



600-MW Morro Bay Battery Energy Storage System Project

Geologic and Soils Hazards Evaluation Report

prepared for

City of Morro Bay
Community Development Department
955 Shasta Avenue
Morro Bay, California 93442

prepared by

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April 2023



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April 13, 2023
 Project No. 19-08915

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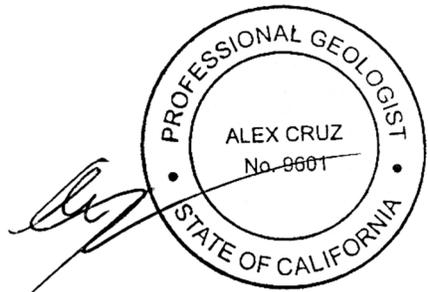
**Subject: Geologic and Soils Hazards Evaluation Report
 Morro Bay Battery Energy Storage System Project
 Morro Bay, California**

Dear Ms. Jacinth:

This report presents the findings of a Geologic and Soils Hazards Evaluation completed by Rincon Consultants, Inc. (Rincon) for the Morro Bay Battery Energy Storage System Project in Morro Bay, California. The Geologic and Soils Hazards Evaluation was performed in accordance with Amendment No. 1 (April 4, 2022) and Amendment No. 2 (May 1, 2022) to our contract scope of services for the Morro Bay Battery Energy Storage System EIR dated March 19, 2021.

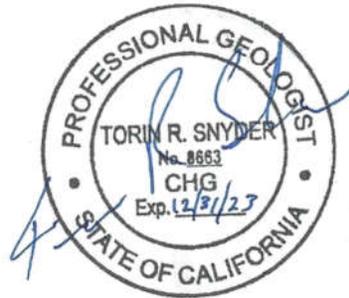
Thank you for selecting Rincon for this project. If you have any questions, or if we can be of any future assistance, please contact us.

Sincerely,
Rincon Consultants, Inc.



Alex Cruz, PG
 Senior Environmental Geologist

This document has been digitally signed and sealed by Alex Cruz, PG, on 4/13/2023.



Torin Snyder, PG, CHG
 Principal

This document has been digitally signed and sealed by Torin Snyder, PG, CHG on 4/13/2023.

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1 Introduction and Background

Rincon Consultants Inc. (Rincon) has prepared this Geologic and Soils Hazards Evaluation Report (Report) for the Morro Bay Battery Energy Storage System (BESS) Project in the City of Morro Bay (the City), California (Figure 1). The BESS Project is planned for construction at the location of the Morro Bay Power Plant (Power Plant), which has been idle since 2014.

The purpose of this Report is to identify potential environmental impacts related to geologic and soil hazards that may result from the development of the Project, and to provide a qualitative assessment of the risks the hazards may pose to the Project. The geologic hazards considered in this Report include:

- Seismic hazards, including ground surface fault ruptures, ground shaking, and liquefaction
- Soil hazards, such as expansive soils, subsidence and collapse, erosion, and slope stability
- Hydrogeologic hazards, such as tsunamis and flooding

These geologic hazards were evaluated specifically with respect to Appendix G of the California Environmental Quality Act (CEQA) Guidelines. This Report is intended to support the Environmental Impact Report (EIR) that is being prepared for the Project in accordance with CEQA Guidelines.

Although not specifically evaluated within Appendix G of the CEQA Guidelines, the County of San Luis Obispo's Guidelines for Engineering and Geology Reports requires the review of the potential for radon gas.

1.1 Methodology

To identify and assess geologic hazards, Rincon's geologists reviewed previous investigative studies, as well as publicly available information, including maps, online databases, articles, reports, and published research papers. Information sources used in this Report include, but are not limited to, the following:

- U.S. Geological Survey (USGS) topographic maps
- USGS and California Geological Survey (CGS) geologic maps
- Seismic hazard zone maps
- Landslide and tsunami hazard maps
- USGS and CGS active fault maps and ground shaking maps
- Alquist-Priolo Special Studies Zones Earthquake Fault maps
- Natural Resources Conservation Services soils maps
- Federal Emergency Management Agency (FEMA) flood maps
- Safety Elements of the General Plans for the County of San Luis Obispo and the City of Morro Bay
- County of San Luis Obispo's Department of Planning and Building Land Use View interactive map application

Figure 1 Regional Location



Imagery provided by Esri and its licensors © 2021.

★ Project Location



Fig 2-1 Regional Location

All sources are documented in Section 8, with internet links included where available. The sources were interpreted and reviewed by a Professional Geologist; professional stamps and signatures are included in Section 7.

1.2 Project Site

The 43-acre Project Site is located on a portion of the 95-acre Morro Bay Power Plant property (Power Plant property) (Assessor's Parcel Numbers [APNs] 066-331-046 and 066-461-016) at 1290 Embarcadero south of State Route 1 (SR 1)/Cabrillo Highway and north of Embarcadero in the City of Morro Bay (Figure 1). Specifically, the project encompasses portions of Section(s) 25 of Township 29 South, Range 10 East on the Morro Bay South, California United States Geological Survey (USGS) 7.5-minute topographic quadrangle.

The Morro Bay Power Plant began operating in 1955 but has been idle since its retirement in 2014. The Power Plant property currently contains the idled power plant building and stacks, Lila Keiser Park, and facilities operated by Pacific Wildlife Care and Marine Mammal Center. The Power Plant property is surrounded by Pacific Gas and Electric (PG&E) property (switchyards) and SR 1 to the northeast; the Embarcadero, commercial uses, and a marina to the southwest; Morro Creek, a recreational vehicle (RV) park, and temporary lodging facilities (hotel and motel) to the north; and Coleman Park, the Morro Bay harbor walk, and dune habitat associated with Morro Rock beach to the west.

The site of the proposed project (Project Site) covers approximately 43 acres of the 95-acre Power Plant property.¹ The Project Site includes approximately 24 acres located immediately north of the inactive power plant building in the northwestern portion of the property. This area is currently vacant but was previously developed with above-ground fuel oil storage tanks. In addition, the Project Site includes approximately 19 acres in the southwestern area of the site that includes the inactive power plant building and three (3) inactive stacks immediately southwest of the power plant building. The Project Site also includes the approximately 2.75-acre driveway that connects the power plant building to Quintana Road (Figure 2).

Current Land Use Designation and Zoning

The Project Site includes approximately 24 acres that are currently vacant but were previously developed with five above-ground fuel oil storage tanks (ASTs) associated with the inactive Morro Bay Power Plant. All five ASTs were removed in 2011. The remaining area of the Project Site includes the inactive power plant building and three (3) inactive stacks immediately southwest of the power plant building.

Under Plan Morro Bay, which was adopted by the City of Morro Bay in May 2021 and serves as the City's General Plan and Local Coastal Program (LCP) Coastal Land Use Plan, the Project Site has a land use designation of Visitor Serving Commercial with a Mixed-Use Residential Overlay.

¹ Following are definitions for several key terms used in this report:

Power Plant Property refers to the approximately 95-acre Morro Bay Power Plant property. Refer to Figure 2.

Project Site refers to the portions of the Power Plant property that would be used for the BESS project. The Project Site covers approximately 43 acres of the 95-acre Power Plant property. Refer to Figure 2.

BESS Site refers to the portions of the Project Site used for construction and operation of the BESS and supporting facilities such as Gen-tie lines and access roads. The BESS Site includes approximately 24 acres of the 43-acre Project Site. Refer to Figure 2.

Figure 2 Project Location and Existing Features



The Project Site is currently zoned M-2/PD/I with a Planned Development overlay and Interim Use overlay designation under the City's current Zoning Code. The Project Site is subject to two land use restrictions, as described below.

PG&E Deed Restriction

PG&E purchased the Morro Bay Power Plant site in 1951 and constructed the power plant in the early 1950s. In connection with the subsequent sale of the property to Duke Energy in 1997, PG&E imposed a deed restriction across much of the approximately 95-acre Power Plant property, including the entire Project Site. That deed restriction prohibits developing portions of the power plant site (including the Project Site) for permanent or temporary lodging, hospitals or other health-care facilities, schools, daycare centers for children, parks, playgrounds, or other recreational uses. This deed restriction remains in place today. Figure 3 shows the location of these restrictions on the Power Plant property.

Proposed DTSC Land Use Restriction

In 2006, PG&E entered into a Corrective Action Consent Agreement with DTSC to address areas of the Power Plant property that were contaminated as a result of past operations at the Morro Bay Power Plant. In October 2021, DTSC released a Revised Statement of Basis for the Morro Bay Power Plant site. This report, prepared by the DTSC for five "Areas of Concern" (AOCs) at the Power Plant, indicates the public-reviewed Statement of Basis recommended that a land use covenant (LUC) be recorded to address total petroleum hydrocarbons (TPH) and arsenic in soil and groundwater at the Power Plant, which would restrict land and groundwater uses and would require a soil management plan (SMP) and annual inspections. In the Revised Statement of Basis, DTSC recommends that this proposed remedy be revised to require a LUC and SMP only for soil at AOC 1, and that "the other AOCs at the [Power Plant] will be appropriate for Corrective Action Complete without Controls determinations for soil" (DTSC 2020b). The proposed land use restriction would restrict future land uses in this area to commercial/industrial uses and prohibit future development of the property for permanent or temporary lodging, school, day care centers, recreation, or hospital uses. Figure 3 shows the location of these restrictions on the Power Plant property.

Surrounding Land Uses

The Project Site is surrounded by Morro Creek, an RV park, and temporary lodging facilities (a hotel and motel) to the north; Coleman Park, the Morro Bay harbor walk, and dune habitat associated with Morro Rock beach to the west; the Embarcadero, commercial uses, and a marina to the southwest; commercial and residential development to the south; and the PG&E switchyard to the east.

1.3 Project Description

The following project description has been adapted from information provided by the Project Applicant and the City of Morro Bay. The proposed project has three components: (1) construction and operation of a 600-MW Battery Energy Storage System (BESS), (2) demolition and removal of the existing power plant building and stacks, and (3) adoption of a Master Plan that would change the land use designation of the BESS Site from Visitor Serving Commercial to General (Light) Industrial.

Construction and Operation of the BESS

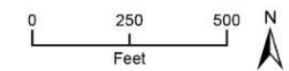
Of the 43 acres included in the Project Site, approximately 24 acres (BESS Site) would be used for construction and operation of the BESS. The BESS would provide power to utility customers by interconnecting to the existing PG&E switchyard located east of the Power Plant property and Project Site. The BESS would operate year-round to store and discharge electricity to support demand on the power grid and improve grid reliability.

The proposed BESS includes three enclosed buildings with fire protection systems to house the batteries. Each building would contain approximately 2,400 battery racks and be surrounded by approximately 60 Power Conversion Systems (PCSs) composed of inverters and transformers to convert the direct current to alternating current. The PCSs would be located on concrete pads outside the buildings. The BESS would also include three substations with transformers, a transmission line (Gen-tie) connecting to the existing deadend structures on the southwestern side of the existing PG&E switchyard (the final structures before the connection with the substation), water supply system improvements, and internal access roads. Figure 4 presents the proposed locations of these facilities on the approximately 24-acre BESS Site. Figure 5 shows typical battery energy storage system components. Table 1 summarizes the characteristics of the BESS component of the proposed project.

Table 1 Project Characteristics

Address	1290 Embarcadero, Morro Bay, California 93442
APN	066-331-046
Parcel Acreage	95 acres
BESS Site Acreage	24 acres
Demolition Site Acreage	19 acres
Battery Storage Buildings (3)	91,000 sf, 30 feet tall (2 stories)
Power Conversion Systems (approx. 180)	300 sf
Substations (3)	49,704 sf, 30 feet tall
Control House (1)	1,200 sf, 15 feet tall
sf = square feet	

Figure 3 Former Tank Farm and Areas of Concern 1 through 8



Source: Terraphase Engineering, 2022.

Figure 5 Example BESS Components
Battery Energy Storage



Power Conversion System



Substation



Source: Vistra, 2018 and 2021.

Battery Energy Storage

The BESS would be installed in three (3) two-story buildings. Each building would be approximately 350 feet by 260 feet, for a total building area of 91,000 square feet (sf) (refer to Figure 4). Each building would require approximately 1,000 to 1,500 pilings to a pile depth of approximately 75 to 100 feet (the depth of each pile will be determined during the final design-level geotechnical work based on loads and other location-specific analysis). The building exteriors would be steel frame with pre-cast concrete sides. Heating, ventilation, and air conditioning (HVAC) units would be either side- or roof-mounted.

Each building would house approximately 2,400 racks containing lithium-ion batteries with storage capacity of 200 MW for a total storage capacity of 600 MW. The battery modules (approximately 60,000 per building) would be housed in racks that are approximately 9 to 24 feet tall, depending on the use of stacked racking systems. The contract with the battery supplier would include provisions that provide for the recycling of batteries through the life of the BESS project. The racks would be grouped into blocks with their own access, fire protection, and safety systems. A typical rack is presented in Figure 5.

Power Conversion Systems

The PCSs would be located adjacent to each building and installed on the pavement or gravel pads. Underground conduits buried three to five feet in depth would connect the PCSs to the batteries in the buildings. Each PCS contains an inverter and transformer, which convert the power between direct current (DC) and alternating current (AC) and the voltage from 1,500V to 34.5kV. This is necessary because the electrical power grid operates in AC while the batteries store energy in DC. The transformer changes the voltage, as required, during battery charging and discharging. Each building would be surrounded by approximately 60 PCS units. Each PCS would be approximately 10 feet by 30 feet, with a height of approximately 15 feet. The location of the power conversion systems is identified in Figure 4. A typical PCS unit is shown in Figure 5.

Substations

The BESS would include three substations located outside the buildings. The substations would include transformers to increase the voltage to the required level for interconnection to the electrical grid, as well as associated switches, breakers, and control systems. Each BESS substation would have a transmission Gen-tie line to connect to the existing PG&E substation. The dimensions of each substation would be approximately 218 feet by 228 feet and approximately 30 feet tall. Drilled pilings to a maximum depth of approximately 75 to 100 feet would be used to support the concrete pad for the transformers. A typical substation is shown in Figure 5.

The substation areas would be graded and compacted to level the ground. Concrete pads would be constructed on site as foundations for substation equipment, and the remaining area would be graveled to a maximum depth of approximately six inches. Pilings drilled to a maximum depth of approximately 75 to 100 feet would be used to support the concrete pad for the transformers. Because each of the substation transformers would contain oil as an insulating fluid, the substations would be designed to accommodate an accidental spill of transformer fluid by the use of containment-style mounting.

One control house would be required for the three substations (refer to Figure 4). The control house would be 30 feet by 40 feet in area for a total area of 1,200 square feet, and 15 feet in height.

Connection to the PG&E Switchyard

The three proposed substations would connect to the existing, adjacent PG&E switchyard. Approximately nine new transmission line poles (one 230-kilovolt [kV] double circuit transmission line pole and eight 230-kV single circuit transmission line poles) with a maximum height of 105 feet would be required for connection to PG&E existing 95-foot deadend structures (the final structures before the connection with the substation). The locations of the proposed transmission poles and lines, and the existing deadend structures are shown on Figure 4.

Operation and Maintenance Building

The existing administration building located south of the southernmost battery storage building and just inside the Morro Bay Power Plant property front gate along Embarcadero (refer to Figure 4) would be renovated and upgraded to serve as the BESS's operation and maintenance (O&M) building. This building would include restrooms to accommodate permanent staff. No exterior modifications are planned for this building.

BESS Construction

Construction of the BESS is anticipated to take 36 to 48 months. Construction would generally occur in three phases, which would overlap. For example, Phase 2 would begin towards the end of Phase 1. Phasing is anticipated to occur as follows:

- Phase 1, Site Preparation, would extend for a duration of 12-18 months;
- Phase 2, Installation, would extend for a duration of 18-36 months; and
- Phase 3, Commissioning (Start-up and Testing), would extend for a duration of 12-18 months.

Access during construction would be provided via two routes from SR 1:

- From Main Street to Quintana Road and then along the northern boundary of the existing PG&E substation; and
- From Main Street to Beach Street to the Morro Bay Power Plant property front gate along Embarcadero.

EROSION AND SEDIMENT CONTROL AND POLLUTION PREVENTION

The project would be subject to the City's adopted Low Impact Development (LID) and Post Construction requirements pursuant to Morro Bay Municipal Code Section 14.48.140. Construction activity would require coverage under the Stormwater Construction General Permit for the National Pollutant Discharge Elimination System (NPDES) program, which requires the applicant/developer to prepare a single or multiple Stormwater Pollution Prevention Plans (SWPPPs) which would be based on the final engineering design and include all project components. The SWPPP would be designed to reduce potential erosion and surface water quality impacts during construction activities and throughout the life of the project. The SWPPP would include project information and best management practices (BMPs) for water quality.

HAZARDOUS MATERIALS AND CONSTRUCTION WASTE

Construction of the project would involve the use of hazardous materials, such as fuels and greases, to fuel and service construction equipment. A Hazardous Materials Business Plan (HMBP) that describes the allowable uses and storage of fuels and greases would be developed prior to

construction. The use, storage, transport, and disposal of hazardous materials used in construction of the facility would be carried out in accordance with federal, State, and county regulations. No extremely hazardous substances (i.e., those governed pursuant to Title 40, Part 335 of the Code of Federal Regulations [CFR]) are anticipated to be produced, used, stored, transported, or disposed of as a result of project construction. Material Safety Data Sheets for all applicable materials present on-site would be made readily available to on-site personnel and emergency services. Trucks and construction vehicles would be serviced at off-site facilities, except that routine fueling may be completed in designated areas within the Power Plant property outside of the BESS footprint.

