and the report be revised. The enclosed report provides a description of the investigation performed and our geotechnical recommendations for design and construction of the proposed pipeline replacement. Additional copies of this report can be provided upon request.

In our opinion, the use of Horizontal Directional Drilling (HDD) proposed for installing the replacement pipeline segments is feasible, but should be planned to accommodate loose sandy soil, soft clay/silt and shallow salty groundwater conditions. This report outlines the soil conditions we encountered in the field and presents our recommendations for installing the new gas pipeline using HDD installation methods. Conclusions provided herein are based on a site reconnaissance, a review of geologic literature associated with the site vicinity, and five exploratory soil borings drilled along the proposed pipeline alignment.

It is our understanding that the bore path is planned to be about 700 feet in length. Consideration will need to be given to accommodate the necessary radius of curvature needed for the 8-inch diameter steel gas pipe. A rule of thumb commonly referred to is that 100 feet of curvature radius is necessary for every inch of pipe diameter. In addition, ASTM recommends that the bore path should have a minimum of 15 feet of cover while crossing a waterway. Contractors should prepare bids based on their ability and experience under such conditions.

The project site is within an area mapped as having a high potential of pipeline damage in a large seismic event. This is largely based on the existence of soft young bay/slough deposits with a high potential for liquefaction occurrence and differential settlement of soft soils. The City of Eureka Waterlines crossing the lowland areas in the vicinity of the site sustained damage as a

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result of earthquake induced liquefaction in 1954 and 1992 (Toppozada, 1995). Based on the subsurface conditions observed, it is our opinion that there could be several inches of settlement occurring within the sand layers across the site. Due to setback of the bore pits and depth of the pipe beneath the slough, the potential for impact to the pipeline as a result of lateral spreading appears low.

PG&E and the selected contractor will need to be aware of requirements, specific to construction projects within waterways, that the U.S. Army Corps of Engineers, U.S. Department of Fish and Wildlife, California Department of Fish and Game, and the California Coastal Commission may impose on this project.

We appreciate the opportunity of providing geotechnical engineering services to Pacific Gas and Electric Company. If you have any questions concerning the information presented, please contact this office.

Sincerely,

KLEINFELDER, INC.

REGISTERED GEOLOGIST
JOHN LYMAN FINNIGSMIER
No. 2028
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA
Exp. 7/2004

John L. Finnigsmier, RG, CEG
Senior Engineering Geologist

REGISTERED PROFESSIONAL ENGINEER
TRAVER E. METCALF, JR.
No. GE2363
Exp. 06/30/05
GEOTECHNICAL
STATE OF CALIFORNIA

Traver E. "Corky" Metcalf, Jr., CEG
Senior Geotechnical Engineer

Kris Johnson, RG, CEG
Senior Project Manager

JF/TM/KJ/jb

cc: Robert Fassett (1)

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GEOTECHNICAL ENGINEERING INVESTIGATION REPORT
HORIZONTAL DIRECTIONAL DRILL REPLACEMENT OF
GAS LINE 137-B AT FRESHWATER SLOUGH, EUREKA, CALIFORNIA

1. INTRODUCTION

1.1. General

This report presents the results of our geotechnical investigation for the planned replacement of the existing 8-inch diameter gas line (137-B) which traverses beneath Freshwater Slough at the east end of Park Street within the City of Eureka, California. Installation of this crossing is planned utilizing horizontal directional drilling (HDD) methods. Kleinfelder previously prepared a "draft" geotechnical investigation report for the project dated September 13, 2001 (Kleinfelder project no. 10-3012-013); however, the alignment of the pipeline crossing has been changed such that the north end of the HDD crossing will be located approximately 400 feet east of the originally planned location. The south end of the HDD installation has not changed significantly. As a result of the realignment and at the request of PG&E, we have drilled an additional boring to characterize the subsurface conditions along the new alignment at the north side of the slough. The purpose of the new boring was to assess if the previously provided information regarding the engineering characteristics of the subsurface soil materials likely to be encountered during the Horizontal Directional Drilling (HDD) pipeline installation were still valid and modify our prior report, as needed. The project location is shown on the Site Geologic Map, Plate 1. The Plan and Profile, illustrating the existing gas line, the planned HDD crossing, and Freshwater Slough is included with this report as Plate 2.

1.2. Project Description

The pipeline replacement is proposed to be completed utilizing HDD installation methods. This will involve drilling horizontally (at a low angle and arc to cross beneath the slough from behind the existing levee on one side to behind the existing levee on the other side. The pipe is

proposed to be comprised of welded steel segments that will be installed within the horizontal drill hole as part of the drilling process. The bore is planned to have a total (horizontal) length of about 700 to 750 feet and will obliquely traverses beneath the slough channel in a northeasterly direction from a bend in the existing gas line on the south side of the slough. Variation in the depth, arc and length may occur depending on the contractors procedures and experience with similar sites.

1.3. Site Description

The project site lies within a flat coastal lowland area about 3000 feet south of Arcata Bay and straddles Freshwater Slough. At the site the slough is about 100- to 150-feet wide and varies in water depth from about 4 to 12 feet depending upon the tide. The slough is bounded by artificial levees that rise about 4 to 6 feet above adjacent lowland area, which is generally at an elevation of about 5 feet above mean sea level (MSL). The levees vary from about 10 to 15 feet in width and are severely eroded on the slough sides such that the side slopes have many slump scars and are commonly steeper than about 1:1 (horizontal to vertical).

About 10 feet west of the existing gas line crossing an existing wooden bridge crosses the slough. The bridge appears to be supported on timber piles, but is in poor condition. A gravel road leads to the bridge from Park Street on the south side while an unimproved dirt road leads away from the bridge to the north.

Land on the north side of the slough is grass-covered pastureland that currently supports grazing cattle. A few pine and cypress trees are present at the north end of gas line crossing atop the levee. South of the slough thick berry bushes are present and a line of cypress trees exists along the south side of the gravel road. About 80 feet south of the levee, a large open area of apparently recently placed fill exists. A house and agricultural structures exist about 200 feet south of the levee.

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1.4. Scope of Services

The original scope of services was outline in our proposal dated June 1, 2001 and included: a literature review; a preliminary site reconnaissance; borehole survey (by PG&E); drilling soil borings; laboratory testing, and preparation of the September 13, 2001 version of this report. Supplemental work was performed in accordance with our *Request for Change Order* dated February 10, 2003. This supplemental work included drilling and sampling of one additional boring along the new bore alignment at the north side of the slough and revision of our report as necessary.

Preparation of this report included:

- A brief review of available geologic and geotechnical data available from public agencies and Kleinfelder's library of geologic and geotechnical information compiled from the Eureka area;
- A preliminary site reconnaissance was performed prior to each episode of drilling (2001 and 2003) to review the site access conditions and borehole locations with PG&E staff, mark the borehole locations for utility clearance, and observe the site surface geologic conditions;
- A total of five borings were drilled to characterize the site subsurface soil conditions and obtain samples for laboratory testing;
- Laboratory tests were performed to assist in soil classification and to obtain pertinent information regarding the soils engineering characteristics relative to the proposed project. The supplemental (2003) work did not include additional laboratory testing.
- Following completion of the initial phase of field and laboratory work (2001), engineering analyses were performed and the September 13, 2001 report prepared;
- Following completion of the supplemental field work (2003), this revised report was prepared to incorporate the supplemental information obtained and recommendations presented, as necessary.

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2. SUBSURFACE INVESTIGATION

2.1. Drilling and Sampling

Our original field exploration was performed on July 11 and 12, 2001. Four borings were drilled at the locations shown on Plate 2. Supplemental exploration (one boring) was performed on May 22, 2003. Borings B-1 and B-2 were drilled south of the slough. Borings B-3 and B-4 were drilled on the north side of the slough along the bore alignment as proposed during 2001. Boring B-5 was drilled on the north side of the slough along the alignment as proposed in 2003. The locations of borings B-1 through B-4 were surveyed by PG&E following drilling in 2001; boring B-5 has not been surveyed.

Borings B-1 through B-4 were drilled with a truck mounted Deeprock 10k drill rig owned and operated by Clear Heart Drilling of Santa Rosa, California. Seven-inch (outside diameter) hollow-stem augers were utilized for subsurface penetration. The borings were drilled to depths ranging between 40 and 50 feet, with the exception of boring B-3. Boring B-3 was attempted at four closely spaced locations, but our penetration efforts were foiled all four times by inability to penetrate concrete blocks encountered at a depth of about 5 feet.

Boring B-5 was drilled with a track mounted Mobile B-53 drilling rig equipped with mud rotary drilling equipment. The method of boring advancement involved rotating 4-inch diameter HQ drill rod while pumping bentonite water and soil cuttings drilling mud through the rods to lift the cuttings out of the borehole around the outside of the casing. The lead rod had 5 carbide tipped drill bit teeth mounted at the end to cut through the soil. The boring was drilled to a depth of 61½ feet below existing site grade.

Drilling and sampling operations were performed under the direction of our field geologist during drilling. Relatively undisturbed samples of the subsurface materials were obtained from the borings using a California drive sampler (with a 2.5-inch inside diameter and a 3.0-inch outside diameter), Modified California drive sampler (with a 2.0-inch inside diameter and a 2.5-

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inch outside diameter), Standard Penetration Test (SPT) drive sampler, or hydraulically pushed Shelby Tubes. The drive samplers were driven 18 inches using a mechanical 140-pound hammer free-falling 30 inches per blow. Blow counts for successive 6-inch penetration intervals were recorded; the blow counts corresponding to the last 12 inches of penetration, or portion thereof achieved, were recorded on the boring logs.

Upon withdrawal of the sampler from the borehole, the samples were removed, examined for field logging, sealed to preserve in-situ moisture content and returned to our Redding laboratory for further examination and possible laboratory testing. Boring logs were initially prepared in the field by our field geologist and edited in the laboratory by our Senior Engineering Geologist. Logs were prepared in general accordance with the terms and nomenclature presented on the Boring Log Legend, Plate A-1 of Appendix A. Logs of the borings are presented in Appendix A as Plates A-2 through A-6.

The blow counts shown on the boring logs reflect the actual blow counts recorded during drilling for the sampler used; conversion factors have not been applied. As such the penetration resistance inferred varies depending upon which sampler was used. The logs indicate which sampler was used at each sampling interval in accordance with the Log Key, Plate A-2.

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2.2. Laboratory Testing

Laboratory tests were performed on selected undisturbed soil samples to evaluate pertinent physical and engineering properties of the soil. Soil index testing, performed in our Redding laboratory, included measurements of unit weight, moisture content, Atterberg Limits, and grain size distribution. The results of the index testing are posted on the boring logs. Additionally, graphical plots of the Atterberg Limits and grain size distribution tests are included in Appendix B (Plates B-1 and B-2).

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3. GEOLOGY

3.1. Tectonic Setting

The Cascadia Subduction Zone (CSZ) is located approximately 30 miles offshore in the vicinity of Eureka and extends northward 750 mile s (Toppazada et al, 1995). The CSZ is a thrust fault zone and delineates the convergent margins of several major tectonic plates. The Gorda plate, located west of the CSZ in the Humboldt County area, is being subducted beneath the westward over-thrusting North American plate. About 30 miles southwest of Eureka, the CSZ terminates at the Mendocino Triple Junction (MTJ). At MTJ, a third plate, the Pacific Plate moves laterally relative to the other two plates, north relative to the North American Plate and west relative to the Gorda Plate. The onshore margin is known as the San Andreas Fault and the offshore margin is known as the Mendocino fault. As a result of ongoing tectonic activity within the CSZ and at the MTJ, the Humboldt County area is a dynamic region of California that has been subject to subject to episodic tectonic deformation including folding, faulting, sedimentation, erosion an and high levels of seismicity. The CSZ thrust faults dip beneath Humboldt County at a shallow angle; hence, the leading edge of the North American Plate, beneath the Humboldt Bay region, is thin and subject to significant deformation and seismic activity (Dengler et al, 1992).