Construction waste would be sorted on-site throughout construction and transported to a facility licensed to accept construction waste. The nearest landfills are the Chicago Grade Landfill, located about 20 miles to the northeast via SR 41, and Cold Canyon Landfill, located about 33 miles to the southeast via SR 1 and U.S. 101. Recyclable materials would be separated from non-recyclable items and stored until they could be transported to a designated recycling facility. Hazardous waste and electrical waste would be transported to a hazardous waste handling facility.

PILE INSTALLATION, BUILDING ASSEMBLY, AND RACKING

The structures supporting the building foundation would consist of steel piles which would be driven into the soil. The piles typically would be spaced eight feet apart. Between 1,000 and 1,500 pilings would be installed up to a maximum depth of approximately 75 to 100 feet. Once the piles are in place, a concrete foundation of 36 inches thick would be poured. The buildings would be erected using a steel frame and pre-cast concrete side panels. HVAC units would be installed on the roof or at the side of the building. After building erection is complete, the batteries would be installed in the buildings along with the associated wiring and control and fire protection systems.

POWER CONVERSION SYSTEMS AND SUBSTATIONS

Underground cables to connect the batteries to the PCSs would be installed using trenching techniques. Wire depths would be in accordance with local, State, and federal requirements, and would likely be buried two to three feet below grade, by excavating a trench approximately three to six feet wide to accommodate the conduits or direct buried cables. After excavation, cables rated for direct burial or cables installed inside a polyvinyl chloride (PVC) conduit would be installed in the trench and the excavated soil would typically be used to backfill the trench.

The substation areas would be excavated for the transformer equipment and control building foundations and oil containment area. The site area for the substations would be graded and compacted to an approximately level grade. Concrete pads would be constructed as foundations for substation equipment, and the remaining area would be graveled. Concrete for foundations would be brought on-site via truck.

BESS Operation and Maintenance

The operational phase of the project would begin with commissioning (start-up and testing). The project would operate continuously. The BESS would store and dispatch power during both daylight and non-daylight hours as required by grid operators year-round.

MAINTENANCE AND STAFFING

Once operational, the project would require only minimal long-term maintenance. Periodically, it may be necessary to test and/or replace individual battery modules. The BESS would be continually

monitored to determine if and when such maintenance is required. To maintain consistent operation and fulfill contractual requirements, it is anticipated that routine module replacement would occur over the life of the project, starting at approximately year five after beginning operation. Batteries would be recycled at the appropriate facilities. The batteries are anticipated to have a 20-year life. At the end of this period the batteries would be replaced.

Operation and maintenance activities would produce negligible volumes of solid and liquid wastes. The transformers proposed to be located at the PCSs and substations would use oil as an insulating fluid. As required for routine maintenance of the transformers, the oil would be replaced and disposed of in accordance with applicable regulations.

SAFETY SYSTEMS

Although the proposed new structures would not be occupied, personnel would be required to access the batteries for maintenance. Therefore, the project would incorporate a multi-tiered safety system based on industrial best practices in consultation with the Morro Bay Fire Department (MBFD). Safety systems would incorporate passive design considerations and include monitoring, automatic and manual protection elements, and explosion prevention protection, further described below.

- **Passive Design Considerations.** Compartmentalization is a passive method of fire protection that would be used to confine batteries into zones or areas. Each zone would be separated by rated fire barriers in accordance with the California Fire Code. The project would not locate any new structures in Federal Emergency Management Agency (FEMA) Flood Zone AE or any other FEMA-designated Special Flood Hazard Area, and has been sited to mitigate sea-level rise and tsunami risk. The former fuel oil tank farm area, including the west, north, and northeast sides of the BESS Site facing the ocean, is protected by existing berms that are approximately 33 feet in height. These external berms will remain intact and only the berms inside the former fuel oil tank farm area would be modified.
- **Monitoring.** The system would be continually monitored for electrical, gas/smoke, and thermal variations.
- **Automatic Protection.** The project would incorporate fire suppression for the various areas within the building based on the type of hazard. The design would incorporate an automatic sprinkler system. There would be one system dedicated to suppression at the battery/rack level and, if required, another system to protect the buildings.
- **Manual Protection.** The project would include on-site fire hydrants, automatic wet standpipes, Class III hose stations, and hand-held portable fire extinguishers.
- **Explosion Prevention Protection.** The lithium-ion batteries selected for the BESS would incorporate explosion prevention protection pursuant to the National Fire Protection Association (NFPA) 855 or International Fire Code Chapter 12.

In addition, any additional conditions required by the MBFD, including fire department site access, fire apparatus access roads, site warning signage, and building safety systems, would be incorporated into the final BESS project design.

Demolition and Remediation of Existing Power Plant Building and Stacks

Prior to the demolition of the existing power plant building and stacks, environmental remediation would occur. Significant environmental remediation was completed at the time the Power Plant

600-MW Morro Bay Battery Energy Storage System Project

closed in February 2014. This included the removal of all oils and flammable materials. The equipment housed inside the Morro Bay Power Plant structure still contains some regulated materials such as mercury switches, lighting devices, and asbestos. Prior to commencement of structural demolition, all remaining regulated materials would be removed and disposed of off-site in compliance with California and federal regulations.

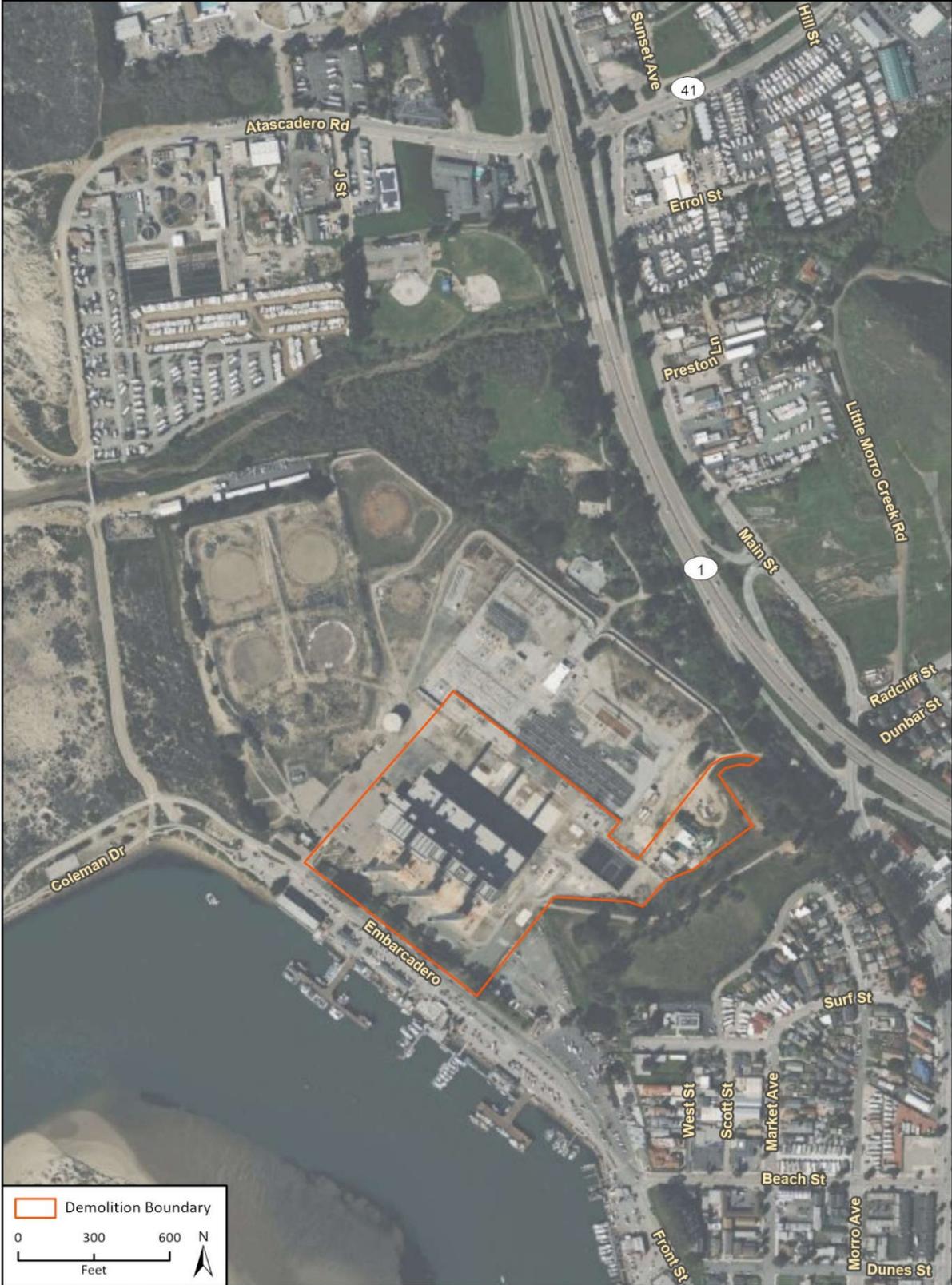
Following construction of the BESS, the existing power plant building and stacks would be remediated and demolished. Remediation and demolition would commence within six months of completion of the BESS. Of the 43 acres included in the Project Site, approximately 19 acres (Demolition Site) would be used for remediation and demolition of the power plant building and stacks. Figure 6 shows the approximate limits of the demolition activities. Environmental remediation and demolition would include the removal of equipment, removal of remaining regulated materials, dismantling of plant facilities and infrastructure, salvage and recycling of remaining equipment, waste management transport and disposal and backfill of below grade voids. Remediation and demolition are anticipated to take up to two years to complete.

Most of the outbuildings and transformers at the Power Plant property were removed in 2014. Several transformers and circuit breakers remain on the Power Plant property and are planned to be removed under a separate minor amendment application filed by the property owner. A detached garage and water tank near the main plant entrance would also be demolished. This work would be accomplished using cranes, torches, and shearing machines. All materials would be hauled to a qualified recycler or disposal facility.

Master Plan for Redevelopment of the Power Plant Property

The proposed project also includes a Master Plan which establishes a vision for the redevelopment of the Power Plant property as well as recommended improvements to pedestrian and circulation connections in the area. The Master Plan would amend the General Plan and LCP LUP land use designation on the BESS Site from Visitor Serving Commercial to General (Light) Industrial. The proposed Master Plan would not modify the existing land use designation on the remainder of the Power Plant property, retaining the Visitor Serving Commercial designation and Mixed-Use Residential Overlay recently implemented through Plan Morro Bay.

Figure 6 Demolition Site Boundary



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Additional data provided by Vistra, 2022.

19-08915 MB, MB BESS EIR
Fig 2-5 Demolition Area

2 Regulatory Setting

The Project is subject to federal and State regulatory requirements that are intended to characterize and reduce the risks posed by geologic and other natural hazards. Mandatory compliance with current State and local construction, engineering, and geotechnical building standards, which are based on the best available science and technology, provide additional protection against such hazards. Regulatory requirements and industry standards address these risks primarily via design and construction techniques, which are confirmed and approved by regulatory entities at various stages of the Project's planning and implementation phases.

Generally, these regulatory requirements and industry standards are delineated in several documents; sources that may contain guidelines and/or requirements that are applicable to the Project include, but are not limited to, the following: the Morro Bay Municipal Code (MBMC); the International Code Council, Inc. (ICC) International Building Code (IBC; most recent update) as adopted by the California Building Code (CBC; Title 24 of the California Code of Regulations); the Morro Bay General Plan/LCP Coastal Land Use Plan (Plan Morro Bay; City of Morro Bay 2021); the Greenbook Committee of Standard Specifications for Public Works Projects (Greenbook Specifications; most recent update), and the State Water Quality Control Board's Construction Stormwater Program.

A brief description of each source is included below:

- **Morro Bay Municipal Code.** The MBMC largely adopts the CBC with specific edits. Chapter 14 of the Morro Bay Municipal Code includes building and construction requirements to reduce hazard potential that are applicable to all new constructions, including the Project. These requirements include, but are not limited to:
 - Seismic Safety Program – Chapter 14.18
 - Flood Damage Prevention – Chapter 14.72, Sections 14.72.010 – 14.72.060
- **California Building Code and International Building Code.** The CBC contains engineering and design requirements for buildings in California, and incorporates elements of the IBC, ASTM, and International and the American Society of Civil Engineers (ASCE) standards. The following CBC sections contain requirements that may be applicable to the Project:
 - General provisions – Chapter 1
 - Structural design (including soil, seismic, and tsunami flood loading) – Chapters 16/16a
 - Structural tests and special inspections (including seismic resistance) – Chapters 17/17A
 - Soils and foundations – Chapters 18/18A
 - Grading, including excavation, fill, drainage, and erosion control – Appendix J
 - Tsunami generated flood hazard – Appendix M

ASCE 7-16 standards include tsunami load standards updated in December 2021 to improve building resilience and safeguard human life in response to tsunamis that struck Chile and Japan in 2010 and 2011.

- **Plan Morro Bay.** California Senate Bill 271 Assembly Bill 2038 required that counties and cities adopt General Plan policies regarding natural hazards. Coastal Act section 30253 provides, in part, that new development minimize risks to life and property in areas of high geologic, flood,

and fire hazards and neither create nor contribute significantly to erosion, geologic instability, or destruction of natural landforms along bluffs and cliffs. In response to this requirement LCPs require that safety and stability be assured for the life of new coastal development. Plan Morro Bay is the City of Morro Bay's General Plan/LCP Coastal Land Use Plan, and it provides direction and resources intended to mitigate death, injuries, and environmental and economic damage. Plan Morro Bay contains several policies that are applicable to the Project, including, but not limited to:

- Geologic and Seismic Hazards - Policies PS-2.8 through PS-2.13: Require new developments to complete soils reports and ensure structural designs address seismic, liquefaction, and other geologic hazards.
 - Coastal Hazards - Policies PS3.6 through PS-3.11: Require new developments to incorporate design elements that address coastal hazards associated with natural disasters and climate change.
- **Greenbook Specifications.** The Standard Specifications for Public Works Construction, or "Greenbook," is produced by a committee of experts from the American Public Works Association, Engineering Contractors Association, Southern California Contractors Association, and others. The Greenbook provides standards for construction materials and methods, engineering, construction activities, and protocols for assessing and mitigating geologic and soil hazards. The Greenbook is widely adopted by regulatory agencies.
- **State Water Quality Control Board's Construction Stormwater Program.** Construction General Permit Order 2009-0009-DWQ requires that dischargers whose projects disturb one or more acres of soil obtain a Construction General Permit, in order to comply with the National Pollutant Discharge Elimination System (NPDES) program. The Construction General Permit requires the development of a Storm Water Pollution and Prevention Plan (SWPPP) to protect against the discharge of pollutants during construction.
- **Morro Bay Local Hazard Mitigation Plan.** The Morro Bay Local Hazard Mitigation Plan (LHMP) is a plan to improve the resiliency in the community by identifying natural hazards present in Morro Bay, determining the community's vulnerability to each hazard, and identifying development mitigation strategies to reduce vulnerability before emergency situations develop. Morro Bay's LHMP was adopted in 2006 and most recently updated in 2019. The LHMP identifies earthquakes (including fault rupture and liquefaction), floods, landslides, and hazardous materials releases as the most significant hazards present in the community and contains nine goals to improve resiliency (City of Morro Bay 2019a). The City's LHMP is part of the County of San Luis Obispo's Multi-Jurisdictional LHMP.
- **Morro Bay Multi-Hazard Emergency Response Plan.** The City of Morro Bay has a Multi-Hazard Emergency Response Plan revised in 2019 and developed by the MBFD. The Emergency Response Plan covers City policies and concepts for responding to any and all emergencies that could affect the health, safety, and property of the public within city limits, including earthquakes, hazardous materials, multi-casualty events, storms and floods, wildland fires, terrorism, nuclear power plant events, and tsunamis (City of Morro Bay 2019b). Most of the hazards in the response plan are also contained in the LHMP. The policies and general approach to emergency situations delineated in the plan follow a number of widely adopted emergency response standards and operations protocols, including the National Incident Management System, the State Emergency Management System, and the Incident Command System.

3 Physical Setting

3.1 Topography

The Project Site lies at an elevation of approximately 10 feet above NAVD88² (USGS 2021) and is generally flat with a gradual southwesterly slope towards the Pacific Ocean and the estuary of Morro Bay, which bounds the Power Plant property to the west. Morro Rock, a prominent volcanic plug (see Section 3.3), is located west of the Power Plant property, and sits at the mouth of Morro Bay. Morro Bay extends south and roughly parallel to the shore for approximately 3.5 miles before terminating at the unincorporated community of Los Osos. The hills of the Coast Ranges lie to the east of the Project Site.

3.2 Regional Geology

The Project Site is located in the Coast Ranges of the California Geomorphic Provinces (CGS 2002), which are characterized by northwesterly-trending mountains and valleys. The Coast Ranges extend from the Pacific Ocean east to the San Joaquin Valley. On the Central Coast, the mountains are primarily composed of sedimentary strata dating to Mesozoic and Cenozoic eras. Several major fault traces run parallel to the Coast Ranges, including the San Andreas, the Rinconada, the Hosgri, and the La Panza fault zones.

The Franciscan Complex is the predominant geologic formation on the portion of the Central Coast where the Power Plant property is located, and it is marked by a *mélange* (or mixture) of marine sediments that have experienced varying grades of metamorphism (Raymond 2019). Intrusive igneous units are also present in localized areas. Morro Rock is an example of such volcanic rocks.

3.3 Local Geology

The Project Site is underlain by Quaternary-age alluvium, composed of gravel, sand, and clay derived from Morro Creek (Dibblee 2006). Immediately surrounding the Project Site are beach and dune sand deposits, metamorphosed *mélange* units of the Franciscan Complex, and intrusive dacite blocks and volcanic plugs. Morro Rock is a prominent geologic feature at the mouth of Morro Bay with geologic, cultural, and regional value. Morro Rock, along with eight other hills, form a line of volcanic plugs extending towards the southeast known as the Nine Sisters.

Currently, no known faults have been mapped through the Power Plant property. The closest active fault is within the Cambria Fault Zone, located approximately 1.75 miles to the northeast (USGS 2017), which is of late Quaternary (less than 130,000 years) age. The Cambria Fault Zone is not identified as a significant seismic risk at the Power Plant property. The Los Osos Fault Zone, also of late Quaternary age, is mapped approximately 5.5 miles to the south of the Power Plant property. The Irish Hills section of the Los Osos Fault Zone, located 9 miles to the south, has a well-defined trace and is estimated to be younger than 15,000 years, and constitutes a zone of required Investigation (see Section 4.2.1). The Los Osos Fault Zone is inferred to pass through Morro Bay and extend into the Pacific Ocean west of Morro Rock, where evidence indicates that it may merge into

² North American Vertical Datum of 1988, as referenced on the Morro Bay South topographic map (USGS 2021).

the Hosgri Fault Zone. The Hosgri Fault Zone is an off-shore, large complex of faults of Quaternary age extending from Vandenberg Air Force Base to the south, to Big Sur, to the north (CGS 2022a).

The Project Site has been mapped in an area containing soils predominantly classified in the psamment and fluvent sub-orders with highly variable profiles, and with small areas of Corralitos and Tujunga series soils (USDA 1984³). Psamments are characterized by low-water holding capacity sands, commonly associated with dunes, and fluvents by typically stratified flood-plain deposits containing clayey and loamy material (USDA-NRCS 1999).

A number of site-specific geologic investigations have been conducted at the Power Plant property in support of historical Power Plant construction and improvement activities not associated with the current Project, including:

- *Geotechnical Studies and Evaluations of Two Fuel Oil Tank Farms at Morro Bay Power Plant*, Roger Foott Associates, August 31, 1993
- *Application for Certification, California Energy Commission, Moro Bay Power Plan Project*, Duke Energy, October 2000

Although these data were collected prior to the application for the current Project, they represent geologic information pertinent to portions of the Project Site and thus were reviewed for this Report. These investigations included the advancement of nearly 100 soil borings and 13 groundwater monitoring points to depths of up to approximately 75 to 100 feet below ground surface (ft bgs) (the depth of each pile will be determined during the final design-level geotechnical work based on loads and other location-specific analysis). Rincon reviewed select logs GT-1 through GT-6, 84-1 through 84-11, 85-P1 and 85-P2, B-1 through B-18 and B-20 through B25 (Duke Energy 2000); these boring logs are included as Appendix A to this Report. Rincon was not provided with the text of the reports that are associated with these boring logs. Based on these historical boring logs, the Project Site overlies material predominantly composed of silty sand and sand mixtures with some thick zones (greater than 5 feet) of clay. A cross section based on a subset of the borings, which was prepared for the former Tank Farm area, shows that subsurface material consists of dune sand and silt, which lie over fine-grained estuarine deposits, medium to coarse grained marine terrace deposits, and shale bedrock (Duke Energy 2000).

Additionally, the Geotechnical (Foundation) Report for Morro Creek Multi-Use Trail and Bridge Project (Morro Creek Geotechnical Report), prepared by Bengal Engineering Inc. (Bengal), was reviewed as the study area was adjacent to the Project Site (Figure 2). The Morro Creek Geotechnical Report included a field program that consisted of advancing three hollow-stem auger borings along the alignment of a proposed multi-use trail; the boring logs for B-1 through B-3 are included as Appendix A of this Report. Bengal's field observations were consistent with those made from on Site borings, and indicate that the subsurface is composed of dune sand with deeper zones of silty sand and clayey sand.

³ Soil Survey Area CA644; accessed from the University of California at Davis SoilWeb online viewer <https://casoilresource.lawr.ucdavis.edu/gmap/> and from <https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx>

3.4 Hydrogeology

The Project Site is at the northern end of Morro Bay, a natural embayment on the Pacific Ocean that parallels the shore for approximately 3.5 miles before terminating south at the unincorporated community of Los Osos. The Project Site is not within a recognized groundwater basin but is situated directly south of the Morro Valley Groundwater Basin (Basin Number 3-041; DWR 2022a). Several groundwater monitoring wells have been installed and/or abandoned at the Project Site. As of the most recent gauging event in 2018, groundwater depths and elevations ranged from approximately 6 to 30 ft bgs, and 3.2 to 13.2 feet above mean sea level⁴ (ft amsl), respectively (ETIC Engineering [ETIC] 2018). Borings advanced on an adjacent site encountered groundwater at a depths of 10 to 14 ft bgs in 2014 (Bengal 2014).

Little Morro Creek combines with Morro Creek approximately 1,800 feet northeast of the Power Plant property before running through the northwesterly portion of the Power Plant property directly north of the BESS Site/former tank farm, and discharges into the Pacific Ocean north of Morro Bay and the Project Site (Figure 2).

⁴ A vertical reference datum was not provided in ETIC Engineering's 2018 Transmittal (ETIC 2018).

4 Evaluation Results

The results of the Geologic Hazards Evaluation for the Project Site are included below.

4.1 Significance Thresholds

In accordance with Appendix G of the CEQA Guidelines, an impact related to geology and soils would be significant if the proposed project would:

- a. Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:
 - i. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zone Map issues by the State Geologist for the area or based on other substantial evidence of a known fault (refer to Division of Mine and Geology Special Publication 42);
 - ii. Strong seismic ground shaking;
 - iii. Seismic-related ground failure, including liquefaction;
 - iv. Landslides;
- b. Result in substantial soil erosion or the loss of topsoil;
- c. Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse;
- d. Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property;
- e. Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater; or

The following discussion evaluates potential Project impacts related to geology and soils. In addition to these thresholds of significance, this Report also evaluates the potential for the project to result in environmental impacts associated with physical hazards related to hydrogeologic conditions described in Appendix G of the CEQA Guidelines. In accordance with these Guidelines, an impact related to hydrology and water quality would be significant if the proposed project would:

- d. In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation.
- “Potentially significant impacts,” as defined by the CEQA Guidelines, would generally result in the loss or degradation of public health and safety or conflict with local, State, or federal agency regulations. The discussion is based on the results of previous investigative studies. Supplementary information was obtained through review of maps, online databases, articles, reports, and published research papers as described in Section 1.1 of this Report, for information on local and on-site geology and hydrogeologic conditions.

The evaluation of geology and soils impacts assumes that the construction and development of the Project would adhere to all applicable federal, State, and local regulations, and conform to the

current required State and local construction, engineering, and geotechnical building standards, as appropriate.

Because the proposed project does not propose the use of septic tank or any alternative wastewater disposal systems, an analysis of potential impacts related to septic tanks or alternative wastewater disposal systems (CEQA Guidelines Geology and Soils checklist question “e”) is not included in this Report.

4.2 Potential Project Impacts

4.2.1 Seismic and Soil Hazards

Hazards associated with seismic phenomena, such as earthquakes, and other on-site soil characteristics are discussed below.

a.i) Would the project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault?

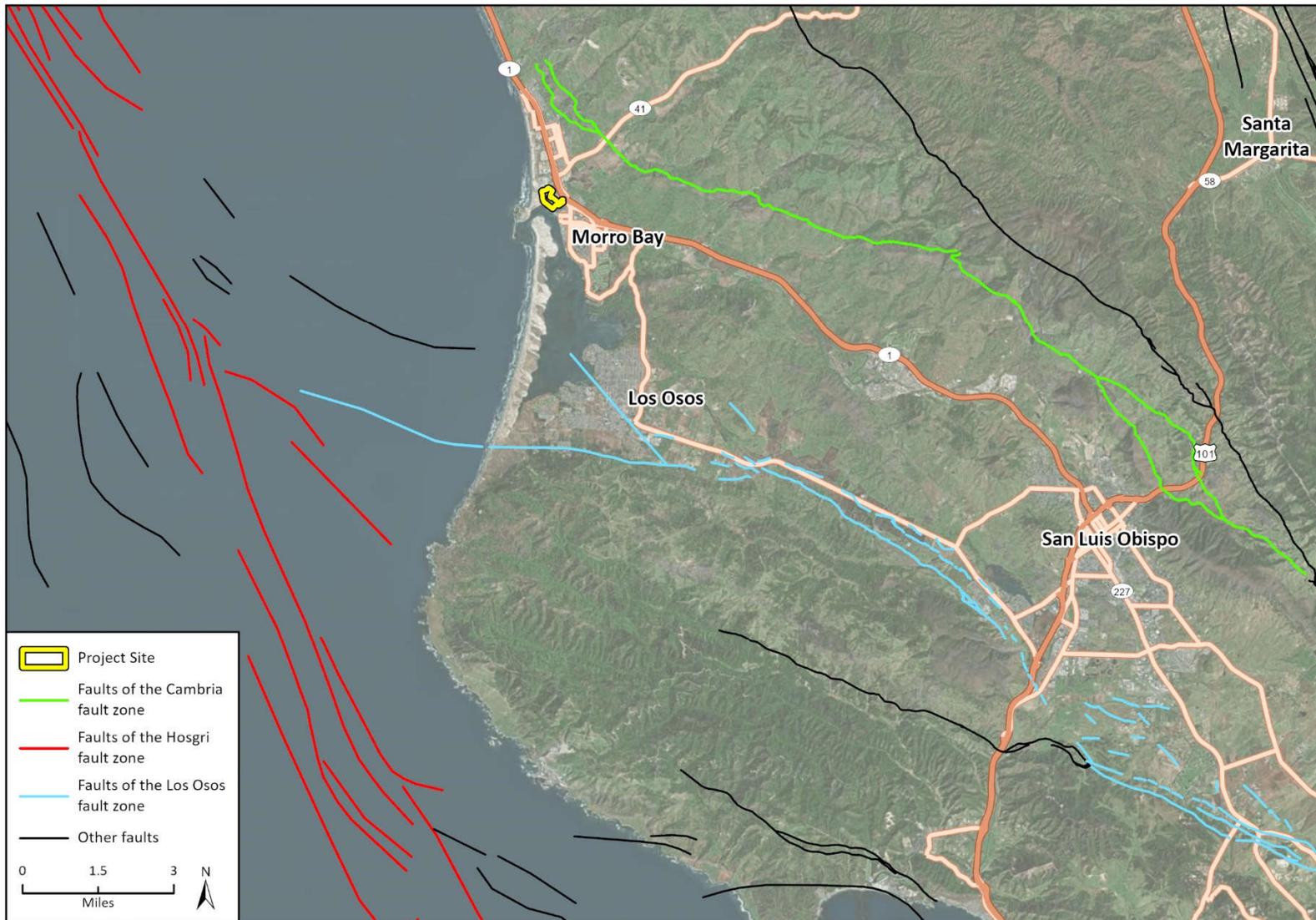
Ground Surface Fault Rupture

Surface rupture refers to the displacement of the ground surface along a pre-existing fault. Fault rupture can endanger life and property if structures are constructed on, or cross over, a fault, due to the differential movement of the ground surface. Alquist-Priolo Earthquake Fault Zoning Act (Alquist-Priolo Act) directed the State Geologist to delineate regulatory “zones of required investigation” to reduce the threat to public health posed by geologic faults and earthquakes. Zones of required investigation indicate areas with active faults that have the potential for surface rupture.

As discussed in Section 3.3, the Project Site is located in a seismically-active area of California; however, the Project Site does not overlie the trace of any known fault (Figure 7). Additionally, the Project Site is not located within an earthquake zone of required investigation as designated by the Alquist-Priolo Act (CGS 2022b). The closest zone of required investigation is the Irish Hills section of Los Osos Fault Zone, located approximately 9 miles southeast of the Project Site (Figure 8). Therefore, the risk of ground surface fault ruptures at the site would be less than significant.

The Los Osos Fault Zone is a complex fault system of well-defined segments with dextral strike-slip and dip-slip displacement (USGS 2016). Geomorphic expressions include prominent spring lines, linear topographic scarps, and deflected drainages. The estimated slip-rate of the Irish Hills section is between 0.2 and 1 millimeter per year, and the most recent deformation age is late Quaternary (in the last 15,000 years).

Figure 7 Regional Quaternary Faults



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Fault zone data provided by California Geological Survey, 2010.

Geology Hazards Figures
Regional Quaternary Fault Traces

Figure 8 Zones of Required Investigation



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Fault zone data provided by California Geological Survey, 2017.

Geology Hazards Figures
Earthquake Zones of Required Investigation

a.ii) Would the project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving strong seismic ground shaking?

Seismically Induced Ground Shaking

As with virtually all of California, the Project Site is located in an area with the potential for ground shaking that may cause structural or property damage in the event of an earthquake. The intensity of ground motion depends upon the magnitude of an earthquake, the distance from the epicenter, and the geology between the epicenter and the Project Site. Ground motion caused by earthquakes can be amplified in softer, unconsolidated soil, in which seismic wave velocity decreases but wave amplitude increases, as opposed to in harder material, such as bedrock. As amplitude increases, so does ground acceleration, and the ground shaking intensity.

As discussed in Section 3.3, the Project Site overlies Quaternary-aged alluvium composed of gravel, sand, and some clay, and the material in the immediate vicinity of the Project Site is beach and dune sands; these materials have an increased risk of damage due to ground shaking (SLO County 1999). Additionally, the Project Site is in an area mapped as having a class 'yellow' earthquake shaking potential, which generally corresponds to a moderate earthquake hazard (CGS 2016)⁵.

A list of historical earthquakes, occurring between 1900 and 2022, within 50 miles of the Project Site and having a magnitude of 4.5 or greater, are summarized on Table 2; a map illustrating the locations and magnitudes of these earthquakes is presented on Figure 9 (USGS 2023).

Table 2 Regional Earthquakes

Date (yr-mo-day)	Magnitude	General Location
2021-10-25	4.65	18km NW of San Simeon, CA
2004-09-30	4.88	13 km NW of Parkfield, California
2004-09-29	5	8 km NW of Parkfield, California
2004-09-28	4.71	12 km SE of Parkfield, California
2004-09-28	5.97	10 km SSE of Parkfield, California
2004-03-17	4.51	9 km WSW of Oak Shores, California
2003-12-23	4.7	9 km NNE of Cambria, California
2003-12-22	4.73	7 km NNE of Cambria, California
2003-12-22	6.5	10 km NE of San Simeon, California
1994-12-20	4.9	3 km NW of Parkfield, California
1993-11-14	4.82	8 km NW of Parkfield, California
1991-09-17	5.2	22 km NW of San Simeon, California
1985-11-24	4.5	2 km ENE of San Ardo, California
1983-08-29	5.2	25 km NW of San Simeon, California
1980-05-29	4.9	26 km WSW of Guadalupe, California
1975-11-13	4.79	11 km W of Oak Shores, California
1975-09-13	4.8	14 km NW of Parkfield, California

⁵ Based on a 1-second spectral period with 2% exceedance probability in 50-years.