3.2. Regional Geology

Basement rock in the region typically consists of Franciscan Complex rock of Upper Jurassic to Cretaceous age (about 65 to 140 million years old). The Franciscan Complex rocks exposed within the region typically consists of deep marine sedimentary and volcanic rocks that have been significantly deformed. Formation of a fore-arc basin adjacent to the CSZ during the late Tertiary (about the last 2 to 25 million years ago) led to the deposition of a thick sequence of marine and non-marine sedimentary rocks that overlie the basement rocks in the Humboldt Bay region (Dickinson et al, 1979). Subsequent erosion and formation of the Humboldt Bay Basin during the Pleistocene resulted in deposition of predominantly non-marine sediments including the Hookton and Falor formations. These Pleistocene formations typically consist of poorly

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consolidated sandstone with minor claystone and conglomerate. Latest Pleistocene and Holocene sedimentation processes have resulted in accumulation of unconsolidated silt, clay and sand within Humboldt and Arcata Bay and in the adjacent lowland/slough areas, as well as alluvium within the river and steam channels and flood plains.

3.3. Site Geology

As shown on the Site Geologic Map, Plate 1, the project site is located along the western margin of a large lowland area shown on published geologic maps (Kilbourne, 1980 and Kelly, 1984) to be underlain by Late Pleistocene to Holocene age bay and slough sediments (map symbol Q). The sediments generally consist of unconsolidated silt and clay rich in organic detritus and interbedded with layers of fine-grained sand. A few hundred yards west of the site, the slightly elevated terrace area, which continues west beneath the downtown area of Eureka, is mapped as underlain by the Pleistocene age Hookton formation (map symbol Qh). The Hookton formation consists of poorly consolidated fine-grained non-marine sandstone that exhibits a characteristically orange color. The Hookton formation is also mapped as underlying upland areas about one-half mile south of the site and one mile east as well. Younger River Terrace deposits (map symbol Qrt), associated with local streams, are mapped at the margins of the lowland areas adjacent to streams. The Qrt deposits typically consist of alluvial sand and gravel. Basement rock of the Franciscan formation crops-out in the low hills east of the Freshwater fault and underlies the Quaternary sediments west of the fault (Kelly, 1984).

3.4. Faulting and Seismicity

Relative to active faulting, the region is predominantly under the influence of the Cascadia Subduction Zone (CSZ). The southern portion of CSZ consists of 257 km (160 mile) long Gorda Plate being subducted beneath the North American Plate. According to Toppozada et. al. (1995), CSZ intersects the surface at about 60 km (40 miles) west of Eureka beneath about 500 meters of water. The interface between Gorda Plate and North American Plate dips easterly at about 11 degrees, and the seismogenic (earthquake-producing) zone extends from about 20 km (12 miles)

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eastward of the surface trace of the CSZ at a depth of 8 km (5 miles) for about 80 km (50 miles), to a depth of about 23 km (14 miles). The hypocentral distance to the seismogenic zone from the site is about 18 km.

With respect to crustal faults on the North American Plate, several mapped active faults exist in the vicinity of Eureka; however, no known active faults cross the site (Hart and Bryant, 1997 and Kilbourne et al, 1980). The site is located about 8 km southwest of the Fickle Hill fault, 11 km northeast of the Little Salmon fault, and about 14 km southwest of the Mad River/McKinleyville fault. There are several other faults in the vicinity that are not considered to be active. In example, the Freshwater fault is mapped by Kelly (1984) about 5 kilometers northeast of the site. The activity status of this Quaternary fault is disputed; however, no evidence of Holocene ground displacement is known.

Table 1 lists regional faults, considered to be significant independent seismic sources, and their seismic parameters. Locations of the active and potentially active faults in the area with respect to the subject site are shown on Plate 1. The locations of the faults and associated parameters presented on Table 1 are based on data presented by Real et. al. (1978), Toppozada et. al. (1978), Wesnousky (1986), Jennings (1994), Topozada et. al. (1995), Petersen et. al. (1996), and Frankel et. al. (1996). The maximum earthquake magnitudes presented in this table are based on the moment magnitude scale developed by Kanamori (1977).

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TABLE 1: SIGNIFICANT FAULTS				
Fault Name	Fault Length (km)	Closest Distance to Site (km)[1]	Magnitude of Maximum Earthquake[2]	Slip Rate (mm/yr)
Little Salmon	34	11	7.0	5
Mad River/McKinleyville	52	14	7.1	0.7
Fickle Hill	34	8	6.9	0.6
Trinidad	88	19	7.3	2.5
Cascadia Subduction Zone (Gorda segment)	257	18	8.4	35
Big Lagoon-Bald Mountain	88	36	7.3	0.5
Briceland-Garberville	39	75	6.9	9
Mendocino	179	68	7.4	35
San Andreas (1906)	470	83	7.9	24

[1] Hypocentral distance to seismogenic zone for the CSZ and closest horizontal distance to the point directly above the rupture for all other faults
[2] Moment magnitude

The Humboldt Bay region is one of the most seismically active areas in North America due to its tectonic setting. There have been six earthquake of magnitude 6.6 to 7.1 in this region since 1990. A major seismic event on the CSZ or any of the regional crustal faults could cause significant ground shaking at the site. The most significant seismic sources in the region are the plate boundaries, the CSZ, the Mendocino fault and the San Andreas fault. The crustal faults within the North American Plate discussed above represent significant seismic sources as well. A third significant seismic source area is the subducting Gorda plate, which has numerous internal faults that commonly exhibit seismicity.

Seismic Shaking Hazard Maps of California (Petersen et al, 1999) shows the site to be within a zone where a peak horizontal ground acceleration in excess of 0.8g should be expected for the Design Basis Earthquake (DBE). The DBE is defined as a seismic event that has a 10% probability of exceedance within a 50-year period (return period of 475 years). For the City of Eureka Mad River Water Pipeline project, Kleinfelder (1999) included a probabilistic seismic hazard assessment (PSHA) for several locations along the water pipeline, located east of the project site, where similar geologic conditions exist. Peak ground accelerations of 0.8 to 0.9g were predicted where sites were underlain soft bay sediments, such as exist at this site.

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4. SUBSURFACE CONDITIONS

4.1. Soil and Groundwater

The soils encountered within our borings drilled for this investigation confirm that the underlying materials are primarily unconsolidated bay/slough sediments. Surficial fill material related to construction of the existing slough levees, approaches to the existing wooden bridge, and filled in marsh around the southern end of the planned HDD bore was also encountered. Logs of the individual borings are presented in Appendix A. Condensed versions of the boring logs are also shown on the Plan and Profile, Plate 2.

The upper one to five feet of soil encountered consisted of fill except within boring B-5 where no fill was encountered. The fill materials consist of variable mixtures of sand, silt and clay. At the north side approach to the existing wooden bridge numerous concrete blocks were encountered at a depth of 5 feet. Although four attempts were made, these concrete blocks, which were apparently placed as ballast material for the bridge approach fill foiled our efforts to drill deeper than 5 feet at the location of boring B-3.

Considering the realignment proposed following our 2001 field investigation, borings B-1, B-2 are located near the southern end of the planned HDD bore and B-5 is located near the north end. Within these borings the native estuarine soils encountered typically consist of soft and wet silty clay and/or lean clay of low to moderate plasticity and containing isolated thin lenses of silty sand. A layer of black clay rich in organic material was encountered within boring B-2 between the depths of about 15 and 19 feet below existing grade. All three borings encountered a relatively clean, medium dense sand layer within the depth range of 15 to 28 feet below existing grade. The thickness of the layer varied from about 5 to 9 feet within the three borings. Additionally within boring B-5 a second similar sand layer apparently about 5 feet in thickness was encountered between about 30 and 35 feet below existing grade. Below the sand layers, the natural materials encountered were typically medium stiff to stiff moderately to highly plastic clay and/or elastic silt with thin sandy lenses.

Groundwater was encountered at 5.5 to 7 feet below the existing ground surface and was observed to rise and fall within the open borehole with diurnal tide changes. Also within several of the samples a strong hydrogen sulfide odor was detected and gas bubbles were observed rising through the water within boring B-2 before it was backfilled.

4.2. Hydraulic Conductivity of Sands

The coefficient of hydraulic conductivity of the fine-grained sand with silt (SP-SM) and fine grained sand materials sampled from borings B-2 and B-4 were approximated using Hazen's formula (Cedergren, 1989):

$$K\ (cm/sec) = C_1 D_{10}^{2}$$

where: C_1 = ranges between 90 and 120

D_{10} = effective size in centimeters

The following coefficients of hydraulic conductivity were calculated using the gradation analysis test results performed on sands encountered at the site:

Table 2: Coefficients of Hydraulic Conductivity

Boring No.	Depth (ft)	Range for Coefficient of Hydraulic Conductivity, k (cm/sec)
B-2	21.0	9.1×10^{-3} to 1.2×10^{-2}
B-4	20.0	6.2×10^{-3} to 8.3×10^{-3}

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5.1. Inadvertent Returns of Drilling Fluid

5.1.1. General

Frac-out is a term used to describe the unintended return of drilling fluids to the ground surface. Drilling fluids may flow (migrate) through existing fractures in rock, soil, or desiccated clay. Where pathways for fluid migration are not present, such as in moist clays or bedrock with little to no fracturing, excess drilling fluid pressure can cause plastic deformation of the soil around the borehole creating and propagating fractures. This phenomenon is known as hydraulic fracturing.

5.1.2. Drilling Fluid Migration

Drilling fluid migration occurs when the drill bit encounters fractures or voids within rock or soil. Fluid migration is recognized by a decrease of fluid in the return tank, a drop in drilling fluid pressure, or a complete loss of drilling fluid return.

If fractures or interstitial pore spaces are small or discontinuous, they may fill with solids contained in the drilling returns as drilling progresses beyond them. Once the fractures or pore spaces are filled, fluid will return up the borehole again and fluid pressure will increase until another fracture is encountered.

5.1.3. Hydraulic Fracturing

Hydraulic fracturing occurs when borehole pressure causes plastic deformation of the soil surrounding the borehole, initiating and propagating fractures in the soil mass. The resistance to plastic deformation and fracturing is a function of soil strength (cohesion and friction angle), overburden pressure, and initial pore pressure. In general, hydraulic fracturing resulting in return

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of drilling fluid to the surface can occur in loose sand or soft clay at depths less than about 20 feet and at a borehole pressure of about 50 psi or greater.

Unwanted returns of drilling fluid due to hydraulic fracturing near the bore entry point are rare since the drilling returns flow easily back through the borehole to the entry point. Sufficient soil and bedrock cover should be maintained over the borehole to provide adequate weight and an appropriate factor of safety against hydraulic fracturing. Where the HDD crosses beneath an environmentally sensitive creek or channel, such as Freshwater Slough, the American Society of Testing and Materials (ASTM F-1962-99) guidelines recommend that the depth below the bottom of the creek bed be at least 15 feet.

The overburden pressure may be calculated using the unit weights in the table below, which are based on laboratory testing performed for this project and consider saturated (below groundwater) soil conditions.