600-MW Morro Bay Battery Energy Storage System Project

Date (yr-mo-day)	Magnitude	General Location
1966-06-28	4.5	8km NW of Parkfield, California
1966-06-28	5.47	8km N of Cholame, California
1966-06-28	4.69	14km NE of Cholame, California
1961-07-31	4.64	8km ESE of Parkfield, California A
1958-10-10	4.71	30km N of San Miguel, California
1955-03-02	4.77	22km NNW of Lake Nacimiento, California
1952-11-22	6.2	28km NW of Cambria, California
1949-06-27	4.5	11 km WNW of Oak Shores, California
1948-12-31	4.6	19 km W of San Simeon, California
1939-12-28	5.17	26km NNW of Lake Nacimiento, California
1938-11-22	4.5	5 km NW of Parkfield, California
1934-12-24	4.77	14km N of San Miguel, California
1934-12-03	4.53	34km SSW of King City, California
1934-06-14	4.5	14 km SE of Parkfield, California
1934-06-08	4.5	14 km SE of Parkfield, California
1934-06-08	5.84	11km NNE of San Miguel, California
1934-06-08	5.09	13km N of San Miguel, California
1934-06-05	4.81	12km SW of Parkfield, California
1932-02-26	5	8 km WSW of San Ardo, California
1931-07-21	4.8	3 km SSW of San Luis Obispo, California
1931-02-23	4.7	9 km SW of Parkfield, California
1927-11-19	5	5 km SSW of Nipomo, California
1927-11-04	6.9	18 km WSW of Vandenberg Air Force Base, California
1922-08-18	5	11 km NNE of Shandon, California
1922-03-16	5	11 km NNE of Shandon, California
1917-07-26	4.8	5 km SSW of Nipomo, California
1902-07-28	5.4	7 km SSE of Orcutt, California
1901-03-03	6.4	12 km NNW of Parkfield, California

Figure 9 Historical Regional Earthquakes



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-  Project Site
- Earthquake Magnitude**
-  4 - 5
-  5 - 6
-  6 - 7

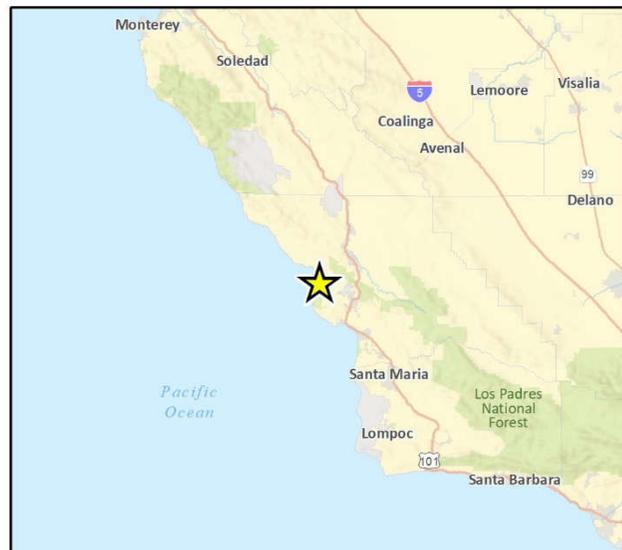


Fig 5 Historical Regional Earthquakes

The Los Osos Fault zone has been estimated to have a 0.25% probability of producing a magnitude 7.0 earthquake in the next 30 years (Field et. al. 2013).

According to the Duke Energy application, the Project Site is subject to a peak horizontal ground acceleration (PGA) of 33% of the acceleration of gravity (g-units; 0.33 g) from a maximum credible earthquake of magnitude 6.8 on the Los Osos Fault and is located within Seismic Zone 4 as designated by the CBC (Duke Energy 2000). According to the USGS Unified Hazard Tool⁶, which calculates estimated ground accelerations based on site-specific parameters and published earthquake hazard and probability maps, the Project Site has a 2% chance in 50 years of experiencing a PGA of approximately 0.49g⁷. This PGA corresponds to a “moderate perceived shaking” and “very light potential damage,” based on the Modified Mercalli scale (Kramer, Upsall 2006)⁸.

Based on this information, the Project Site is susceptible to seismic activity, and would be subject to moderate ground shaking during a reasonably likely earthquake. However, the Project would be required to minimize this risk through incorporation of applicable CBC standards as adopted by the City (MBMC Section 14.01.020). Proposed new project structures (including the battery racks) would be required to be designed in accordance with the minimum requirements of the versions of CBC and ASCE 7 in place at the time of construction permitting. During the plan check process, the City would review detailed structural engineering drawings of the proposed seismic anchoring, which would be reviewed and approved by a licensed structural engineer to ensure that in the event of an earthquake, the racks/cabinets would remain upright and have a low probability of resulting in property loss or injury. The project design and compliance with the CBC would minimize the risk of loss, injury, or death involving seismic ground shaking. With adherence to existing regulatory requirements, the project would not directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death, associated with seismic-related ground shaking, ground failure, or landslides.

- a.iii) Would the project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving seismic-related ground failure, including liquefaction?
- a.iv) Would the project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving landslides?
- c. Would the project be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?

Liquefaction

Liquefaction is a process in which saturated soil temporarily becomes fluid during intense and prolonged ground shaking, or because of a sudden shock or strain. Liquefaction typically occurs in areas with loose sand or silt where groundwater is shallow (less than 40 ft bgs [SMGB 2014]). Settlement is the vertical compression of the soil structure in response to a load, such as a building

⁶ <https://earthquake.usgs.gov/hazards/interactive/>

⁷ Calculated using Dynamic Conterminous U.S. 2014 (v4.2.0) hazard model edition assuming a Site Class of D/E

⁸ The PGA derived for this Report is intended to offer a qualitative assessment of potential ground shaking and is not intended to provide information for use in engineering calculations or designs for the Project.

or compressive ground shaking in an earthquake. Settlement can be rapidly induced by liquefaction as sediments densify in response to the dissipation of pore water pressures (dewatering).

As discussed in Section 3.3, the Project Site overlies Quaternary-aged alluvium composed of gravel, sand, and some clay, and the material in the immediate vicinity of the Project Site is beach and dune sands (Figure 2). Areas containing beach and dune sand deposits have a high liquefaction potential (SLO County 1999), and the Site has a “moderate potential” liquefaction risk (SLO County 2023). Additionally, as of the most recent gauging event in 2018, groundwater depths and elevations ranged from approximately 6 to 30 ft bgs, and 3.2 to 13.2 ft amsl, respectively (ETIC 2018). An adjacent site was assessed to have soils that are highly susceptible to liquefaction (Bengal 2014).

Based on this information, the Project Site soils are susceptible to liquefaction and associated settlement that may result from a seismic event. This impact is potentially significant. Mitigation Measure GEO-1 would require the project applicant to prepare a geotechnical assessment according to the most current analytical procedures and industry standards. The required geotechnical assessment shall provide design recommendations for the proposed Project to withstand existing conditions or treat the Project Site in such a manner as to address liquefaction and associated settlement conditions. Suitable measures to reduce impacts are described in Mitigation Measure GEO-1 in Section 5.1.

Subsidence and Collapse

Subsidence is the differential (lateral or vertical) movement of the ground due to the collapse of soil pore space, which occurs without the application of an external load, such as a building. Subsidence can also occur during the compressive ground shaking of an earthquake. A common cause of subsidence in California is the over-pumping of groundwater, which reduces pore pressure, or the decay of organic matter, such as peat, which allows the soil substrate to compress and surface elevations to decrease. Subsidence is generally viewed as a regional change in surface elevation; however, localized differential displacements of the ground surface can damage foundations and structures as does settlement.

According to the boring logs that Rincon reviewed (included in this Report as Appendix A), the Project Site overlies a mix of cohesive and cohesionless soils containing silty sands and some clays. Although the fine-grained elements may provide enough structure to the soil matrix to protect against subsidence, the low-cohesion fractions may be susceptible in the event of dewatering or ground shaking. Additionally, organic estuarine deposits were encountered in select borings, which may contain peat that could compress and lead to subsidence as organic matter decays.

The Project Site is not located in an area with known locally specific subsidence risks (DWR 2022b & DWR 2022c, SLO County 1999, USGS 2022). However, localized subsidence can occur as a result of regional events, including seismic events. This impact is potentially significant. Mitigation Measure GEO-1 would require the project applicant to prepare a geotechnical assessment according to the most current analytical procedures and industry standards. The required geotechnical assessment shall provide design recommendations for the proposed Project to withstand existing conditions or treat the Project Site in such a manner as to address subsidence conditions. Suitable measures to reduce this impact are described in Mitigation Measure GEO-1 in Section 5.1.

Slope Stability and Landslides

Landslides are a form of mass wasting, in which rocks or soil material travel downhill under the force of gravity in a slope failure. Significant damage to structures and/or infrastructure can occur depending on the extent and energy of the landslide.

Since the Project Site is virtually flat and is located approximately at sea level, there is minimal risk of seismic induced landslides and slope instability on the Project Site, and the Site has a “low potential” for landslide risks (SLO County 2023).

The Project Site could also be affected by landslides that originate off-site and travel downslope for a distance. The Project Site is near the foothills of the Santa Lucia Mountains of the Coast Ranges. The closest known historical landslide is located approximately 1.9 miles to the north and is classified as active/historic or dormant young (CGS 2022c); no known landslides have been mapped in the immediate vicinity of the Project Site (Figure 10).

An unnamed ridge, with a maximum elevation of 226 feet above NAVD88 (USGS 2021), lies approximately 2,000 feet to the northwest of the Project Site (Figure 2). The western flank of this ridge has been assigned a Landslide Susceptibility Class of X (CGS 2022c), or the most susceptible combination of rock strength and slope to land sliding (CGS 2011), and has a “high potential” landslide risk (SLO County 2023). Although a landslide originating from this ridge poses a minor potential risk to the Project Site, given the low elevation of the ridge and its distance from the Project Site (located across Highway 1), the potential for damage to onsite infrastructure would be less than significant.

Lateral Spreading

Lateral spreading can occur when liquefiable soils present on a slope are subject to ground shaking. If the liquified soil is not laterally contained, it can deform and translate horizontally. The Project Site soils are susceptible to liquefaction; however, since the topography is generally flat, lateral spreading during an earthquake is not likely. Therefore, impacts from lateral spreading would be less than significant.

d. Would the project be located on expansive soil, creating substantial direct or indirect risks to life or property?

Expansive Soils

Soils with relatively high clay content that contain specific clay minerals (such as smectite clays) are considered expansive, which indicates that they shrink and swell in response to changing water content. This action is characterized by a soil’s “shrink-swell potential,” and can damage building and structural foundations via the differential movement of soil.

As discussed in Section 3.3, the Project Site has been mapped in an area containing soil classified as psamments and fluvents (Figure 11; USDA 1984). The specific soil profiles of psamments and fluvents are highly variable and include small areas of Corralitos and Tunjunga series soils. Corralitos and Tunjunga soils are considered to have low shrink-swell potential; however, fluvents contain flood-plain deposits that include zones of clay (USDA-NRCS 1999). Based on the boring logs that Rincon’s geologist reviewed (included in this Report as Appendix A), the Project Site overlies soil with a mix of cohesive and cohesionless soils containing silty sands and undifferentiated clays. The clays tend to appear between 5 and 15 ft bgs and were classified as having “high plasticity.” The

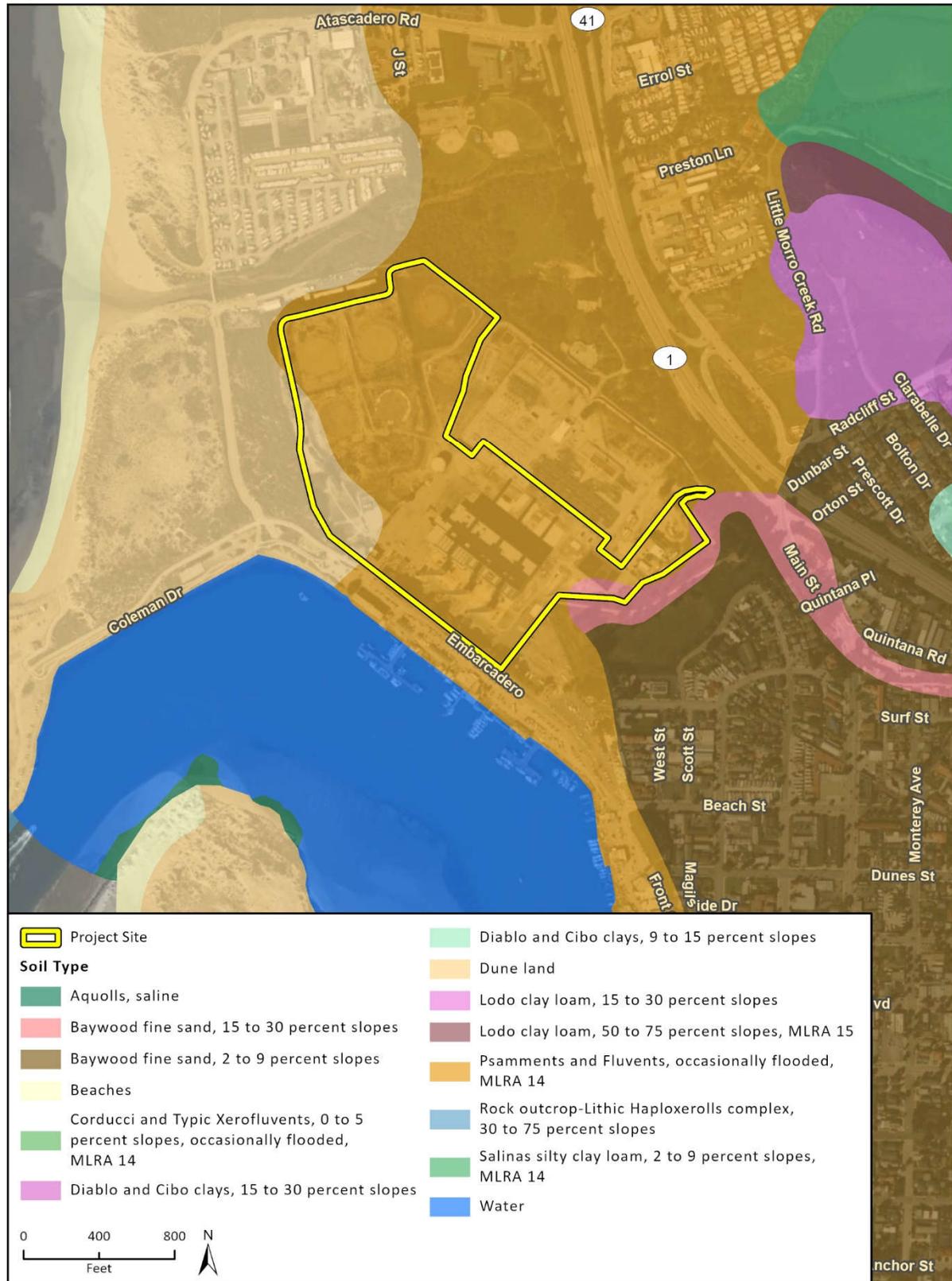
Figure 10 Regional Landslides



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Landslide data provided by California Geological Survey, 2022.

Geology Hazards Figures
Regional Historical Landslides

Figure 11 Soil Classifications



specific shrink-swell potential of these clay zones has not been assessed; however, high plasticity clays suggests the presence of expansive soils with the potential to result in significant project impacts. Mitigation Measure GEO-1 would require the project applicant to prepare a geotechnical assessment according to the most current analytical procedures and industry standards. The required geotechnical assessment shall provide design recommendations for the proposed Project to withstand existing conditions or treat the Project Site in such a manner as to address expansive soil conditions. Suitable measures to reduce this impact are described in Mitigation Measure GEO-1 in Section 5.1.

b. Would the project result in substantial soil erosion or the loss of topsoil?

Erosion

Erosion is a natural process whereby soil and weathered rock materials are worn away and transported, most commonly by wind or water. This action presents hazards to structures because it removes soils, which can undermine foundational elements, and transports and deposits the eroded material at other locations, which could cover roads, fill in reservoirs, and cause other impairments to infrastructure.

The Project Site is innately susceptible to some erosion risks because it lies in a coastal zone that is subject to ocean wave action. This action is currently being managed by emplaced rip-rap along Morro Bay's western shore and attenuated by the sand spit and dunes that form Morro Bay's western boundary (SLO County 1999).

The Project Site is previously developed, generally flat, and located in a developed area of the City. The primary source of erosion would be during initial site ground disturbance and construction and from storm water runoff. The soil erodibility factor, or K-value, of the Universal Soil Loss Equation (USLE) and Revised Universal Soil Loss Equation (RUSLE), was used to assess the Project Site's vulnerability to erosion by surface water run-off (sheet and rill erosion). The K-value is a measure of the susceptibility of soil particles to detachment and transport by rainfall and runoff. K-values range from 0.02 to 0.69, and other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by surface water flows. The Project Site has been mapped in an area containing soil classified as psamments and fluvents, with small areas of Corralitos and Tunjunga series soils (Figure 11). Because psamments and fluvents are taxonomical sub-orders and vary in profile at the Project Site, a K-value has not been established for psamments and fluvents, although they are described as having a "moderate" water erosion risk (USDA 1984). Corralitos and Tunjunga soils have K-values of 0.17 and 0.2 respectively (USDA 1984). Based on this information, the Project Site has a moderate erosion hazard.

Prior to the initiation of construction, the Project would be required to obtain coverage under a Construction General Permit to comply with NPDES permitting program to control construction stormwater discharges. Compliance with the conditions of the Construction General Permit would require the developer to develop and implement a SWPPP to reduce potential erosion and loss of topsoil during project construction activities. Typical Best Management Practices (BMPs) included in a SWPPP would include covering of inactive stockpiles, silt fences and gravel bag berms to trap sediments, and inlet protection, and slope stabilization to limit discharge of eroded soils from the construction site and sedimentation of surface waters offsite. Preparation of the required SWPPP would help ensure the project would not result in substantial temporary or long-term erosion or loss of topsoil. With implementation of required NPDES permitting program requirements, this impact would be less than significant.

4.2.2 Hydrogeologic Hazards

d. In flood hazard, tsunami, or seiche zones, would the project risk release of pollutants due to project inundation?

Flooding

Floods cause damage to buildings and infrastructure by inundating them with water and, potentially, with debris. The Base Flood Elevation (BFE) is the computed elevation to which a flood is anticipated to rise during a 100-year flood event, or during a flood that statistically has a 1% chance of occurring in any given year. The BFE was derived from local topography and historical weather data, is shown on Flood Insurance Rate Maps (FIRMs) developed by the Federal Emergency Management Agency (FEMA). Areas that are within the 100-year flood zone are within Special Flood Hazard Areas (SFHAs).

The Project Site includes areas mapped in a flood zone designated with “AE” and “X” (Figure 12). Specifically, the BESS Site is within Zone X, which has a 0.2 percent annual (minimal) chance of flood hazard. The remaining portions of the Project Site are in an SFHA with a high flood risk (FEMA 2022), or AE Zone, which indicates that the area has a 1% annual flood risk and a 26% risk of flooding over 30 years. BFEs are estimated to range between 15 and 20 feet above NAVD88 for these areas. Based on the mapped flood zone, the BFE would primarily affect the Power Plant area; most of the BESS/former tank farm is outside of the SFHA.

Based on this information, the Project Site (which includes both the BESS Site and the Demolition Site) is susceptible to a 100-year flood risk. However, the Project does not propose new structures on the portion of the Project Site within the Zone AE SFHA. The proposed BESS would be required to be constructed in accordance with FEMA Zone X requirements and would include stormwater detention and infiltration components in accordance with Regional Water Quality Control Board requirements. Therefore, the potential impact from flooding would be less than significant.

Tsunamis

Tsunamis are a powerful series of water waves generated by a substantial displacement of water, typically caused by an earthquake. Wave heights can reach tens of feet high and can cause significant damage to buildings and infrastructure in coastal areas. Tsunami Hazard Areas are generated by the California Geologic Survey (CGS) and are based on models that account for local geographic features. Tsunami Hazard Areas show coastal areas that may be at risk based on inundation limits corresponding to a 975-year average return period tsunami event and are reevaluated at least every 5 to 10 years.

The Project Site lies within a Tsunami Hazard Area (CGS 2022d; Figure 13, which extends east approximately 1,600 feet to the foot of an unnamed ridge located adjacent to Little Morro Creek Road. According to the Duke Energy application, tsunamis occurred in the Morro Bay area in 1878, 1953, 1960 and 1964, which resulted in localized damage to piers, wharves, and buoys in Morro Bay Harbor. More recent tsunami advisories have been issued in 2011 and 2022. Based on historical records, there has been no resultant flooding or damage to the Power Plant site as a result of tsunamis. The potential for damage to the site from tsunamis is reduced by the existing sand spit, Morro Rock and the narrow harbor entrance (Duke Energy 2000). The proposed BESS Project has been sited to mitigate tsunami risk; the side of the project facing the ocean is protected by existing

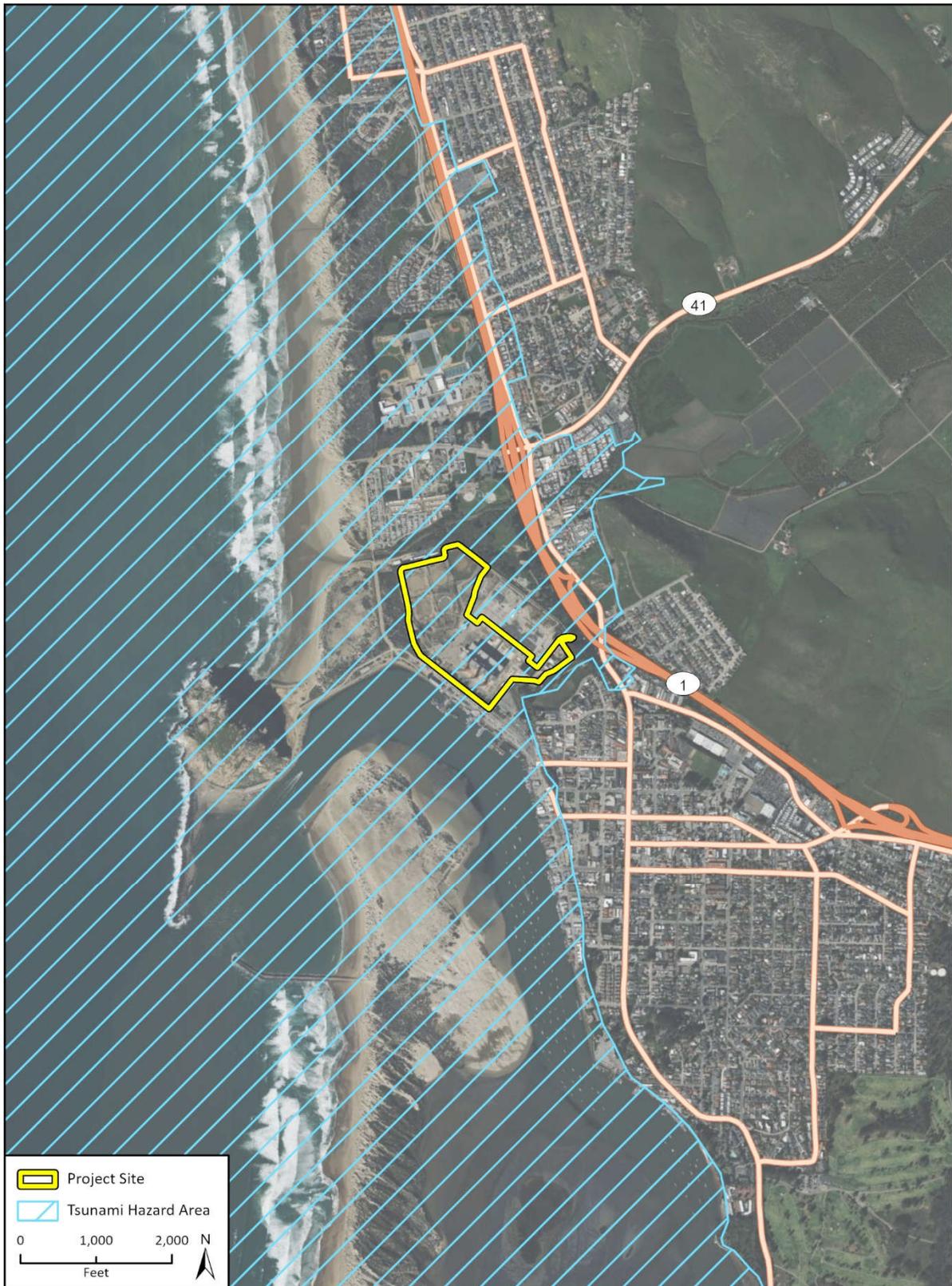
Figure 12 Base Flood Elevations



Imagery provided by Microsoft Bing and its licensors © 2022.
Floodplain data provided by FEMA, 2021.

Geology Hazards Figures
Base Flood Elevations

Figure 13 Tsunami Inundation Zones



Imagery provided by Microsoft Bing and its licensors © 2022.
Tsunami data provided by California Geological Survey, 2021.

Geology Hazards Figures
Tsunami Hazard Area

berms that are approximately 33 feet in height (Figure 14 and Figure 15). Nonetheless the Project Site is susceptible to tsunami risks.

The Project applicant would be required to minimize the risk of damage by incorporating applicable CBC standards as adopted by the MBMC into the final Project design plans. CBC structural design standards require buildings and structures in the Tsunami Design Zone to be designed and constructed in accordance with ASCE 7-16 standards. During the plan check process, the City would be required to review and approve detailed structural engineering drawings such that the BESS would be compliant with applicable CBC structural design standards, ASCE 7-16 standards, and MBMC requirements such that the Project would be reasonably expected to withstand a hypothetical Maximum Considered Tsunami (MCT)⁹.

Lithium-ion batteries are regulated by the United States Department of Transportation as Class 9 Miscellaneous Dangerous Goods. The use, storage, and disposal of batteries during operation and maintenance of the Project would be subject to all applicable state and federal laws, such as the Hazardous Materials Transportation Act, Resource Conservation and Recovery Act, the California Hazardous Material Management Act, and the California Code of Regulations, Title 22.

The proposed BESS facility incorporates a multi-tiered safety system based on industrial best practices in consultation with the Morro Bay Fire Department (MBFD). Safety systems incorporate passive design considerations and include monitoring, automatic and manual protection elements, and explosion prevention protection, further described below.

- **Passive Design Considerations.** Compartmentalization is a passive method of fire protection that would be used to confine batteries into zones or areas. Each zone would be separated by rated fire barriers in accordance with the California Fire Code. The project would not locate any new structures in Federal Emergency Management Agency (FEMA) Flood Zone AE or any other FEMA-designated Special Flood Hazard Area, and has been sited to mitigate sea-level rise and tsunami risk. The former fuel tank farm area, including the west, north, and northeast sides of the BESS Site facing the ocean is protected by existing berms that are approximately 33 feet in height. The only voids in the berms surrounding the BESS Site are to the east and south, facing away from the ocean (Figure 14 and Figure 15). These external berms will remain intact and only the berms inside the former fuel oil tank farm area would be modified.
- **Monitoring.** The system would be continually monitored for electrical, gas/smoke, and thermal variations.
- **Automatic Protection.** The project would incorporate fire suppression for the various areas within the building based on the type of hazard. The design would incorporate an automatic sprinkler system. There would be one system dedicated to suppression at the battery/rack level and, if required, another system to protect the buildings.
- **Manual Protection.** The project would include on-site fire hydrants, automatic wet standpipes, Class III hose stations, and hand-held portable fire extinguishers.
- **Explosion Prevention Protection.** The lithium-ion batteries selected for the BESS would incorporate explosion prevention protection pursuant to the NFPA 855 or International Fire Code Chapter 12.

⁹ The MCT is a hypothetical design basis event and has a 2% probability of being exceeded in a 50-year period, or a ~2,500 year average return period per ASCE-7 Tsunami Loads and Effects.

Figure 14 Project Topographic Survey (1/2)



Source: Westwood Professional Services, Inc., 2021.

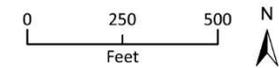
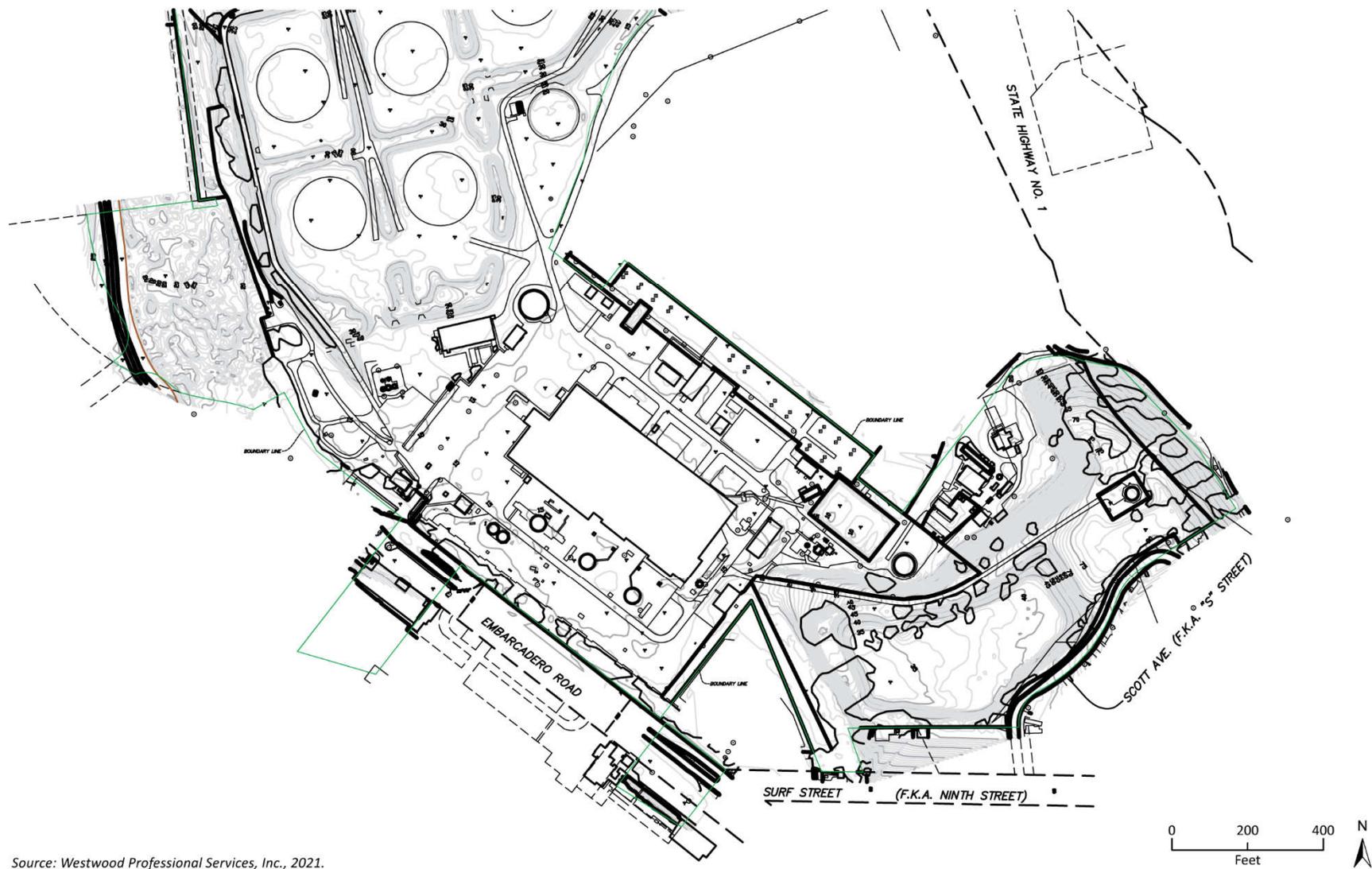


Figure 15 Project Topographic Survey (2/2)



Source: Westwood Professional Services, Inc., 2021.

The City is requiring, as a Condition of Approval for the project, that the applicant prepare a Tsunami Response Plan for review and approval by the Fire Chief, Police Chief, Harbor Director, and the Community Development Director. The applicant's Tsunami Response Plan would be required to be approved prior to issuance of a building permit and would include components such as (but not limited to) clearly defined warning procedures, triggers for activation of the City's Emergency Operation Center (EOC), and a media and public information plan. The purpose of the Tsunami Response Plan would be to provide detailed project-specific procedures and coordination to implement the City's emergency response procedures. Any additional conditions required by the MBFD, including fire department site access, fire apparatus access roads, site warning signage, and building safety systems, would be incorporated into the final BESS project design.

During normal operation, lithium-ion batteries would not represent a significant risk of chemical release that may affect on-site or off-site receptors or involve hazardous emissions. Safety standards and features incorporated in the Project would minimize the potential for a release of pollutants associated with proposed onsite lithium-ion batteries. Incorporation of applicable CBC structural design standards into the structural plans for the BESS Project and compliance with applicable state and federal regulations regarding related to the use, storage, and disposal of hazardous materials, including lithium-ion batteries, would limit the risk that inundation of the Project Site due to a tsunami would result in the release of pollutants. Implementation of a Tsunami Response Plan approved by the City of Morro Bay Fire Chief, Police Chief, Harbor Director, and Community Development Director would ensure the project would provide clearly-defined project-specific warning procedures, triggers for activation of the City's EOC, and a media and public information plan to implement the City's emergency response procedures.

In the event of an emergency that could affect the health, safety, and property of the public, the policies and general approach of the City's Multi-Hazard Emergency Response Plan would apply. The Plan implements the City's LHMP, which is part of the County of San Luis Obispo's Multi-Jurisdictional LHMP. The policies and general approach to emergency situations delineated in the Plan follow a number of widely adopted emergency response standards and operations protocols, including the National Incident Management System, the State Emergency Management System, and the Incident Command System. Implementation of the proposed safety standards and features incorporated in the Project; applicable CBC structural design standards; applicable state and federal regulations regarding related to the use, storage, and disposal of hazardous materials, including lithium-ion batteries; implementation of the required Tsunami Response Plan; and compliance with the provisions of the Emergency Response Plan would collectively minimize the potential for the project to release pollutants due to project inundation as well as the risk that any accidental release would result in adverse impacts to the health, safety, and property of the public. Therefore, this impact would be less than significant.

4.2.3 Radon Gas

Radon gas is produced by the radioactive decay of naturally occurring uranium present in soil and rocks, and poses a human health risk via the emission of high-energy alpha particles. Radon gas that intrudes into indoor air can build up and increase the risk of health conditions, such as cancer.

The United States Environmental Protection Agency has established an action level of 4 picocuries per liter (pCi/L); an estimated 5.9% of homes in San Luis Obispo County contain radon gas concentrations that are above this action level (CGS 2008). A non-regulatory, screening-level Radon Potential Zone Map was prepared by the CGS and California Department of Public Health to show areas with high, moderate, or low radon gas potential. The Project Site is in an area that has a low radon gas potential (CGS 2023).

5 Conclusions and Recommendations

Based on this Geologic Hazards Evaluation, Rincon concludes that the following geologic and hydrologic hazards could result in potentially significant environmental impacts:

- Liquefaction and Settlement
- Subsidence and Collapse
- Expansive soils

These impacts can be feasibly mitigated below the applicable thresholds of significance through implementation of the mitigation measures in Section 5.1.