Table 3: Estimated Unit Weight of Subsurface Material

Soil Description	Saturated Unit Weight (pcf - pounds per ft.^{3})	Submerged Unit Weight (less 62.4 pcf)
Soft to medium stiff lean clay/silt (CL, ML)	104-111	42-49
Loose to medium dense silty, clayey and clean, fine-grained sand (SM, SC, SP)	115-121	53-59
Stiff lean clay, fat clay, elastic silt (CL, CH, MH)	111-120	49-58

The soils directly beneath the slough crossing generally consist of soft to medium stiff fine-grained soils or loose to medium dense sandy soils to depths of approximately 15 to 20 feet. Within the depth range of 20 to 60 feet the fine-grained soils are typically stiff and the sandy soils medium dense to dense. Since the HDD process involves drilling fluid at high pressures, there are potential risks to the slough that are addressed below.

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5.2. Drilling Conditions and Recommendations

The drilling subcontractor shall review the provided boring logs which provide an indication of possible adverse drilling conditions, and be prepared to adjust drilling equipment and procedures if and when adverse conditions are encountered. However, these logs may not identify all adverse conditions through the entire HDD drilling length. As such, the Drilling Contractor must be aware of the range of adverse drilling conditions inherent within the slough deposits, and be prepared to adjust drilling equipment and procedures accordingly.

The table below presents a chart of suitable soil and rock conditions for horizontal directional drilling (HDD).

Table 4: Soil Conditions and Suitability of Horizontal Directional Drilling

Soil Conditions	Generally Suitable	Difficulties May Occur	Substantial Problems
Soft to very soft clays, silts, and organic deposits		X	
Medium stiff to very stiff clays and silts	X		
Hard clays and highly weathered shales	X		
Very loose to loose sands above and below the water table (Not more than 30% gravel by weight)		X	
Medium dense to dense sands above or above the water table (Not more than 30% gravel by weight)	X		
Very loose to dense gravelly sand (30% to 50% gravel by weight)		X	
Very loose to dense gravelly sand (50% to 85% gravel by weight)			X
Very loose to very dense gravel			X
Soils with significant cobbles, boulders, and obstructions			X
Weathered rocks, marls, chalks, and firmly cemented soils	X		
Slightly weathered to un-weathered rocks		X	

Ref. ASTM F 1962-99

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At depths above about 20 feet, soft clays, silts, organic soils and loose sand lenses were encountered in our borings. Additionally, at depths between about 15 and 35 feet, medium dense, relatively clean sands were encountered. The installation of the proposed pipeline within these materials is feasible; however, the following adverse drilling conditions should be anticipated within the upper about 35 feet:

- Difficulty steering including possible tendency for the drill head to sink on the entry side and resist turning up on the exit side in loose or soft soils.
- Partial or complete loss of drilling fluid returns in poorly graded sands and soft silt/clay.
- Decrease in or loss of borehole stability in the loose sands and soft silt/clay

Generally below depths of 30 to 35 feet, stiff cohesive soils were encountered. Drilling conditions should improve below this depth.

The adverse drilling conditions discussed above may be partially or completely mitigated through the use of the following drilling practices:

- Drilling deeper beneath the slough to stay primarily within the stiff cohesive soils at depth.
- The HDD drilling subcontractor should prepare a drilling fluid program specifically designed for the site soil conditions. The program should include any additives the subcontractor may need to employ including additives to increase gel and filter cake strength, inhibit caving and squeezing, and reduce stickiness. Possible loss of circulation materials and grouting materials should also be addressed in the plan.

- It is recommended that the ground surface and the slough water be monitored during drilling for indications of possible drilling fluid returns.
- Monitoring of adjacent underground utilities should also be performed during HDD activities.

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PG&E and the selected contractor will need to be aware of requirements, specific to construction projects within waterways, that the U.S. Army Corps of Engineers, U.S. Department of Fish and Wildlife, California Department of Fish and Game, and the California Coastal Commission may impose on this project. Such items are recommended to be identified in their bid documents.

5.3. Drilling Fluid Program Design Guidelines

5.3.1. General

The drilling contractor should develop a Drilling Fluid Program as part of the HDD Bore Plan. A properly designed drilling fluid program can substantially reduce losses due to frac-out, stuck product pipe, or loss of tooling. The drilling fluid program should take into account anticipated soil conditions, fluid selection, drill bit and reamer selection, and volume calculations.

5.3.2. Soil Conditions

For the purpose of drilling fluid design, earth materials are divided into two categories: Inert, including silt, sand, gravel, and rock; and reactive, including clay and shale. Information regarding subsurface conditions likely to be encountered at the site is provided in the Subsurface Conditions section of this report as well as in the Logs of Test Borings and laboratory test results presented in Appendix A.

5.3.3. Drilling Fluid Selection

Drilling fluid program base fluid (DFP-BF) should be designed for site-specific soil conditions. The base fluid may consist of either a bentonite or polymer base and water, with additives to achieve specific fluid properties.

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For example, a base fluid for an inert alluvial soil might consist of:

- 100 gallons of water
- 35 pounds of Baroid Bore Gel
- 4 pounds of Baroid Quicktrol (filter cake enhancer)
- 1/4 pound of Baroid No-Sag (gel strength enhancer)

In reactive soils the use of PHPA polymers to inhibit swelling and wetting agents to reduce stickiness may prove beneficial. Additives may be needed to treat make-up water containing excess amounts of calcium or chlorine. Water within Freshwater slough and subsurface soil is brackish; hence, it contains salt (chloride). Salt is detrimental to base fluid performance and should not be present in make-up water. Bore hole stability and positive pressure should be maintained to minimize infiltration from formations containing salt water.

The drilling contractor should submit a base fluid design as well as a list of additives, loss of circulation materials, and grouting materials that may be used on the project. Assistance with drilling fluid selection can be obtained from reputable drilling fluid suppliers.

5.3.4. Drill Bit and Reamer Selection

Drill bits and reamers should be selected based on anticipated subsurface conditions and past experience. The drilling contractor should be prepared with a variety of bits and reamers that have worked well in similar soil conditions.

5.4. Seismic Considerations

5.4.1. Soil Instability Due to Liquefaction

Liquefaction is a phenomenon whereby loose, saturated, granular soil deposits lose a significant portion of their shear strength due to excess pore water pressure buildup resulting from cyclic loading, such as that caused by an earthquake. Among other effects, liquefaction can result in

densification of such deposits after an earthquake as excess pore water pressures are dissipated. The primary factors affecting liquefaction potential of a soil deposit are: (1) level and duration of seismic ground motions; (2) soil type and consistency; and (3) depth to groundwater.

The project site is within and area mapped as having a high potential of pipeline damage in a large seismic event (Toppozada, 1995). This is largely based on the existence of soft young bay/slough deposits with a high potential for liquefaction occurrence and differential settlement of soft soils. The City of Eureka Waterlines crossing the lowland areas in the vicinity of the site sustained damage as a result of earthquake induced liquefaction in 1954 and 1992 (Toppozada, 1995). Based on the conditions observed, it is our opinion that seismically induced settlement on the order of 1 to 4 inches could occur within the sand layers across the site.

Lateral spreading is a potential hazard commonly associated with liquefaction where extensional ground cracking and settlement occur as a response to lateral migration of subsurface liquefiable material. This phenomenon typically occurs adjacent to slopes or incised channels, i.e. Freshwater Slough. The simplest mitigation method for reducing the risk of lateral spreading damage is setback from the edge of the slope or channel. As shown on Plate 2, the bore pits are setback nearly 200 feet from the channel and the pipeline will cross beneath the channel more than 15 feet below the bottom of the channel. This should significantly reduce the potential for pipeline damage due to lateral spreading.

Even though the liquefaction susceptibility of a site may be known, it is extremely difficult to predict ground deformations patterns. However, historical seismically induced breaks of the City of Eureka water pipe occurred at non-welded joints.

5.4.2. Fault Rupture

The subject site is not within a fault rupture hazard zone. As such, surface fault rupture due to a seismic event is not anticipated to occur at the project site. Ground rupture due to faulting could occur at other locations where the alignment crosses fault rupture hazard zones. The delineation of such areas (if any) is beyond the scope of this investigation.

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6. ADDITIONAL SERVICES

6.1. Plans and Specifications

We recommend Kleinfelder conduct a general review of final plans and specifications to evaluate that our recommendations have been properly interpreted and implemented during design. In the event Kleinfelder is not retained to perform this recommended review, we will assume no responsibility for misinterpretation of our recommendations.

6.2. Project Bid Documents

It has been our experience contractors bidding on the project often contact us to discuss the geotechnical aspects of the project. Informal contacts between Kleinfelder and an individual contractor could result in misleading or incomplete information being provided to the contractor. Therefore, we recommend a pre-bid meeting be held to answer any questions about the report prior to submittal of bids. If this is not possible, questions or clarifications regarding this report should be directed to the project owner or his designated representative. After consultation with Kleinfelder, the project owner (or his representative) should provide clarifications or additional information to all contractors bidding the job.

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Pacific Gas and Electric Company

HDD Fluid Release Contingency Plan
G/L 137B Crossing of Freshwater Slough Project.

Those HDD projects involving sensitive biological resources such as waterways, bodies of water, and wetland areas, require the development of a frac-out contingency plan to deal with inadvertent releases of drilling fluids into terrestrial or aquatic environments. The goal of the plan is to effectively control, manage, and report any surface release of drilling fluids associated with HDD operations of a project. The plan effectively involves eight sections or processes:

1. Establishment of an on-site materials list to manage and control drilling fluid surface releases, relevant to the project size and environmental issues involved with each project.
2. Pre-construction protection measures.
3. Monitoring program.
4. Containment and control methods for frac-outs.
5. Notification processes and contacts (Agency Notification).
6. Evaluation Plan
7. Abandonment Contingency Plan
8. Haz-Mat Spill Contingency Plan

EXHIBIT NO. 5
APPLICATION NO. 1-04-010
PG&E
SPILL CONTINGENCY PLAN (1 of 5)

1. General On-Site Materials Checklist

Types and amounts of materials needed and their relevancy to each particular project should be discussed and determined in the planning portion of each project. The following is a general list that should cover most HDD project situations:

- Industrial grade PVC mesh with steel T-posts
- Large diameter standing pipe material (such as 55-gallon open ended drums*, heavy PVC/CMP pipe, or culvert type material)
- Heavy weight plastic clean gravel filled sand bags (recommended 100)
- Silt fencing (300-feet recommended)
- Straw bales
- Straw log or wattles (100 feet recommended)
- Geotek filter bags, 10-by-12-foot size or equivalent
- Several 5-gallon plastic buckets
- Shovels (flat blade and round nose)
- Wide heavy-duty push broom
- Absorbent pads and plastic sheeting for placement beneath motorized equipment operating in the vicinity of a riparian/stream zone
- Vacuum hose (200-feet minimum)
- Portable pumps
- Vacuum trucks (800 and 3000-gallon capacities)

2. Recommended Protection Measures

The following protection measures are recommended prior to beginning HDD operations:

1) Lining of entry or "return" pit with an impervious, flexible membrane.

*These may be welded together to achieve the necessary water level clearance

2) Addition of dye to drilling fluid to aid in visible detection.

3) Creating an earth berm around drilling fluid mixing and pumping areas to contain any inadvertently spilled fluid. These areas may also be reinforced with straw bales or silt fencing.

4) Erecting sedimentation devices between the drilling staging areas and waterway. This also includes any nearby culvert or drainage ditch that leads to the waterway.

3. On-Site Monitoring

During drilling operations, visual inspection along the bore path of the alignment shall take place at all times and the environmental monitor shall keep a written log of daily construction activities. The drilling contractor shall regularly provide the monitor with the following information throughout the entire HDD procedure:

- Position of the drill head in relation to the point of entry
- Estimate of the volume of drilling fluid pumped during the drilling process, as compared to the volume of current returns
- Abnormal drilling fluid pressures at time of occurrence
- Changes of drilling fluid contents
- Equipment breakdowns and repairs

Some loss of returns may be inevitable as drilling fluids are absorbed by the lateral and subterranean fractures within the formation. A complete and sudden loss of returns serves as a signal to both the operator and the monitor that something more significant may be occurring and to watch closely for a possible surface release. ***In the event of a frac-out, the on environmental monitor has the authority to halt all operations until appropriate procedures are implemented.***

4. Containment and Control

Upon detection of a terrestrial or aquatic frac-out, the following plan of action shall be placed in effect:

1) Directional boring will stop immediately and the drill head will be pulled back to relieve pressure on the frac-out.

2) For terrestrial frac-outs in the project area, an earth berm will be constructed around it for containment. On-site materials consisting of industrial grade PVC mesh with steel T-posts and natural straw bales may also be installed around the frac-out areas to contain the fluid.

3) For frac-outs occurring beneath a waterway any individual or combination of the following approaches may be used to contain the drilling fluid:

    a) A sand bag berm surrounding the frac-out area (effective at waters edge situations).

    b) A standing pipe (such as 55-gallon open ended drums, heavy PVC/CMP pipe, or culvert type material) tall enough to exceed the water level should be placed over the frac-out and sealed at the base by sand bags.

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c) Industrial grade PVC mesh with steel T-posts and natural straw bales installed above and below the crossing site where the depth of the waterway allows.

4) Appropriated agency notifications shall be made.

5) After these procedures are implemented, any drilling fluid that has been contained will be returned to the entry pit for re-use or removed using a vacuum truck and then transported to a disposal site as approved by the California Division of Oil & Gas.

5. Notification Contacts

The following agencies will be notified immediately in the event this contingency plan is implemented:

1. Department of Fish and Game, Mike Maschmeier, 707.445.6493
2. National Marine Fisheries Service, Keytra Meyer, 707.825.5168
3. U.S. Army Corps of Engineers, Carol Heidsiek, 707.443.0855
4. Regional Water Quality Control Board, Dean Prat, 707.576.2801
5. California Coastal Commission, Bob Merrill, 707.445.7833

6. Evaluation Plan

After containment and notification steps have been taken, PG&E management, designee contract drilling engineer, or contractor's representative will evaluate the feasibility of continuing the boring process. At that time it will be decided whether to continue with the bore or implement the abandonment contingency plan (ACP) after evaluating the following:

1) The exact location of the drilling head assembly will be verified with portable locating equipment. If it is determined that the drilling profile does not match the planned profile, and exceeds design limits, the ACP will be implemented.

2) If the location and profile are within design limits, the specific weight of the drilling mud will be verified to ensure a slightly overbalanced condition to the surrounding formation. The specific weight will be adjusted as necessary.

3) If location, profile, and drilling mud weight are determined to be within design limits, and frac-out of Bentonite slurry is controlled, the contract drilling engineer may proceed.

4) Should it be determined that the stability of the bored crossing is in serious question, even if location, profile, and drilling mud weight are deemed satisfactory, the ACP will be implemented.

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7. Abandonment Contingency Plan

The following general plan would be executed if for any reason the drilling operation were forced to be suspended and the partially completed drilled hole abandoned.

During Pilot Hole Drilling

If drilling were to be suspended during pilot hole drilling, the following general procedures would be executed:

1) Advancement of the drill string would be halted.

2) Cement or Bentonite mixing and pumping equipment would be mobilized to the drilling location.

3) Cement or Bentonite pumping equipment would be rigged up to the drill string.

4) Drill string would be withdrawn and hole pumped with cement or industry approved fill material to displace the Bentonite slurry material.

During Reaming

If Drilling were to be suspended during the reaming of the hole, the following general procedures would be executed:

1) Pull back of the reaming string would be halted.

2) Cement or Bentonite mixing and pumping equipment would be mobilized to the drilling location.

3) Cement or Bentonite pumping equipment would be rigged up to the drill string.

4) If possible, the reamer would be replaced with a cementing head.

   a) The reamer would be replaced with a cementing head.

   b) Drill string would be withdrawn and hole pumped with cement or industry approved fill material to displace the Bentonite slurry material.

5) If reamer could not be pushed back to exit end, then:

   a) Drill string would be withdrawn and hole pumped with cement or industry approved fill material to displace the Bentonite slurry material.

   b) Drilling rig would rig down at entry end and right up at exit end.

   c) Run in pilot hole with cement head on pilot hold drill string until previously cemented reamed hole is pumped.

   d) Drill string would be withdrawn and hole pumped with cement or industry approved fill material to displace the Bentonite slurry material.

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8. Hazardous Materials Contingency Plan for Horizontal Directional Drilling Construction Phase

The only known hazardous materials that will be on site during the construction phase will be fuels and lubricants in construction equipment. No fuels or lubricants will be stored on the construction location. The exposure to a fuel or lubricant spill will be limited to the actual tank capacity of the equipment.

In the event of a fuel or lubricant spill on the construction site the following plan is to be implemented:

1) Primary action at the spill location:

   a) Notification of the PG&E representative or designee.

   b) Contain the spill by building earth dikes to surround the spill.

2) Secondary action:

   a) For small quantity spill apply absorbent pads, stored in the contractor construction storage container on site. All absorbent pads to be disposed of in plastic bags and placed into container marked for proper disposal.

   b) For larger quantity spills request the contracted hazardous waste removal contractor to mobilize to the site with a vacuum truck.

   c) If any hazardous material reaches any waterway or ditch containing water deploy absorbent booms which are stored at the construction container on site.

3) Final clean-up:

   a) All contaminated soil or other contaminated materials to be removed and placed into plastic bags or other approved container and disposed of off site by the contracted hazardous waste contractor.

   b) Perform any remedial backfill and grading to restore area of spill.

4) Notifications:

   a) Immediately notify on site contractor supervisor and owner representative.

   b) Make all notifications to county and state agencies as appropriate and as required by the regulations of the local emergency services. A copy of the notification information is in the possession of the contractor site supervisor.

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NRM
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October 8, 2003

EXHIBIT NO. 6
APPLICATION NO.
1-04-010
PG&E
EXCERPTS OF
BIOLOGICAL ASSESSMENT
(1 of 21)

Jesse Viscarra, Environmental Coordinator
Pacific Gas and Electric Company
3400 Crow Canyon Road
San Ramon, California 94583

Re: Mitigation recommendations for avoiding or minimizing impacts to rare plant species within the G/L 137B HDD Crossing of Freshwater Slough Project Area.

Dear Mr. Viscarra,

This letter serves as an addendum to the botanical report dated October 8, 2003 for the PG&E proposed G/L 137B HDD Crossing of Freshwater Slough project. The purpose of this letter is to provide recommended mitigation measures for avoiding or minimizing impacts to sensitive botanical resources with the implementation of project activities. As detailed in the botanical report, two CNPS-listed species occur along the salt/brackish marsh habitat on the south side of Freshwater Slough within the proposed re-alignment path of the G/L 137B. These species are Humboldt Bay owl's-clover (*Castilleja ambigua* ssp. *humboldtiensis*) and western sand spurry (*Spergularia canadensis* var. *occidentalis*).

As discussed in the above-mentioned botanical report, there is the potential for impacts to the Humboldt Bay owl's-clover and western sand spurry occurrences in the project area with project implementation. Because Humboldt Bay owl's-clover and western sand spurry both are annual species that typically complete their yearly life cycles by late summer to early autumn, it would be in their best interest if on-the-ground project activities were delayed until after approximately October 1 (or whenever the species have set seed, as determined by a qualified botanist). If this were the case, then the project's potential impacts on these rare plant occurrences would likely be to their potential seed banks rather than to actual plants. Direct impacts to seed banks could occur as a result of trampling by foot traffic causing burial or breakage of seeds or by seed bank contamination due to a "frac-out" (i.e., leaking of bentonite drilling fluid into the environment). Indirect impacts to plants could occur as a result of habitat loss due to invasive species encroachment onto disturbed ground following project activities (especially dense-flowered cordgrass).

The following mitigation measures are recommended to avoid or minimize impacts to Humboldt Bay owl's-clover and western sand spurry occurrences in the project area:

1. Prior to construction activities, a site visit to the rare plant occurrence areas shall be made in order to document the estimated number of individuals that potentially could be impacted with project implementation. Although this was done in 2003, there may be spatial and temporal variation in the population structure of both rare plant species since both have annual life cycles (see botanical report for more details). Thus, a pre-construction survey of all Humboldt Bay owl's-clover and western sand spurry potential habitat areas in the project area is recommended for the purpose of gaining a more accurate estimate of population parameters for both rare plant species. The survey should be conducted by a qualified botanist at the seasonally appropriate time of year;

2. All construction activities shall be conducted after Humboldt Bay owl's-clover and western sand spurry have set seed (approximately September-October, but this should be field-verified by a qualified botanist);

3. Rare plant occurrences shall be flagged with appropriate flagging and brought to the attention of all ground crew personnel;

4. There shall be no heavy equipment operation within rare plant occurrence areas except in the case of a frac-out;

5. Foot traffic in rare plant occurrence areas shall be avoided or minimized whenever possible;

6. A qualified biological monitor shall be on site for the duration of the ground work, and this monitor shall ensure that all mitigation measures are adhered to during project activites. The biological monitor shall maintain a detailed log of observed potential impacts to rare plants or rare plant habitat.

7. In the case of a frac out within a rare plant occurrence area, it is recommended that a follow-up rare plant survey be conducted the following year (and for up to 5 years if possible) by a qualified botanist at the seasonally appropriate time of year for monitoring purposes. If it is determined that the frac out may have caused significant impact to rare plant habitat (e.g., heavy foot traffic disrupting native vegetation), additional restorative measures (e.g., revegetation) may be appropriate.

If you have any questions or if there is any other information that I can provide you with, please do not hesitate to contact me at 707/269-1382.

Sincerely,

Melissa Brooks, NRM Staff Botanist

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Botanical Report for a Botanical Survey Conducted for Pacific Gas and Electric Company's Proposed G/L 137B HDD Crossing of Freshwater Slough Project

Prepared by: Melissa Brooks, Staff Botanist
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Melissa Brooks
Signed

Submitted: October 8, 2003

October 8, 2003
Dated

I. Introduction

Botanical surveys are conducted to determine the presence of sensitive species or communities within a proposed project area. Survey findings are useful in assessing the potential for significant negative impacts on botanical resources and critical in mitigating those impacts to a level less than significant. The following report conforms to the California Department of Fish and Game's (DFG) *Guidelines for Assessing the Effects of Proposed Projects of Rare, Threatened, and Endangered Plants and Plant Communities* (DFG 2000).

II. Project Description

The project is known as the PG&E G/L 137B HDD Crossing of Freshwater Slough Project (herein "project"). The project area is located on Freshwater Slough, a tributary of Eureka Slough, which flows into Humboldt Bay at the northeastern edge of Eureka, CA. The legal description of the project area includes Sections 19 and 30 of Township 5N and Range 1E (HB&M) on the Arcata South U.S. Geologic Survey 7.5-minute quadrangle map, Humboldt County, CA (see Figure 1, General Location map). The proposed project involves using horizontal directional drilling (HDD) technology to bore beneath Freshwater Slough for the re-routing of an approximate 1,200-foot section of G/L 137B, which is currently exposed (PG&E 2003). The estimated depth of the new alignment will be approximately 40 feet beneath the channel of the slough. Two bore pits (6 ft x 12 ft x 8 ft) with associated tail ditches (3 ft x 20 ft x 6 ft) will be established at entry and exit locations of the alignment. Equipment will be staged around both pits, with the entrance pit located on the south bank of the slough. Access to the south bank (entrance pit) will be via Park Street in Eureka.