5.1 Mitigation Measures

GEO-1 Geotechnical Assessments

A geotechnical assessment shall be prepared for the Project Site by a qualified engineer prior to development of the Power Plant property. The geotechnical assessment shall include onsite sampling of existing soil to ascertain current conditions and characterize the potential for risks associated with liquefaction (such as lateral spreading, sand boils, etc.) and implications for future building foundation elements. The analysis of the onsite potential for liquefaction, settlement, and the presence of expansive soils, will be based on laboratory results generated in accordance with current procedures and applicable State and local construction, engineering, and geotechnical building standards at the time the assessment is prepared. The Project's design and/or construction shall incorporate all recommendations of the geotechnical assessment. The design shall be prepared by a California-licensed engineer and shall comply with current State and Local Building Codes and Department of Transportation design standards. The design of all building foundations, subgrades, and transportation infrastructure shall such that they can withstand existing conditions, or the site shall be treated in such a manner as to address the conditions.

Suitable measures to reduce impacts include, but are not limited to, the following:

- Specialized design of foundations by a structural engineer
- Removal or treatment of liquefiable soils
- Drainage to increase the depth to groundwater
- In-situ densification of soils or other alterations to soil characteristics
- Excavation and recompaction of onsite or imported soils

Treatment of existing soils with fixing agents prior to recompaction

6 Limitations

Rincon prepared this Report in a manner that is consistent with the level of care and skill ordinarily exercised by other members of the environmental profession. The conclusions, opinions, and recommendations presented herein are based on a limited number of observations and data; conditions could vary between or beyond the data evaluated. Rincon makes no other representation, guarantee or warranty, express or implied, regarding the services, communication (oral or written), Report, opinions, or instruments of service provided.

Rincon's Report is preliminary in nature and performed solely from a review of available public information. No interviews were conducted, regulatory agency personnel contacted or consulted, site reconnaissance performed, samples obtained, and no form of site or laboratory testing completed.

Although risk can never be eliminated, more detailed and extensive studies will yield more information, which may help understand and manage the level of risk involved. Since detailed study and analysis involves greater expense, clients participate in determining levels of service that provide adequate information for their purposes at acceptable levels of risk. More extensive studies could be performed to reduce these uncertainties and are recommended. The Limitations of this Report apply to any electronic data submitted to the client that is associated with this desktop review.

7 List of Preparers

This Report was prepared in accordance with generally accepted practices and procedures, under the direction of the following registered environmental professionals with Rincon Consultants, Inc.



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Senior Environmental Geologist

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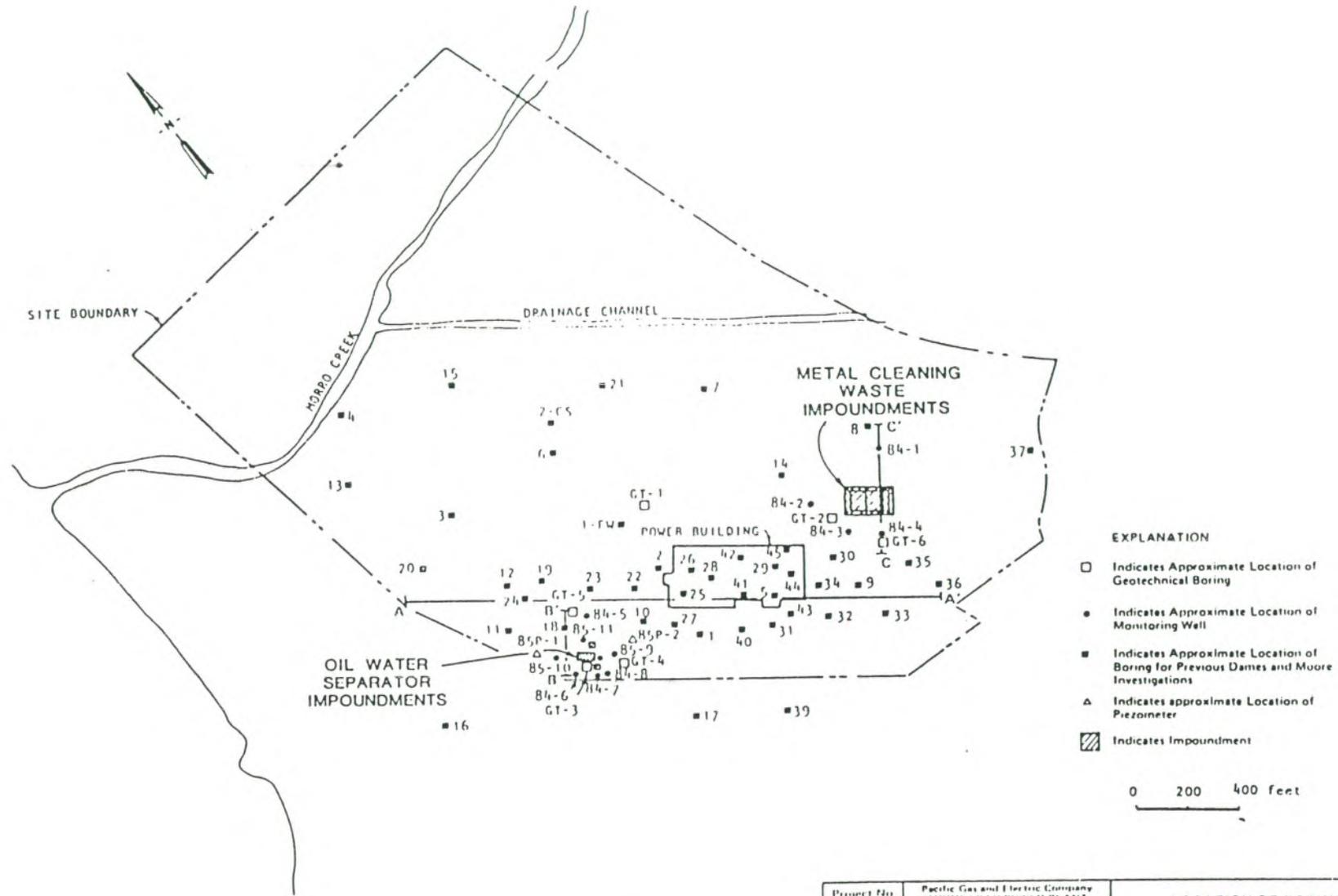
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Project No. 00177II	Pacific Gas and Electric Company MOSS LANDING POWER PLANT Moss Landing, California	LOCATION OF BORINGS AND MONITORING WELLS	Figure B-1
Woodward-Clyde Consultants			

Project: PGandE Morro Bay Power Plant
Morro Bay, California

LOG LEGEND SHEET

Date Drilled: _____ Remarks: _____
 Type of Boring: _____
 Hammer Weight: _____

Depth, Ft.	Samples	Blows/Ft.	MATERIAL DESCRIPTION	WELL DETAILS		LABORATORY TESTS		
				Moisture Content, %	Dry Density, pcf	Unconfined Compressive Strength, psf		
0				Cast Iron Christy Box Cover				
0				Locking Steel Casing				
0				Water tight PVC Slip Cap				
0				4" Diameter Sch. 40 Flush-Threaded PVC Blank Well Casing, or as noted				
0				Borehole Wall				
0				Cement Bentonite Grout Seal				
0				Bentonite Seal				
0				4" Diameter Sch. 40 Flush-Threaded PVC Slotted Well Casing (0.020" slots), or as noted				
0				Sand Pack Monterey No. 3, or as noted				
0				Threaded PVC Cap				
0				Borehole Collapse				
5			2-INCH I.D. MODIFIED CALIFORNIA SAMPLER					
10			2-INCH O.D. STANDARD SPLIT-SPOON SAMPLER					
15		29	BLOW COUNT WITH A 140-LB. HAMMER FALLING 30 INCHES					
20			 WATER LEVEL ON DATE 8-5-85 INDICATED  WATER LEVEL AT TIME OF DRILLING ATD					
25								
30								

Proj. No. 90177B

Woodward-Clyde Consultants

Figure B-2

11AR

Project: PGandE Morro Bay Power Plant
Morro Bay, California

Log of Boring No. GT-1

Date Drilled: 8-13-85 Remarks: _____
 Type of Boring: 8" Hollow stem auger
 Hammer Weight: 140 lbs (See Legend Sheet for sampler types and hammer weights)

Depth, Ft.	Samples	Blows/Ft.	MATERIAL DESCRIPTION	LABORATORY TESTS		
				Moisture Content, %	Dry Density, pcf	Unconfined Compressive Strength, psf
Ground Surface Elevation:						
			FILL: Dry, light gray brown, silty sand with gravel and some organic debris — Increasing moisture content ↓			
5	1	14				
		5				
	2	23	SILTY TO SANDY CLAY (CL-CH) Soft, moist to wet, dark gray, with interbeds of silty sand with pebbles Some roots and layers of organic debris QUATERNARY ALLUVIUM	56.2		
		15				
	3	24				
10		23				
	4	25				43.9
		15				
	5	21	— Change to wet ↓			
		12				
15	6	22				
		15				
	7	49				
			BOTTOM OF BORING AT 17.5'			
20						
25						
30						

11AR

Proj. No. 90177B

Woodward-Clyde Consultants

Figure B-3

Project: PGandE Morro Bay Power Plant
Morro Bay, California

Log of Boring No. GT-2

Date Drilled: 8-13-85

Remarks: _____

Type of Boring: 8" Hollow stem auger

Hammer Weight: 140 lbs

(See Legend Sheet for sampler types and hammer weights)

Depth, Ft.	Samples	Blows/Ft.	MATERIAL DESCRIPTION	LABORATORY TESTS		
				Moisture Content, %	Dry Density, pcf	Unconfined Compressive Strength, psf
Ground Surface Elevation: _____						
1			FILL: Dry to damp, gray brown, silty sand with gravel			
2		72	HYDRAULIC FILL: Damp to moist, light gray brown, fine sand	13.2		
5		49				
4		38		10.9		
10						
5		8	SILTY CLAY TO SANDY CLAY (CL-CH) Soft, saturated, dark gray to black, with beds of silty sand, organic debris QUATERNARY ALLUVIUM			
15						
6		34				
20						
7		18				
25			SILTY CLAY (CH) Stiff to very stiff, saturated, light brown to tan QUATERNARY TERRACE DEPOSITS?			
8		37	SILTY SAND (SM) Dense, saturated, tan			
30			BOTTOM OF BORING AT 28.5'			

Proj. No. 90177B

Woodward-Clyde Consultants

Figure B-4

HAR

Project: PGandE Morro Bay Power Plant
Morro Bay, California

Log of Boring No. GT-3

Date Drilled: 8-14-85 Remarks: _____
 Type of Boring: 8" Hollow stem auger
 Hammer Weight: 140 lbs (See Legend Sheet for sampler types and hammer weights)

Depth, Ft.	Samples	Blows/Ft.	MATERIAL DESCRIPTION	LABORATORY TESTS		
				Moisture Content, %	Dry Density, pcf	Unconfined Compressive Strength, psi
Ground Surface Elevation: Approximately 15'						
0 - 5	1		FILL: Dry to damp, gray brown, silty sand with scattered gravel	3.4		
5 - 10	2	42	HYRAULIC FILL: Damp to moist, gray brown, silty sand	3.0		
10 - 15	3	78	SAND (SP) Medium dense to dense, saturated, tan Change to gray			
15 - 20	4	73	Gravel layers			
20 - 25	5	65				
25 - 30	6	68				

11111

Proj. No. 901778

Woodward-Clyde Consultants

Figure B-5

Project: PGandE Morro Bay Power Plant
Morro Bay, California

Log of Boring No. GT-3

(Continued)

Depth, Ft.	Samples	Blows/Ft.	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, pcf	Unconfined Compressive Strength, psf
7		30	SAND (SP) Cont'd.....			
35			SILTY SAND (SM) Dense, saturated, gray, with shells and scattered gravel QUATERNARY ALLUVIUM			
8		49				
40						
9		64				
45						
50	10	75	CLAY (CH) Gray			
51.5			BOTTOM OF BORING AT 51.5'			
55						
60						
65						

Proj. No. 901778

Woodward-Clyde Consultants

Figure B-6

HAI

Project: PGandE Morro Bay Power Plant
Morro Bay, California

Log of Boring No. GT-4

Date Drilled: 8-15-85
Remarks: _____
Type of Boring: 8" Hollow stem auger
Hammer Weight: 140 lbs (See Legend Sheet for sampler types and hammer weights)

Depth, Ft	Samples	Blows/Ft.	MATERIAL DESCRIPTION	LABORATORY TESTS		
				Moisture Content, %	Dry Density, pcf	Unconfined Compressive Strength, psf
Ground Surface Elevation:						
1			FILL: Dry to damp, gray brown, silty sand with gravel	4.9		
2			HYDRAULIC FILL: Damp to moist, light gray brown, silty fine sand	2.2		
3		28				
4		24 39				
5		32 51				
6		25 59	SILTY SAND (SM-SW) Dense, saturated, gray brown to gray, with interbeds of small gravel QUATERNARY ALLUVIUM			
7		49				
8		78				
9		115				

Project: PGandE Morro Bay Power Plant
Morro Bay, California

Log of Boring No. GT-4

(Continued)

Depth, Ft.	Samples	Blows/Ft.	MATERIAL DESCRIPTION	Moisture Content, %	Dry Density, pcf	Unconfined Compressive Strength, psf
10		31	SILTY SAND (SM-SW) Cont'd.....			
35						
11		53				
40						
12		100				
45						
13		128				
50						
			BOTTOM OF BORING AT 51.5'			
55						
60						
65						

HAF

Proj. No. 90177B

Woodward-Clyde Consultants

Figure B-8

Project: PGandE Morro Bay Power Plant
Morro Bay, California

Log of Boring No. GT-5

Date Drilled: 8-15-85
 Type of Boring: 8" Hollow stem auger
 Hammer Weight: 140 lbs

Remarks: _____

(See Legend Sheet for sampler types and hammer weights)

Depth, Ft.	Samples	Blows, /Ft.	MATERIAL DESCRIPTION	LABORATORY TESTS		
				Moisture Content, %	Dry Density, pcf	Unconfined Compressive Strength, psf
Ground Surface Elevation: Approximately 15'						
1			FILL: Dry to damp, gray brown, silty sand with gravel	1.3		
2			HYDRAULIC FILL: Damp, light brown and light gray, fine sand	0.9		
3		16		0.7	95.6	
5		36				
4		25				
		58				
		43				
5		86				
10		36				
		64				
BOTTOM OF BORING AT 12'						
15						
20						
25						
30						

HAR

Project: PGandE Morro Bay Power Plant
Morro Bay, California

Log of Boring No. GT-6

Date Drilled: 8-15-85
 Type of Boring: 8" Hollow stem auger
 Hammer Weight: 140 lbs
 Remarks: _____
 (See Legend Sheet for sampler types and hammer weights)

Depth, Ft	Samples	Blows/Ft.	MATERIAL DESCRIPTION	LABORATORY TESTS		
				Moisture Content, %	Dry Density, pcf	Unconfined Compressive Strength, psf
Ground Surface Elevation:						
1			FILL: Dry to damp, light brown to gray brown, silty sandy gravel			
2			HYDRAULIC FILL: Damp to moist, gray brown, silty sand	4.4		
3		18				
4		13		25.3	98.5	
5		20	SILTY SAND (SM) Loose to medium dense, saturated, dark gray to black, interbeds of soft, black silty clay QUATERNARY ALLUVIUM			
6		4	Layers of organics			
7		20				
8		32	SANDY GRAVEL (GM) Medium dense, saturated, dark gray brown			
9			SANDY TO SILTY CLAY (CH) Hard, saturated, tan QUATERNARY TERRACE DEPOSITS			
10						
15						
20						
25			BOTTOM OF BORING 23.5'			
30						

Proj. No. 901778

Woodward-Clyde Consultants

Figure B-10

HAR

0532C-4

PGandE
MORRO BAY POWER PLANT
HYDROGEOLOGIC ASSESSMENT REPORT (HAR)

November 8, 1985
Revision: 0

APPENDIX B-2

PGandE MONITORING WELL BORING LOGS

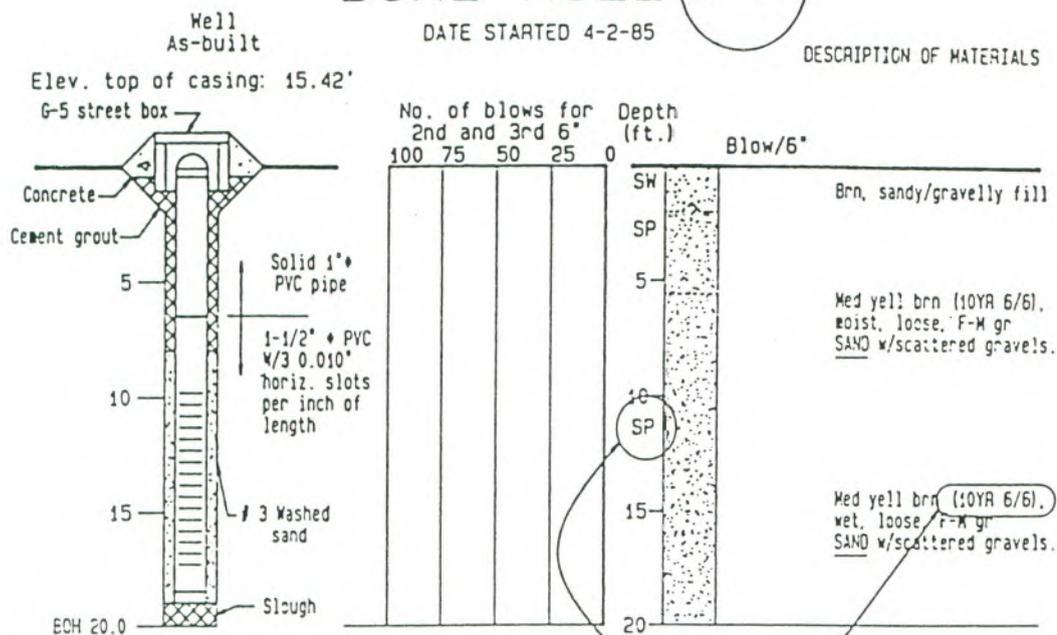
KEY to BORE HOLE LOG

BOREHOLE LOGS AND WELL CONSTRUCTION RECORD MORRO BAY POWER PLANT

BORE HOLE 85-P2

DATE STARTED 4-2-85

DESCRIPTION OF MATERIALS



SOIL TYPE, UNIFIED SOIL CLASSIFICATION SYSTEM.