III. Biological Description

The project area is located within the California Coastal Zone and includes at least two vegetation types (based on Sawyer & Keeler-Wolf 1995). Introduced perennial grassland series dominates the entrance and exit pit areas, and Salt grass series and/or Pickleweed series are present on the south bank of Freshwater Slough. The soils are "unclassified soils in cultivated and intensively pastured areas" (Cooper 1975; Alexander & DeLapp 1959), but in general tend to be clayey. Slopes are primarily flat. The hydrology includes Freshwater Slough (which is fed by Freshwater Creek and Ryan Slough) surrounded by diked former tidelands, which are classified as wetlands (City of Eureka 2001). Freshwater Slough is a tidally-influenced estuary that drains in to Eureka Slough, which drains into Humboldt Bay. The diked former tidelands surrounding the slough are used for livestock grazing and other agricultural purposes. The bore exit pit is situated within these diked former tidelands, while the entrance pit is on upland terrain (PG&E 2003).

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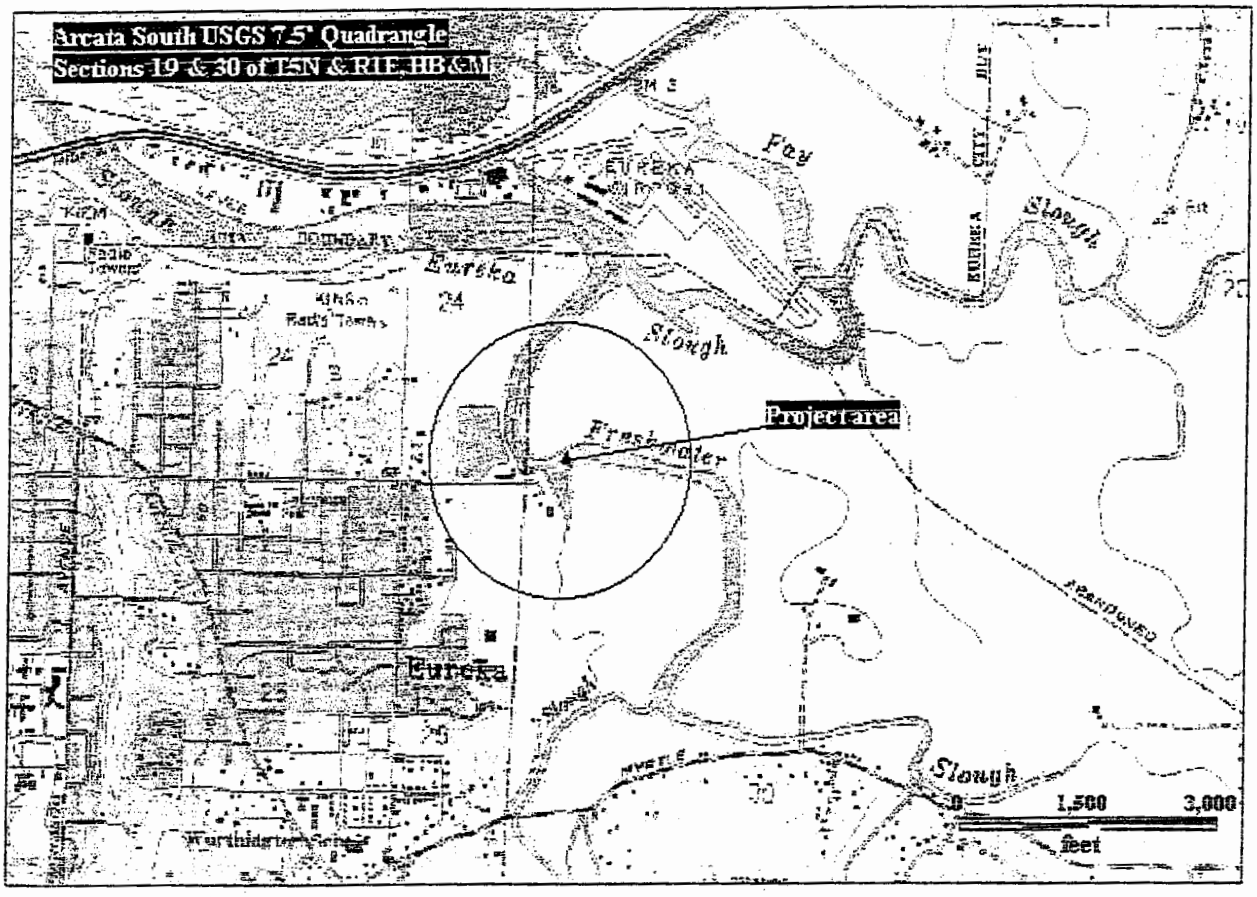

Figure 1. General Location Map for the PG&E G/L 137B HDD Crossing of Freshwater Slough Project.

IV. Methods

Scoping strategies, survey methods, and impact assessments/mitigations were consistent with the following: *Guidelines for Assessing the Effects of Proposed Projects of Rare, Threatened, and Endangered Plants and Plant Communities* (DFG 2000); *Mitigation Guidelines Regarding Impacts to Rare, Threatened, and Endangered Plants* (CNPS 1998); and the *California Environmental Quality Act* (State of California 2001).

The project area was scoped with the current inventories of the California Native Plant Society's (CNPS) *Electronic Inventory of Rare and Endangered Vascular Plants of California* (CNPS 2002) and the DFG *California Natural Diversity Database* (DFG April 2003). Queries were performed on the USGS 7.5 minute quadrangle containing the project area (Arcata South) and all contiguous quadrangles (McWhinney Creek, Fields Landing, Eureka, Blue Lake, Korbel, Iaqua Buttes, Arcata North, and Tyee City). Thirty-three botanical species resulted from this regional querying process. However, since the greater scoping region encompasses habitat types that are not present in the Freshwater Slough project area (e.g., coastal dunes), the resulting list was reduced to a target list of taxa for the project area. Furthermore, since the database queries only result in those species that historically have been recorded in the specified quadrangle, they do not account for species that have not been recorded but for which habitat may be present in the quadrangle(s). Thus, plant lists from local experts (e.g., Golec 2002) were

also considered in the scoping process, as were the lists included in the PG&E Biological Assessment for the project area (PG&E 2003) and the Draft EIR for the Mad River Pipeline Rehabilitation Project (City of Eureka 2001), which addresses a project area that is adjacent to the Freshwater Slough project area. Any additional species with potential habitat in the project region were included on the target list. The target list of 21 botanical taxa (vascular plants only) for the PG&E Freshwater Slough project is presented in Table 1 below.

The survey was conducted according to the DFG *Guidelines* (DFG 2000) on June 23 and August 26, 2003 by Melissa Brooks, a qualified botanist with both a degree in biology (with botany emphasis) as well as experience surveying for the target species. The total number of field-survey-hours was three (3). The survey was intuitively controlled, floristic, and high in coverage intensity in all proposed work areas. These included an approximate 100-ft wide area along the terrestrial portion of the proposed pipeline alignment (50-ft to each side of center); an approximate 100-by-150 ft area around entry and exit pits; and an approximate 25-ft wide by 1000-ft long area to the north of the tie in location to accommodate pipe assembly and layout. The survey was seasonally appropriate (i.e., conducted during the target species' blooming windows or when plants were readily identifiable by vegetative characteristics) for most target species. For those target species for which the survey was not seasonally appropriate, the survey focused on identifying potential habitat, if present, for those species. Vascular plants encountered in the field were identified to the lowest taxonomic level necessary for a rare plant determination, and a species list was recorded (Appendix A). The taxonomic nomenclature used follows *The Jepson Manual* (Hickman 1993).

Table 1. Target list of botanical taxa for the PG&E G/L 137B HDD Crossing of Freshwater Slough Project.

Species	Listing	R-E-D	Blooming	Habitat
Astragalus pycnostachyus var. *pycnostachyus* coastal marsh milk-vetch	CNPS 1B	3-2-3	April-Oct.	CoDns, MshSw (coastal salt, streamsides); 0-30 m.
Calamagrostis bolanderi Bolander's reed grass	CNPS 4 (used to be a 1B)	2-2-3	June-Aug.	BgFns, CCFrs, CoScr, Medws (mesic), MrshSw (freshwater), NCFrs / mesic; 0-185 m.
Carex arcta northern clustered sedge	CNPS 2	2-2-1	June-Aug.	BgFns, NCFrs (mesic); 60-1400 m.
Carex leptalea flaccid sedge	CNPS 2	3-2-1	May-July	BgFns, Medws (mesic), Msh/Sw; 0-700 m.
Carex lyngbyei Lyngbye's sedge	CNPS 2	2-2-1	May-Aug	Msh/Sw (brackish or freshwater); 0-10 m.
Carex praticola meadow sedge	CNPS 2	2-2-1	May-July	Medws (mesic); 0-3,200 m.
Carex viridula var. *viridula* green sedge	CNPS 2	3-1-1	June-Sept.	BgFns, MshSw (freshwater), NCFrs (mesic); 0-1600 m.
Castilleja ambigua ssp. *humboldtiensis* Humboldt Bay owl's-clover	CNPS 1B	2-2-3	April-Aug.	Msh/Sw (coastal salt); 0-3 m.
Cordylanthus maritimus ssp. *palustris* Point Reyes bird's-beak	CNPS 1B	2-2-2	June-Oct.	Msh/Sw (coastal salt); 0-10 m.

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Species	Listing	R-E-D	Blooming	Habitat
Erythronium revolutum coast fawn lily	CNPS 2	2-2-1	Mar.-June	BgFns, BUFrs, NCFrs / mesic streambanks; 0-1065 m.
Gilia capitata ssp. *pacifica* Pacific gilia	CNPS 1B	2-2-2	May-Aug.	CBScr, VFGrs, CoPrr; 5-300 m.
Lathyrus palustris marsh pea	CNPS 2	2-2-1	Mar.-Aug.	BgFns, CoPrr, CoScr, LCFrs, MshSw, NCFrs/mesic; 1-100 m.
Lilium occidentale western lily	CNPS 1B CE, FE	3-3-2	June-July	BgFns, CBScr, CoPrr, CoScr, MshSw (freshwater), NCFrs (openings); 2-185 m.
Lycopodium clavatum running-pine	CNPS 2	2-1-1	N/A (fern ally)	MshSw, NCFrs (mesic); 60-790 m.
Montia howellii Howell's montia	CNPS 2	3-2-1	Mar.-May	Medws, VnPls, NCFrs/vernally mesic; 0-595 m.
Puccinellia pumila dwarf alkali grass	CNPS 2	3-2-1	July	MshSw (coastal salt); 0-10 m.
Sidalcea malachroides maple-leaved checkerbloom	CNPS 1B	2-2-2	April-Aug.	BUFrs, CoPrr, CoScr, NCFrs/often in disturbed areas; 2-700 m.
Sidalcea malviflora ssp. *patula* Siskiyou checkerbloom	CNPS 1B	3-2-2	May-June	CBScr?, CoPrr, NCFrs; 15-65 m.
Sidalcea oregana ssp. *eximia* coast checkerbloom	CNPS 1B	3-2-3	June-Aug.	LCFrs, Medws, NCFrs; 5-1340 m.
Spergularia canadensis var. *occidentalis* western sand spurry	CNPS 2	3-3-1	June-Aug.	MshSw (coastal salt); 0-3 m.
Viola palustris marsh violet	CNPS 2	3-2-1	March-Aug.	CoScr (mesic), BgFns (coastal); 0-150 m.