Hole terminated at 31.5' on 4/2/85.

Notes:

- Holes advanced by PG&E 880 using 6" casing and rock bit. R. Hansen, R. Poe drillers.
- Bore hole logged by L.A. Flora.
- Elevations referenced to BM 6 at M.B.P.P.

GEOLOGICAL SOCIETY OF AMERICA,
ROCK COLOR CHART CLASSIFICATION.

ABBREVIATIONS

brn	BROWN
C	COURSE
dk	DARK
f	FINE
frags	FRAGMENTS
gr	GRAINED
horiz	HORIZONTAL
M	MEDIUM
mod	MODERATE
rdd	ROUNDED
SRF	SEDIMENTARY ROCK FRAGMENTS
Subang	SUANGULAR
Subrdd	SUBROUNDED
w/	WITH
yell	YELLOW

BOREHOLE LOGS AND WELL CONSTRUCTION RECORD
MORRO BAY POWER PLANT

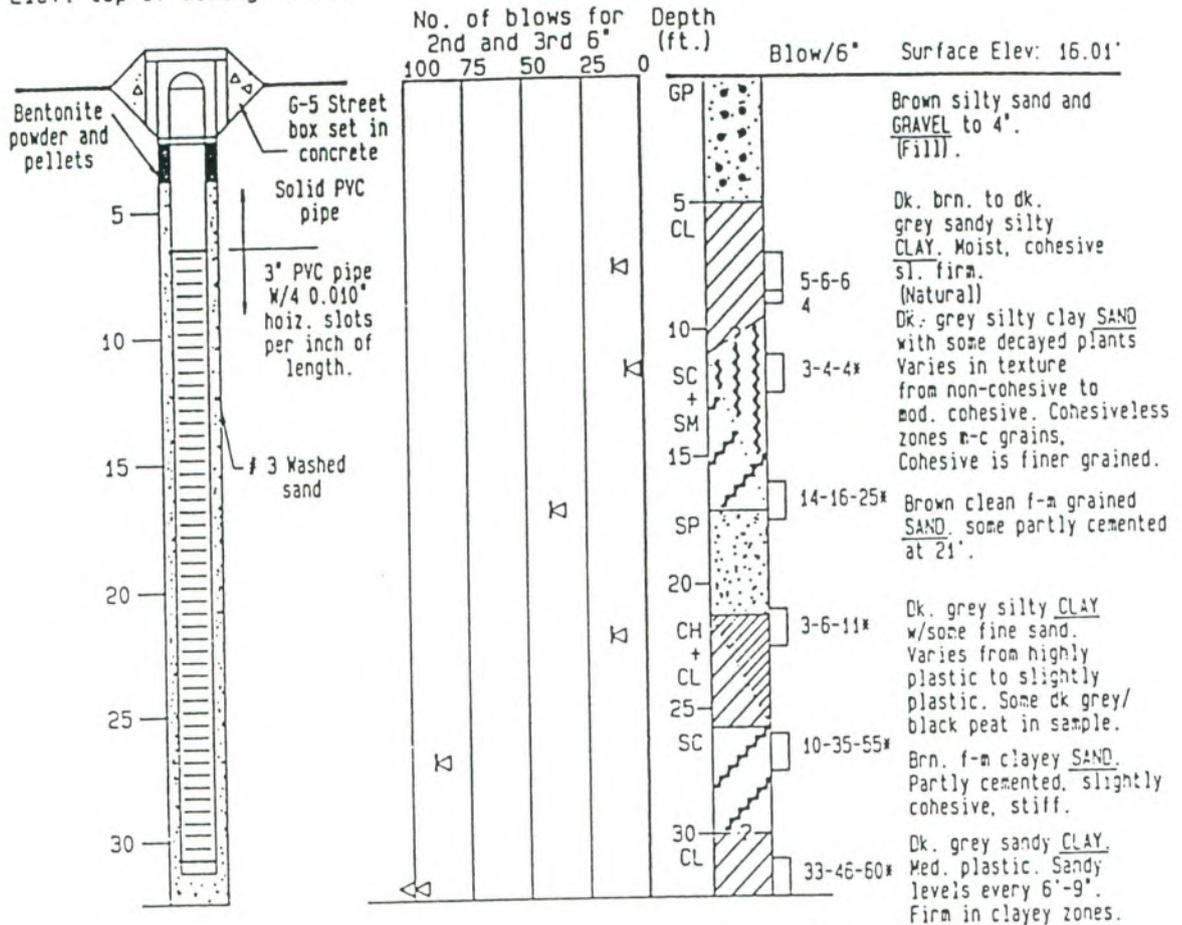
BORE HOLE 84-1

Well
As-built

DATE STARTED 5-31-84

DESCRIPTION OF MATERIALS

Elev. top of casing: 15.73'



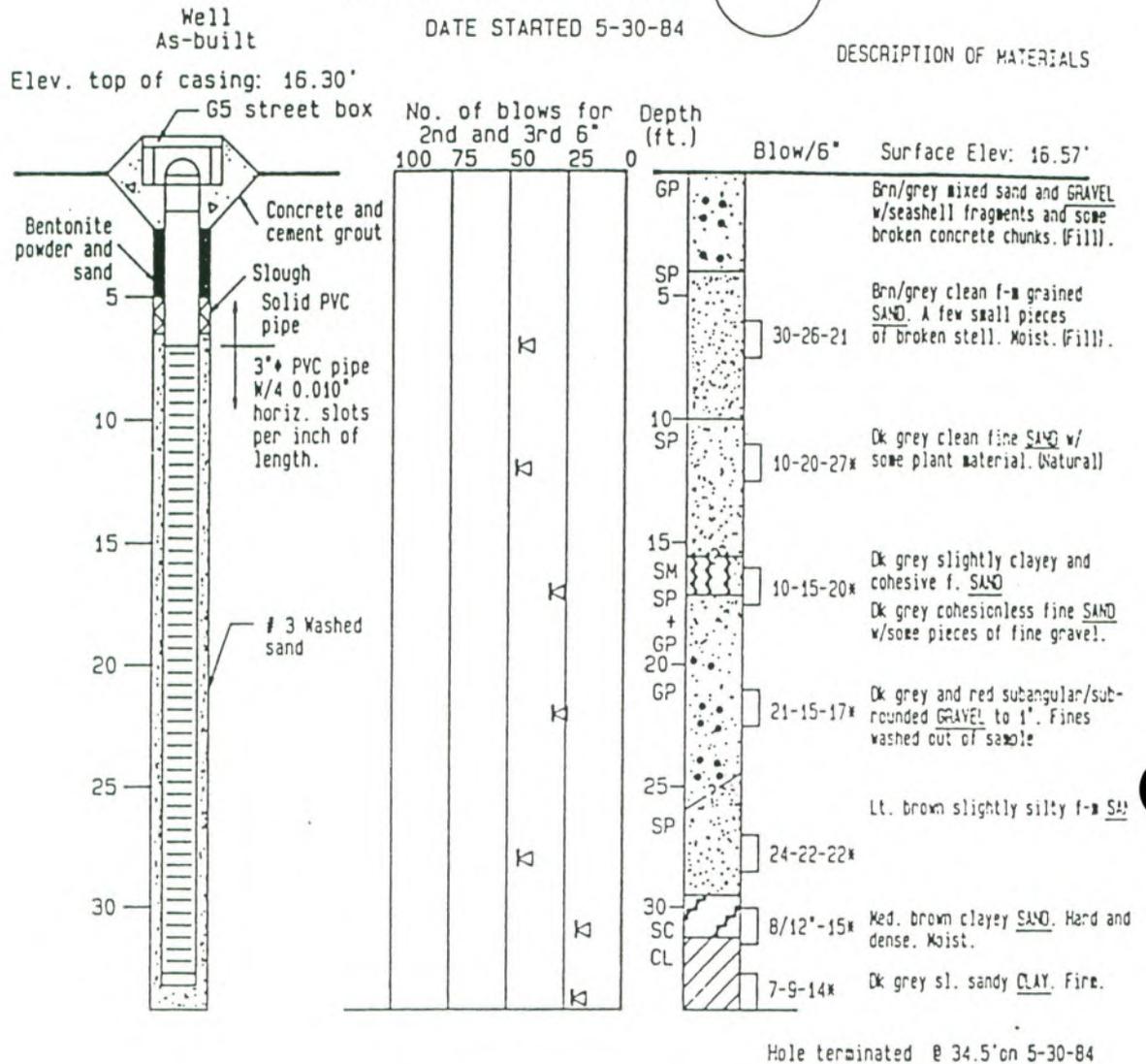
Hole terminated at 32.5' on 6/1/84.

Notes:

- Holes advanced by PG&E 880 using 6" casing and rock bit. R. Hendren, R. Poe drillers.
- Bore hole logged by R.A. McManus.
- Blows are for SPT sampler advanced by 140# hammer falling 30". * denotes hammer under water. Full energy of blow not developed.
- Elevations referenced to BM 6 at MB PP.

BOREHOLE LOGS AND WELL CONSTRUCTION RECORD
MORRO BAY POWER PLANT

BORE HOLE 84-2



Notes:

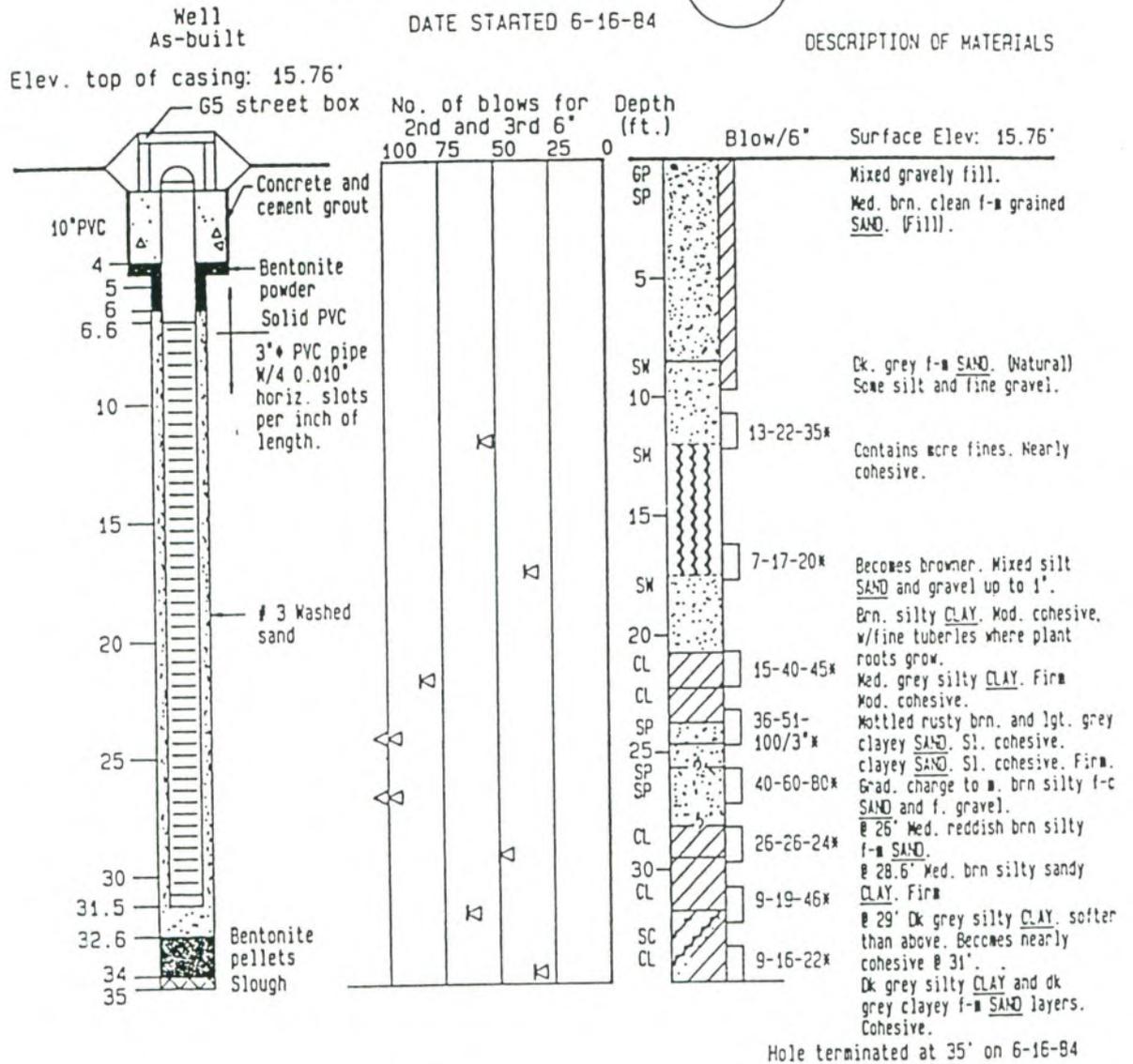
- Holes advanced by PG&E B80 using 6" casing and rock bit. R. Hendren, R. Poe, drillers.
- Bore hole logged by R.A. McManus.
- Blows are for SPT sampler advanced by 140# hammer falling 30". * denotes hammer under water. Full energy of blow not developed.
- Elevations referenced to BM 6 at MB PP.

BOREHOLE LOGS AND WELL CONSTRUCTION RECORD
MORRO BAY POWER PLANT

BORE HOLE 84-3

DATE STARTED 6-16-84

DESCRIPTION OF MATERIALS



Notes:

- Holes advanced by PG&E 880 using 6" casing and rock bit. R. Hendren, R. Poe, drillers.
- Bore hole logged by R.A. McManus.
- Blows are for SPT sampler advanced by 140# hammer falling 30". * denotes hammer under water. Full energy blow not developed.
- Elevations referenced to BM 6 at MB PP.

BOREHOLE LOGS AND WELL CONSTRUCTION RECORD
MORRO BAY POWER PLANT

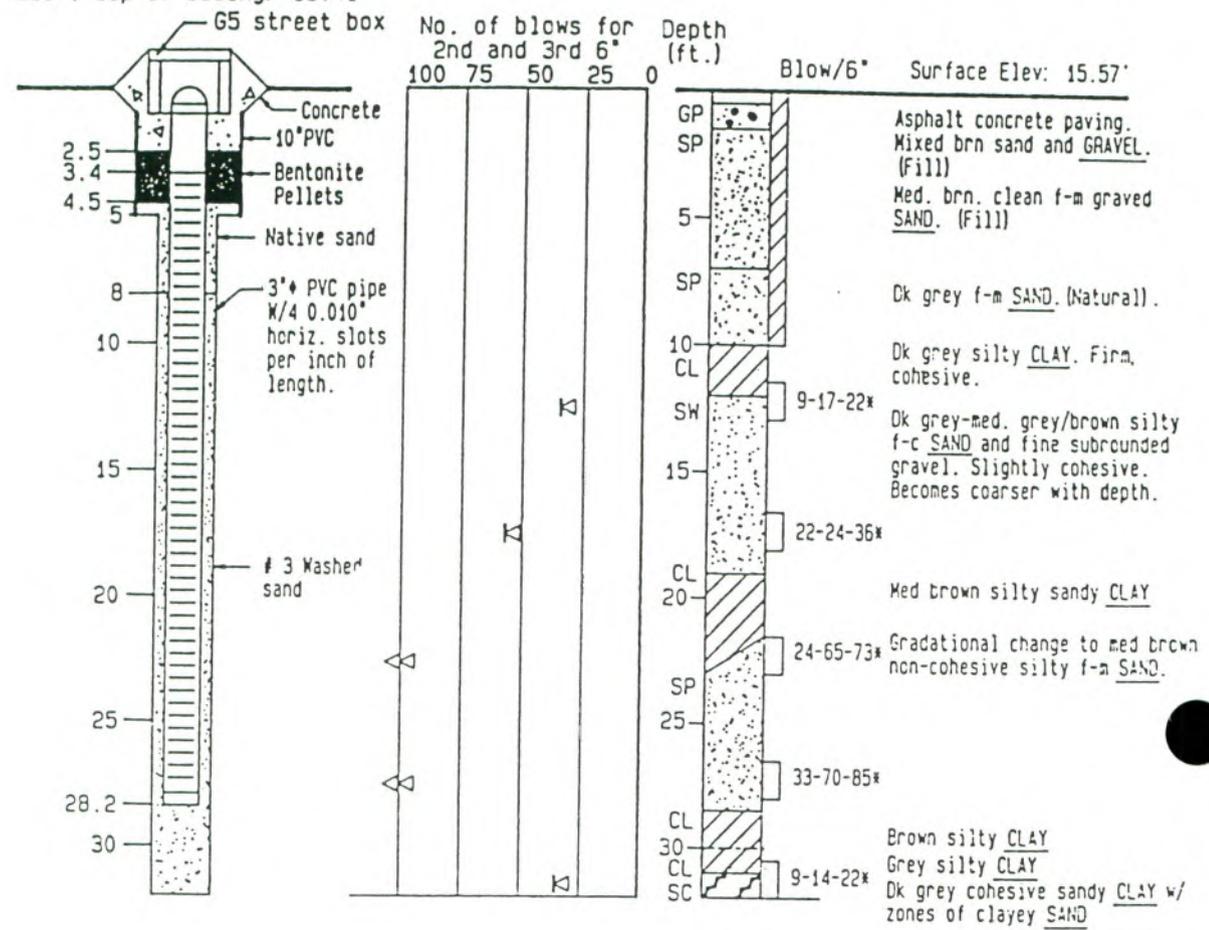
BORE HOLE 84-4

Well
As-built

DATE STARTED 6-16-84

DESCRIPTION OF MATERIALS

Elev. top of casing: 15.41'



Hole terminated at 32' on 6-16-84

- Notes:
- Holes advanced by PG&E B80 using 6" casing and rock bit. R. Hendren, R Poe, drillers.
 - Bore hole logged by R.A. McManus.
 - Blows are for SPT sampler advanced by 140# hammer falling 30". * denotes hammer under water. Full energy blow not developed.
 - Elevations referenced to BM 6 at MB PP.