* Listing codes are as follows: **CNPS 1A** = presumed extinct in CA; **CNPS 1B** = rare, threatened, or endangered in CA and elsewhere; **CNPS 2** = rare, threatened, or endangered in CA, but more common elsewhere; **CNPS 3** = plants about which more information is needed—a review list; **CNPS 4** = Uncommon plants—a watch list; **CR** = state-listed RARE; **CE** = state-listed ENDANGERED; **FE** = federally-listed ENDANGERED; **FC** = CANDIDATE for federal listing; **G3** = NDDB global ranking of 21-100 Elemental Occurrences OR 3,000-10,000 individuals OR 10,000-50,000 acres; **S2.1** = NDDB state ranking of "very threatened". **Note:** CNPS inventory quadrangle data include only CNPS list 1-3 plants (not list 4 plants). Therefore, plant listings considered in this target list were CNPS list 1A, 1B, 2, and 3, and state- and federally-listed rare, threatened and/or endangered taxa (CNPS list 4 plants were only considered if they were also state- or federally-listed).

* R-E-D codes are based on CNPS 2001. **R (Rarity)** codes are as follows: **1** = rare in CA, but found in sufficient numbers and distributed widely enough that the potential for extinction is low at this time; **2** = distributed in a limited number of occurrences in CA; occasionally more if each occurrence is small; **3** = distributed in CA in one to several highly restricted occurrences, or present in such small numbers that it is seldom reported. **E (Endangerment)** codes are as follows: **1** = not very endangered in CA; **2** = fairly endangered in CA; **3** = seriously endangered in CA. **D (Distribution)** codes are as follows: **1** = more or less widespread outside CA; **2** = rare outside CA; **3** = endemic to CA.

* Plant community classifications are based on *Preliminary Descriptions of the Terrestrial Plant Communities of California* (Holland 1986). Abbreviation codes are as follows:

BUFrs	Broadleaved Upland Forest	CoDns	Coastal Dunes	RpScr	Riparian Scrub
BgFns	Bogs and Fens	CoPrr	Coastal Prairie	RpFrs	Riparian Forest
CBScr	Coastal Bluff Scrub	CoScr	Coastal Scrub	UCFrs	Upper Montane Coniferous Forest
CCFrs	Closed-cone Coniferous Forest	LCFrs	Lower Montane Coniferous Forest	VFGrs	Valley and Foothill Grassland
Chprl	Chaparral	Medws	Meadows and Seeps	VnPls	Vernal Pools
ChScr	Chenopod Scrub	MshSw	Marshes and Swamps		
CmWld	Cismontane Woodland	NCFrs	North Coast Coniferous Forest		

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V. Survey Results

Two rare plant species were located during the survey: Humboldt Bay owl's-clover (*Castilleja ambigua* ssp. *humboldtiensis*) and western sand spurry (*Spergularia canadensis* var. *occidentalis*). A total of approximately 300 blooming inflorescences of Humboldt Bay owl's-clover and approximately 75 blooming or fruiting western sand spurry plants were located along the salt/brackish marsh habitat on the south side of Freshwater Slough within the proposed alignment path. The plants of each species are scattered throughout an approximate 25-ft-by-30-ft area. Most plants occur in the higher elevation marsh habitat, but some plants occur directly next to the slough bank itself. Dominant and associated species include pickleweed (*Salicornia virginica*), dense-flowered cordgrass (*Spartina densiflora*), seaside arrow-grass (*Triglochin maritima*), salt grass (*Distichilis spicata*), jaumea (*Jaumea carnosa*), and sea lavender (*Limonium californicum*). NDDB forms for the occurrences are attached in Appendix B. Survey results are summarized in Table 2 below.

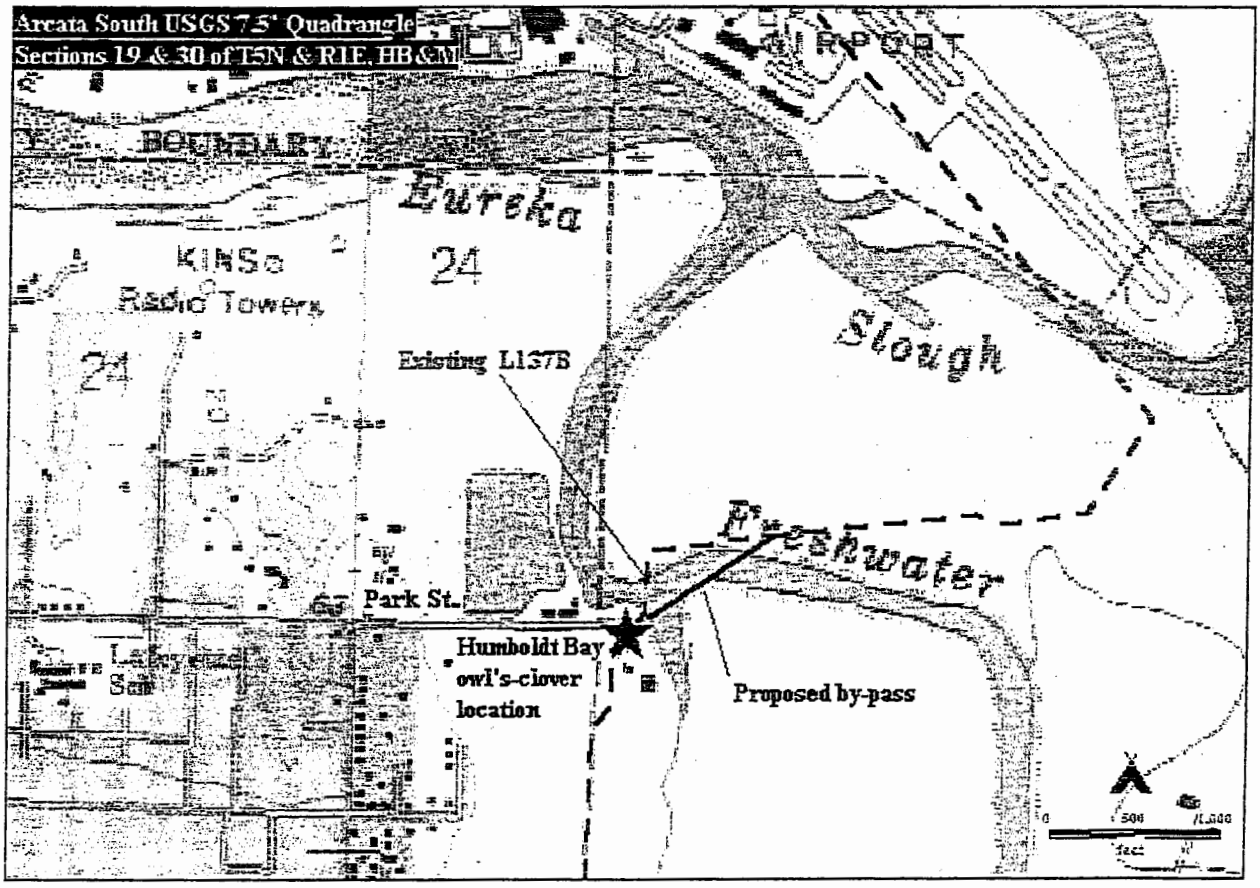

Figure 2. Location Map for Humboldt Bay Owl's-Clover (*Castilleja ambigua* ssp. *humboldtiensis*) and western sand spurry (*Spergularia canadensis* var. *occidentalis*) in the PG&E G/L 137B HDD Crossing of Freshwater Slough Project Area. Note: The western sand spurry, although not labeled on the map, is at the same location as the Humboldt Bay owl's-clover.

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Table 2. Survey results for the PG&E G/L 137B HDD Crossing of Freshwater Slough Project.

Species	Species detected	Survey seasonally appropriate?	Habitat present (If so, Specify)	Comments
Astragalus pycnostachyus var. *pycnostachyus* coastal marsh milk-vetch	No	Yes	Yes (coastal salt marsh habitat)	species surveyed for but not detected
Calamagrostis bolanderi Bolander's reed grass	No	Yes	Yes	species surveyed for but not detected
Carex arcta northern clustered sedge	No	Yes	No	no bogs/fens or forest habitat
Carex leptalea flaccid sedge	No	Yes	No	not boggy enough
Carex lyngbyei Lyngbyei's sedge	No	Yes	Yes (banks of Freshwater Slough)	species surveyed for but not detected
Carex praticola meadow sedge	No	Yes	No	habitat probably too disturbed for this species
Carex viridula var. *viridula* green sedge	No	Yes	No	marsh/swamp habitat brackish not freshwater
Castilleja ambigua ssp. *humboldtiensis* Humboldt Bay owl's-clover	YES	Yes	Yes (coastal salt marsh habitat on south side of slough)	300 plants estimated to be present on the south side of the slough within the realignment path
Cordylanthus maritimus ssp. *palustris* Point Reyes bird's-beak	No	Yes	Yes	species surveyed for but not detected
Erythronium revolutum coast fawn lily	No	NO (but fruits would have still been apparent)	No	no habitat
Gilia capitata ssp. *pacifica* Pacific gilia	No	Yes	Maybe	species surveyed for but not detected
Lathyrus palustris marsh pea	No	Yes	Maybe	species surveyed for but not detected
Lilium occidentale western lily	No	Yes	No	no Sitka spruce or coastal prairie habitat
Lycopodium clavatum running-pine	No	Yes	No	no habitat
Montia howellii Howell's montia	No	NO	Maybe (areas of seasonal ponding with fines)	habitat quality seemed low for this species
Puccinellia pumila dwarf alkali grass	No	MAYBE	Yes (coastal salt marsh)	no unidentifiable species of grasses encountered
Sidalcea malachroides maple-leaved checkerbloom	No	Yes	Yes (near entry pit)	species surveyed for but not detected
Sidalcea malviflora ssp. *patula* Siskiyou checkerbloom	No	Yes	Maybe (open grassland)	species surveyed for but not detected
Sidalcea oregana ssp. *eximia* coast checkerbloom	No	Yes	Maybe (open grassland)	species surveyed for but not detected
Spergularia canadensis var. *occidentalis* western sand spurry	YES	Yes	Yes (coastal salt marsh)	~75 plants on the south side of the slough within the realignment path

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Species	Species detected	Survey seasonally appropriate?	Habitat present (If no, Specify)	Comments
Viola palustris marsh violet	No	Yes	No	no habitat

VI. Discussion

Humboldt Bay owl's-clover is listed as CNPS as 1B with an R-E-D code of 2-2-3, meaning that it is distributed in a limited number of occurrences in California, is fairly endangered in California, and is endemic to California. According to one source (Hickman 1993), the taxon is known from only Humboldt and Marin Counties, but according to another (CNPS 2002) it is also known from Mendocino County. The NDDB (DFG 2003) has records for 18 post-1960 occurrences totaling tens of thousands of individuals. The majority of these occur around the coastal salt marsh habitat of Humboldt Bay and the mouth of the Eel River, while one occurrence is recorded for Point Reyes National Seashore. Threats to the species are largely from coastal development (CNPS 2002), but habitat loss to dense-flowered cordgrass may also be a threat (Clifford 2002).

Humboldt Bay owl's-clover plants typically occur in the Mixed marsh vegetation type, which is a subtype of coastal salt marsh habitat occurring at average tidal elevations of 7.3 ft MLLW (mean low low-water) (Eicher 1987). The lower tidal elevation vegetation types of Salicornia marsh (below 6.9 ft MMLW) and Spartina marsh (6.9-7.3 MMLW) tend to harbor less species diversity than the Mixed marsh type, and they tend to lack Humboldt Bay owl's-clover (Eicher 1987). Typical Mixed marsh habitat is dominated by low-growing vegetation that commonly includes pickleweed, jaumea, salt grass, sea lavender, arrow-grass (*Triglochin maritima* and *T. concinna*), and Point Reyes bird's beak (*Cordylanthus maritimus* ssp. *palustris*), which is another rare salt marsh species (that was not located in the project area).

Humboldt Bay owl's-clover is a facultative hemiparasitic annual herb of the snapdragon family (Scrophulariaceae). Hemiparasites produce food through photosynthesis but parasitize additional nutrients from host species by means of root-like haustoria. In the case of Humboldt Bay owl's-clover, it is hypothesized that various species may serve as its host, and plants may even be capable of surviving in the absence of a host (Eicher 1994 as cited in City of Eureka 2001).

Western sand spurry is listed as CNPS 2 with an R-E-D code of 3-3-1, meaning its distribution is highly restricted in California and it is seriously endangered in California, but it is more or less widespread outside of the state. In California, it is known only from coastal salt or brackish marsh habitat areas around Humboldt Bay. The NDDB (DFG 2003) has three records for the species, but it does not give an estimate of total number of individuals.

Western sand spurry is an annual plant of the pink family (Caryophyllaceae). Given the fact that population size and structure in annual species generally tends to vary from year to year, it is reasonable to assume that the number and/or specific locality of western sand spurry plants in the project area next year will differ from this year's number and/or specific locality of plants.

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VII. Potential Impact Assessment

There is the potential for impacts the Humboldt Bay owl's-clover and western sand spurry occurrences in the project area with project implementation. Plants occur directly in the path of the proposed alignment on the south side of Freshwater Slough in the coastal salt marsh habitat type. Because the Humboldt Bay owl's-clover and western sand spurry plants will have completed their annual life cycles by the time project activities commence (proposed for late September or October), impacts to the occurrences most likely would be to the potential seed banks rather than to actual plants themselves. Direct impacts to seed banks could occur as a result of trampling by foot traffic causing burial or breakage of seeds or by seed bank contamination due to a "frac-out" (i.e., leaking of bentonite drilling fluid into the environment). Indirect impacts to plants include habitat loss due to invasive species encroachment (especially dense-flowered cordgrass) onto disturbed ground following project activities (Clifford 2002).

VIII. Recommendations

Measures to avoid or minimize impacts to the Humboldt Bay owl's-clover and western sand spurry occurrences through project activities will be provided in a separate memorandum to PG&E upon finalization of the project operations plan.

IX. Floristic Species List

A list of plants identified during the survey is attached in Appendix A.

X. Description of Reference Sites

Reference sites were very limited and not visited unless surveys were conducted outside known blooming window as stated in Item IV, Methods.

XI. Copies of NDDB Forms

Completed California Natural Diversity Database (NDDB) forms for Humboldt Bay owl's-clover and western sand spurry are attached in Appendix B.

XII. Persons Contacted, Herbaria Visited, Voucher Specimens

Andrea Pickart, USFWS Ecologist at the Lanphere Dunes Unit of the Humboldt Bay National Wildlife Refugee, verified the identity of the western sand spurry on Thursday, August 28, 2003.

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XIV. Appendices (attached)

- Appendix A: Floristic Species List for the PG&E G/L 137B HDD Crossing of Freshwater Slough Project
- Appendix B: California Native Species Field Survey Forms (NDDB forms) for Humboldt Bay owl's-clover and western sand spurry

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Appendix A:
Floristic Species List for PG&E's G/L 137B HDD Crossing of Freshwater Slough Project

Survey Dates: June 23 and August 26, 2003

Trees:
Cupressus macrocarpa Monterey cypress

Shrubs:
Baccharis pilularis coyote brush
Cytisus scoparius Scotch broom
Lupinus arboreus yellow bush lupine
Rubus discolor Himalayan blackberry

Grasses and Graminoids:
Bromus hordeaceus soft chess
Cortaderia jubata weedy pampas grass
Cynosurus echinatus hedgehog dogtail grass
Dactylis glomerata orchard grass
Deschampsia caespitosa tufted hair-grass
Distichilis spicata salt grass
Festuca arundinacea tall fescue
Holcus lanatus common velvet grass
Hordeum brachyantherum meadow barley
Hordeum sp. wild barley
Juncus effusus common rush
Lolium perenne perennial ryegrass
Spartina densiflora Dense-flowered or Chilean cordgrass

Other Flowering Herbs:
Achillea millefolium common yarrow
Aster chilensis California aster
Atriplex triangularis spearscale
***Castilleja ambigua* ssp. *humboldtiensis* Humboldt Bay owl's-clover**
Cirsium vulgare bull thistle
Convolvulus arvensis field bindweed
Cotula coronopifolia brass-buttons
Cuscuta salina var. *major* salt marsh dodder
Daucus carota Queen Anne's lace
Dipsacus sp. teasel
Erodium cicutarium red-stemmed filaree or common stork's bill
Hypochaeris radicata hairy cat's-ear
Jaumea carnosa jaumea
Limonium californicum sea lavender
Lotus corniculatus bird's-foot trefoil
Parentucellia viscosa yellow parentucellia
Plantago lanceolata English plantain
Polygonum sp. knotweed
Potentilla anserina silverweed
Raphanus sp. wild radish
Rumex crispus curly dock

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Salicornia virginica pickleweed
Sonchus oleraceus common sow thistle
***Spergularia canadensis* ssp. *occidentalis* western sand spurry**
Spergularia rubra ruby sand spurry
Trifolium repens white clover
Triglochin maritima seaside arrow-grass
Vicia sativa ssp. *sativa* common vetch or spring vetch

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Appendix B (attached):

California Native Species Field Survey Forms (NDDB forms) for
Humboldt Bay owl's-clover and western sand spurry

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BIOLOGICAL ASSESSMENT
PACIFIC GAS & ELECTRIC COMPANY
G/L 137B HDD CROSSING OF
FRESHWATER SLOUGH
HUMBOLDT COUNTY

Prepared for:

Pacific Gas and Electric Company
Corporate Real Estate Services
245 Market Street
San Francisco, CA

Prepared by:

Pacific Gas and Electric Company
Technical and Ecological Services
3400 Crow Canyon Road
San Ramon, CA

Contact: Jesse Viscarra
Terrestrial Biologist
(925) 866-5633

July 23, 2003

Introduction

This biological assessment was prepared by Pacific Gas and Electric Company (Company) biologist, Jesse Viscarra, in support of the Company's proposed G/L 137B crossing of Freshwater Slough Project. The project entails using horizontal directional drilling (HDD) technology to bore beneath Freshwater Slough for the re-routing of an approximate 1200-foot section of G/L 137B. The existing section of line 137B that crosses beneath the slough has become exposed. It will be by-passed with the new construction and then abandoned in place. Two bore pits measuring 6 ft. by 12 ft. by 8 ft. with associated tail ditches measuring 3 ft. by 20 ft. by 6 ft. will be established at entry and exit locations of the bore alignment. The estimated depth of the new alignment will be approximately 40 feet beneath the channel of the slough. Equipment will be staged around both pits, with the entrance pit located on the south bank of the slough. Access to the south bank (entrance pit) will be via Park St.

The objectives of this assessment are: to determine whether or not suitable habitat exists for special status plant and wildlife species or communities within the project area, to evaluate potential effects of the project on these species and communities, and to propose measures that minimize or avoid potential adverse effects of this project.

Project Area

The G/L 137B crossing of Freshwater Slough project is located in northeastern Eureka, CA (T5N, R1E, SW ¼ of SW ¼ Sect. 19, and NW ¼ of NW ¼ Sect. 30, HBM; Arcata South 7.5 minute quadrangle) (Figure 1). Line 137B runs through diked former tidelands. These diked former tidelands, classified as wetlands (City of Eureka 2001), are used for livestock grazing and other agricultural purposes. The bore exit pit is situated within these diked former wetlands (Photo 1 & 2) and the entrance pit is located in uplands along the fringes of the city boundary. Freshwater Slough is a tidally influenced estuary that drains into Arcata Bay via Eureka Slough (Photo 3, 4, and 5). Ryan and Freshwater creeks and their numerous tributaries feed into Freshwater Slough.

The conversion of former tidelands into agriculture lands by channeling, diking, and construction of railroads and U.S. Route 101 have resulted in wetlands composed primarily of velvet grass (*Holcus lanatus)*, sweet vernal grass (*Anthoxanthum odoratum*), ryegrass (*Lolium perenne*), tall fescue (*Festuca arundinacea*), common rush (*Juncus effuses*), silverweed *(Potentilla anserine pacifica*), water foxtail (*Alopecurus geniculatus*), spike rush *(Eleochaeris macrostachya*), and mannagrass, (*Glyceria occidentalis).* The slough channels and drainages that meander across these pasturelands sustain populations of wetland and marsh species such as Lyngbye's sedge (*Carex lyngbyei*, a special status species), dense-flowered cord grass (*Spartina densiflora*), pickleweed (*Salicornia viginica*), saltgrass (*Distichlis spicata*), seaside arrow-grass (*Triglochin maritimus*), brass buttons (*Cotula coronopifolia*), and spearscale (*Atriplex triangularis*) (City of Eureka 2001, Morrissette 2001).

Riparian and upland species found along the banks of Freshwater Slough at the project site consist of coyote brush (*Baccharis pilularis*), Scotch broom (*Cytisus scoparius*), berries (*Rubus sp.)*, and ornamental cypress (*Cupressus sp.*) and pine (*Pinus sp.*) trees. Ruderal vegetation, typical of roadsides and disturbed places, made up the sparse forbs cover within the proposed entry pit staging area on the south bank of the slough (Photo 6 & 7).

Methods

A search was performed for California Natural Diversity Data Base (CDFG 2003) records within the vicinity of the project site, (USGS 7.5 minute quadrangles, Arcata South, Eureka, Fields Landing, and McWhinney Creek,) to determine if any special status plant or wildlife species had been recorded. Species lists reviewed included those published by U.S. Fish and Wildlife Service (USFWS 1999), California Department of Fish and Game (CDFG 2003), and the California Native Plant Society (CNPS 2001). Species of special concern were also reviewed (CDFG and USFWS). Special status species were defined as those species currently listed, proposed for listing, or

candidates for listing as rare, threatened, or endangered under federal or California endangered species acts, and those listed as rare or endangered by the California Native Plant Society. The project site was visited on March 7, 2003 to assess current site conditions and habitat types present.

The City of Eureka has prepared an EIR for its Mad River Water Pipeline Rehabilitation Project (City of Eureka 2001), which will upgrade the city's water supply system by installing a new water line from Arcata to Eureka. This project will employ the same methodology as that proposed for the installation of G/L 137B beneath Freshwater Slough. It will also occur in the same habitat type and cross the same watercourse (Freshwater Slough) about a half of a mile to the southeast of the G/L 137B project site. Review of the EIR and any related documents should provide insight to the development of the G/L 137B project.

Results

Twenty-five special status plant species have been previously recorded within the vicinity of the project site (CDFG 2003). Based on habitat types present at the project site, fourteen of the twenty-five special status plant species recorded in the vicinity of the project have the potential to occur on site (Table 1). The grazed wetland and marsh habitats observed at the project site provide suitable habitat for the special status species listed. Morrissette (2001) found subpopulations of Lyngbye's sedge and Humboldt Bay owl's clover (*Castilleja ambigua ssp. humboltiensis*) in Freshwater Slough during rare plant surveys for the Mad River Pipeline project. It was also stated that the Humboldt Bay owl's clover becomes more abundant further downstream in Freshwater Slough, where suitable habitat is more abundant. Humboldt Bay owl's clover and Lyngby's sedge were also found in similar Fay Slough just over a mile east-northeast of the project site. Figure 1 depicts the proximity of the Mad River Pipeline Project crossing of Freshwater Slough to the project site; biological mitigation/protection measures (if applicable) and findings associated with the Mad River Pipeline project could be directly applied to the development of the G/L 137B project.

Table 1. Special status plant species with potential to occur at the G/L 137B crossing of Freshwater Slough Project site.

Common Name / *Scientific Name*	**Habitat Requirements**	**Status***	**Bloom Period**
Coastal marsh milk-vetch/ *Astragalus pycnostachyus* var. *pycnostachyus*	Coastal dunes (mesic), marshes and swamps (coastal salt, streamsides).	1B	April-Oct
Flaccid sedge/ *Carex leptalea*	Bogs and fens, meadows and seeps (mesic), marshes and swamps.	2	May-June
Howell's montia/ *Montia howellii*	Meadows, North Coast coniferous forests, and vernal pools.	2	March-May
Humboldt Bay owl's clover/ *Castilleja ambigua ssp. humboltiensis*	Endemic to Humboldt County. Coastal dunes and salt marshes.	1B	May-Aug
Lyngbye's sedge/ *Carex lyngbyei*	Marshes and swamps.	2	May-Aug
Maple-leaved checkerbloom/ *Sidalcea malachroides*	Woodlands and clearings near coast. Broadleaved upland forest, coastal prairie, coastal scrub, and North Coast coniferous forest. Often associated with disturbed areas.	1B	April-Aug
Marsh pea/ *Lathyrus palustris*	Bogs and fens, lower montane coniferous forest, marshes and swamps, North coast coniferous forest, coastal prairie, and coastal scrub habitat types.	2	March-Aug
Marsh violet/ *Viola palustris*	Coastal scrub (mesic), and coastal bogs.	2	March-August

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Table 1. Continued...

Common Name / *Scientific Name*	Habitat Requirements	Status*	Bloom Period
Meadow sedge/ *Carex praticola*	Moist to wet meadows.	2	May-July
Point Reyes bird's-beak/ *Cordylanthus maritimus ssp. palustris*	Coastal salt marsh.	1B	June-Oct
Running-pine/ *Lycoposium clavatum*	Mesic, shady areas of North Coast coniferous forest, marshes and swamps.	2	July-Aug
Siskiyou checkerbloom/ *Sidalcea malviflora ssp. patula*	Coastal prairie, broadleaved forest (open coastal forest) habitat types.	1B	May-June
Western lily/ *Lilium occidentale*	Coastal scrub, freshwater marsh, bogs and fens, costal bluff scrub, coastal prairie, and North Coast coniferous forest habitat types.	FE/SE/1B	June-July
Western sand-spurrey/ *Spergularia canadensis var. occidentalis*	Coastal salt marsh.	2	June-Aug

Status*
US Dept. Fish and Wildlife
FE Federally listed as endangered
California Dept. Fish and Game
SE State listed as endangered
California Native Plant Society
1B Plants rare, threatened, or endangered in CA and elsewhere
2 Plants rare, threatened, or endangered in CA but more common elsewhere

Eleven special status wildlife species have been recorded within the vicinity of the project site (CDFG 2003 [Table 2]). Marsh habitat observed at the site along Freshwater Slough provides suitable habitat for the California clapper rail (*Ralus longirostris obsoletus*), double crested cormorant (*Phalacrocorax auritus*), and snowy egret (*Egrette thula*). Piscivorous bird species such as great egret (*Casmerodius* albus), western grebe (*Aechmophorus* occidentalis), and double-crested cormorant were observed foraging in the slough. The western snowy plover (*Charadrius alexandrinus novosus*) has potential to occur along the margins of nearby Humboldt and Arcata bays.

The grazed wetlands within the project vicinity provide suitable foraging habitat for a host of avian species. White-tailed kite (*Elanus leucurus*) (a federal species of concern and state fully protected species) and Canada goose (*Branta Canadensis*) were observed foraging near the project site. Humboldt Bay provides foraging habitat for osprey (*Pandion haliaetus*). A bald eagle (*Haliaeetus leucocephalus*) (a federally threatened and state endangered species) was observed approximately 2 miles to the northeast in the Indianola area (Personal observation). Very few trees were observed at the project site and those that were showed no signs of usage as nesting habitat by raptors.

Freshwater Slough provides suitable habitat for aquatic species such as coast cutthroat trout (*Oncorhynchus clarki clarki*) and tidewater goby (*Eucyclogobinus newberryi).* Salamunovich (2001) stated that Chinook salmon (*Oncorhynchus tshawytscha),* Coho salmon *(Oncorhynchus kisutch*), and steelhead (*Oncorhynchus mykiss*) are known to occur in Freshwater and Ryan creeks. All three fish species are listed as federally threatened according to their respective evolutionarily significant unit (ESU). In addition, a host of other marine and estuarine species, including the federally endangered tidewater goby were identified in Freshwater Slough between US 101 and Old Arcata Rd.

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Table 2. Special status wildlife species within the vicinity of the G/L 137B crossing of Freshwater Slough Project site.

Common Name/ ***Scientific Name***	**Habitat Requirements**	**Status***	**Habitat Suitability In Project Area**
California Clapper Rail/ *Rallus longirostris obsoletus*	Salt-water and brackish marshes and sloughs dominated by pickleweed.	FE/SE	Suitable habitat
Coast cutthroat trout/ *Oncorhynchus clarki clarki*	Coastal low gradient streams and estuaries.	FC/CSC	Suitable habitat
Double-crested cormorant/ *Phalacrocorax auritus*	Colonial nester along coastal cliffs, islands, and lake margins.	CSC	Suitable habitat
Northern red-legged frog/ *Rana aurora aurora*	Humid forests, woodlands, grasslands, and streamside in northwestern California.	FSC/CSC	No suitable habitat
Osprey/ *Pandion haliaetus*	Nests in treetops in proximity to ocean shores, bays, fresh water lakes, and streams.	CSC	Suitable foraging habitat in Humboldt Bay
Red tree vole/ *Arborimus pomo*	Douglas fir, redwood, and montane hardwood-conifer forest habitat types.	FSC/CSC	No suitable habitat
Snowy Egret/ *Egrette thula*	Colonial nester among protected beds of dense tules in marshes, tidal flats, streams, wet meadows, and along lake margines.	FSC	Suitable habitat
Southern torrent salamander/ *Rhyacotriton variegates*	Cold well shaded permanent streams and seepages of coastal redwood, Douglas fir, mixed conifer, montane riparian, and montane hardwood-conifer habitat types.	FSC/CSC	No suitable habitat
Tailed frog/ *Ascaphus truei*	Perennial streams of montane hardwood-conifer, redwood, Douglas fir, and ponderosa pine habitat types.	FSC/CSC	No suitable habitat
Tidewater goby/ *Eucyclogobius newberryi*	Brackish water lagoons, and lower stream reaches with high oxygen content.	FE/CSC	Suitable habitat
Western snowy plover/ *Charadrius alexandrinus novosus*	Sandy beaches, salt pond levees, shores of alkali lakes with friable soils for nesting.	FT/CSC	Potential nesting sites along margins of Humboldt Bay

Status*
US Dept. Fish and Wildlife
FT Federally listed as threatened
FE Federally listed as endangered
FSC Federal species of concern
FC Federal candidate species
California Dept. Fish and Game
SE State listed as endangered
CSC State species of special concern

Discussion

The G/L 137B project on Freshwater Slough has potential to impact sensitive biological resources potentially occurring at the project site. Special status plant and wildlife species have been recorded in the vicinity of the project site. The HDD technology to be employed involves the use of bentonite as a drilling fluid. The possibility of spillage of drilling fluid (frac-outs) into the aquatic environment places at risk aquatic and plant species known to occur in Freshwater Slough, its tributaries, and nearby bodies of water that it flows into.

Overall toxicity of HDD drilling fluid is low and reflective of its major component, bentonite clay. However, other components and additives of drilling fluids may vary in toxicity. Factors such as water temperature, size of suspended particles and life stage and relative health of aquatic organisms involved can influence toxicity. In addition to the toxicity concern, several non-toxic

effects of bentonite on aquatic life exist. Suspended bentonite may temporarily inhibit respiration and alter normal behavior of fishes, and increase drift of benthic invertebrates reducing densities. Once the bentonite settles, secondary long-term effects can result. For example, egg masses of fish could be covered by a layer of bentonite inhibiting the flow of dissolved oxygen to the egg masses; benthonic invertebrates and/or the larval stages of pelagic organisms may be covered and suffocate due to fouled gills and/or lack of oxygen. Aquatic plants can be affected through reduction of available light for photosynthesis, smothering of individuals, and altered growing conditions caused by suspended and settling drilling fluid particles. The most negative, long lasting effect bentonite releases can have on aquatic habitats is the degradation of habitat conditions to unsuitable levels for resident organisms (Reed and Anderson 1998).

Other possible impacts to biological resources associated with the project are secondary poisoning effects of bentonite on piscivorous and insectivorous species foraging in the slough and associated waters. Although these species may not be directly affected by a drilling fluid spill, they may ingest organisms that are contaminated with additives in the drilling fluid. Hazardous materials used at the project site such as fuel and hydraulic fluid also pose a threat to any organism contaminated by a spill or leakage.

Special status plant species potentially occurring at the site and the sensitive marsh habitat along the slough may be impacted by construction operations. A frac-out at waters edge or in the channel will require mobilization of personnel and equipment to contain and clean it up. This type of activity will inevitably disrupt or destroy vegetation surrounding the frac-out. A botanical review of the project site will be performed in order to identify any special status plant species present. A comprehensive report will be made available upon completion of surveys.

Section 7 of the Endangered Species Act, 16 U.S.C. Section 1536(a)(2), requires all developers of proposed projects to consult with the National Marine Fisheries Service (NMFS) for marine and anadromus species, or the United States Fish and Wildlife Services (FWS) for fresh-water and wildlife, if they are proposing an "action" that may affect listed species or their designated habitat. Action is defined broadly to include funding, permitting and other regulatory actions. (See 50 CFR §402.02) For developers, any project that requires a federal permit or receives federal funding is subject to Section 7.

Each regulatory agency is to insure that any action they authorize is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat. This is done through consultation. If such species may be present, the developer must conduct a biological assessment (BA) for the purpose of analyzing the potential effects of the project on listed species and critical habitat in order to establish and justify an "effect determination." The federal agency reviews the BA and, if it concludes that the project may adversely affect a listed species or their habitat, it prepares a "biological opinion." The biological opinion may recommend "reasonable and prudent alternatives" to the proposed action to avoid jeopardizing or adversely modifying habitat. These so-called "RPAs" carry great weight and are treated as binding requirements.

Project construction will involve drilling under a watercourse, therefore under California Fish and Game Code 1600, it is required that the Company notify CDFG of said project prior to commencement of construction.

This biological assessment was intended to identify biological resources that may be impacted by the project. Issues presented are dependant on proposed construction methodologies, access routes, equipment staging areas, and timeframe of construction. Complete and detailed construction plans are necessary to finalize environmental mitigation needs for the project. Upon completion of a final construction plan, appropriate protection and mitigation measures (including a drilling fluid spill contingency plan) will be recommended.

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