BOREHOLE LOGS AND WELL CONSTRUCTION RECORD
MORRO BAY POWER PLANT

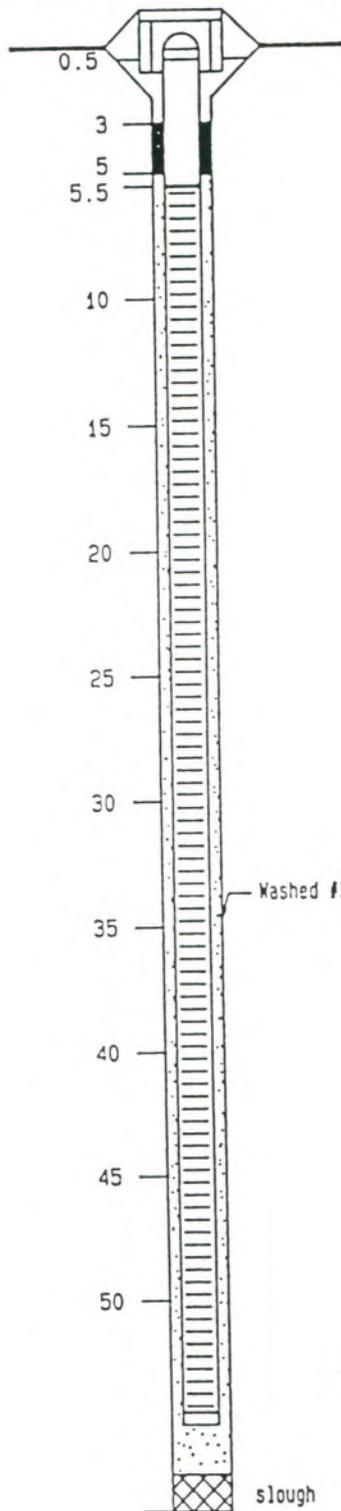
BORE HOLE 84-5

Well
As-built

DATE STARTED

DESCRIPTION OF MATERIALS

Elev. top of casing: 16.68'



No. of blows for
2nd and 3rd 6"

Depth
(ft.)

Blow/6"

Surface Elev: 16.46'

Depth (ft.)	Blow/6"	Description of Materials
SP		Brn sl. silty fine SAND (Fill). Near surface contains scattered broken asphalt pieces.
5	9-4-6	
10	6/18*	
15	16-25-30*	
20	15-17-22*	Dk grey sl. clayey f-c SAND. Zones of coarser or clayier sand 3-4" thick, some fine broken shell fragments.
25	17-60-50*	
30	13-22-34*	Sparse rounded 3/8" gravel in sand.
35	20-35-60*	
40	10-20-28*	Dk grey f-c SAND w/sparse shell fragments. Varies in texture.
45	48-80-100/5**	Rounded GRAVEL and shell fragments.
	16-55-100*	Dk grey sl. clayey f-c SAND.
	32-100/5**	
50	20-28-18*	Dk grey silty m-c SAND w/a few gravel pieces and broken shells
55	11-18-27*	Dk grey/olive sl. sandy CLAY. Firm, plastic.

Notes:

- Holes advanced by PG&E B80 using 6" casing and rock bit. R. Hendren, R. Poe drillers.
- Bore hole logged by R.A. McManus.
- Blows are for SPT sampler advanced by 140# hammer falling 30". * denotes hammer under water. Full energy of blow not developed.
- Elevations referenced to BM 6 at MB PP.

BOREHOLE LOGS AND WELL CONSTRUCTION RECORD
MORRO BAY POWER PLANT

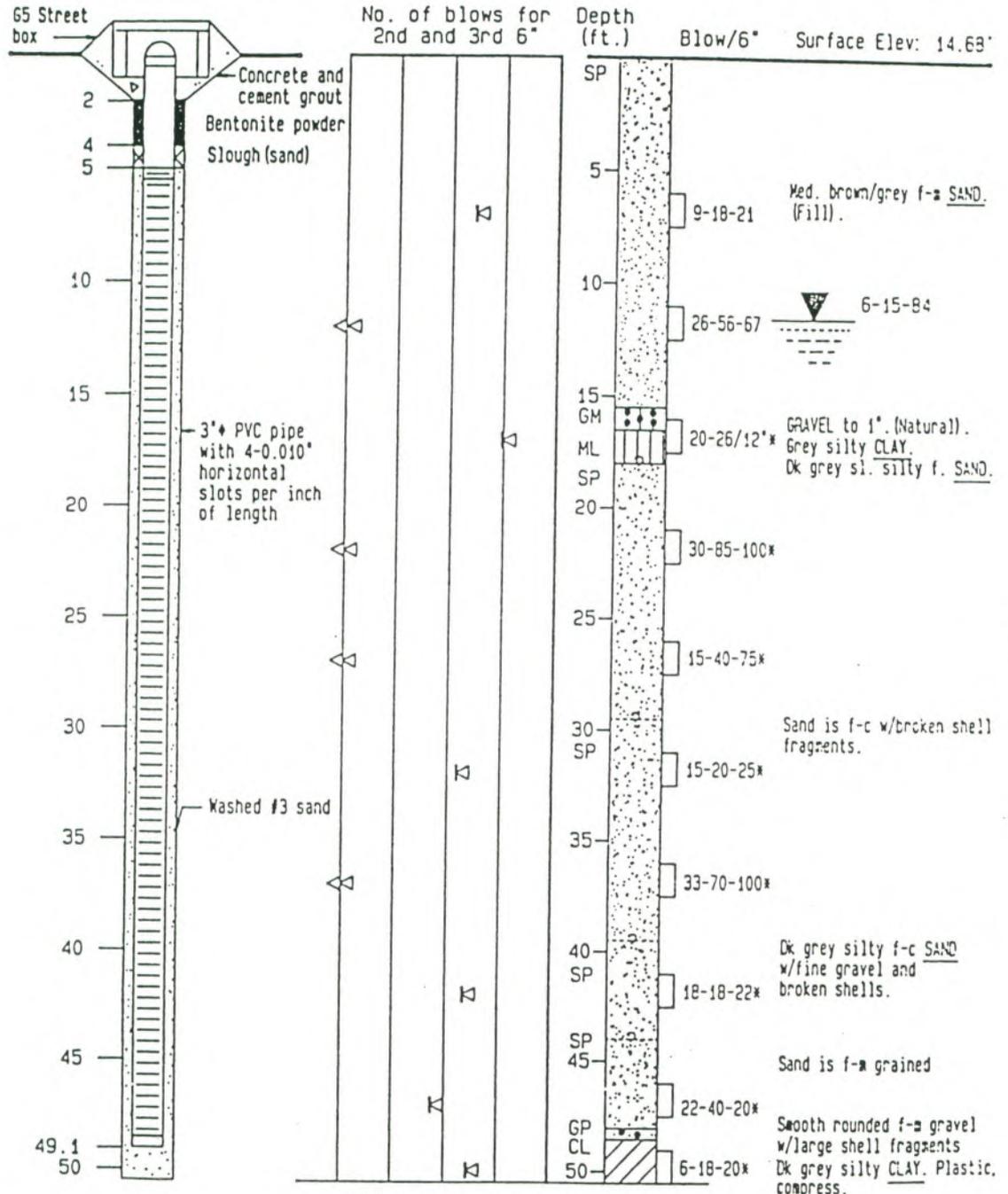
BORE HOLE 84-6

Well
As-built

DATE STARTED 6-5-84

DESCRIPTION OF MATERIALS

Elev. top of casing: 14.78'



Notes:

- Holes advanced by PG&E B80 using 6" casing and rock bit. R. Hendren, R. Poe drillers.
- Bore hole logged by R.A. McManus.
- Blows are for SPT sampler advanced by 140# hammer falling 30". * denotes hammer under water. Full energy of blow not developed.
- Elevations referenced to BM 6 at MB PP.

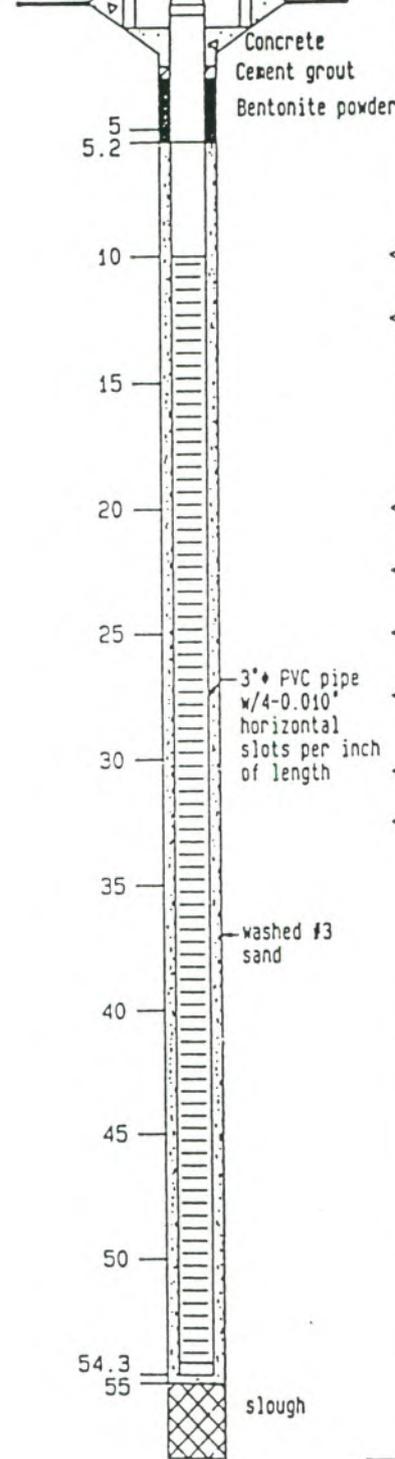
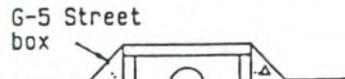
**BOREHOLE LOGS AND WELL CONSTRUCTION RECORD
MORRO BAY POWER PLANT**

BORE HOLE 84-7

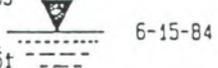
DATE STARTED 6-1-84

DESCRIPTION OF MATERIALS

Well As-built
Elev. top of casing: 14.44'



Depth (ft.)	Blow/6"	Description of Materials	No. of blows for 2nd and 3rd 6"		
			100	75	50
0		Surface Elev: 14.76'			
GP		A.C. Paving			
SP	13-19-42	Mixed med. brn sl. silty SAND w/ a few 1" rocks. (Fill).			
5	10-25-44	Med. brown clean f-m SAND, Uniform grain size. (Fill).			
	13-40-50				
10	14-40-85				
	28-45-61				
15	26-33-38				
SW	17-16-14*	Grey silty SAND and gravel to 1/2" subrounded particles.			
SP	18-48-70*	Grey clean fine grained SAND. A few small shell fragments.			
	30-56-73*				
25	25-65-80*				
	30-60-90*				
30	24-49-95*	Becoming siltier.			
SM	38-45-50*				
35					
40	14-40-41*	Dk grey hard metamorphic rock docking sampler @40'			
	16-20-28*	Dk grey silty f-c SAND and fine gravel with many shell fragments.			
45					
SP	13-18-34*	Dk grey sl. silty f-m SAND.			
50					
CL	6-18-16*	Dk grey silty CLAY. Firm plastic, compressible.			
55					
	19-35-35*				



Hole terminated at 58' on 6-4-84

Notes:

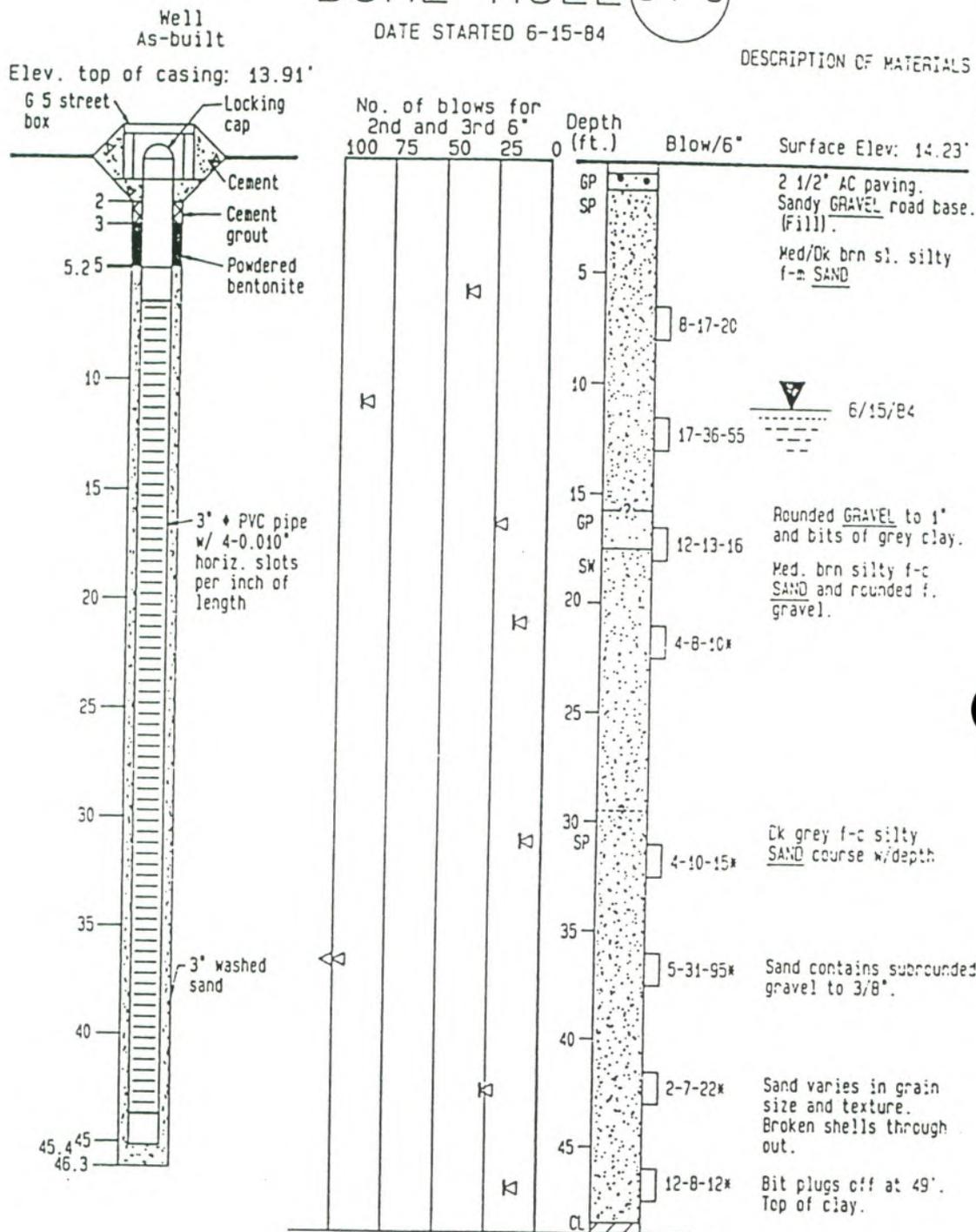
- Holes advanced by PG&E B80 using 6" casing and rock bit. R.Hendren, R.Poe, drillers.
- Bore hole logged by R.A.McManus.
- Blows are for SPT sampler advanced by 140# hammer falling 30". * denotes hammer under water. Full energy of blow not developed.
- Elevations referenced to BM 6 at MB PP.

BOREHOLE LOGS AND WELL CONSTRUCTION RECORD
MORRO BAY POWER PLANT

BORE HOLE 84-8

DATE STARTED 6-15-84

DESCRIPTION OF MATERIALS



Hole terminated at 49' on 6-15-84.

Notes:

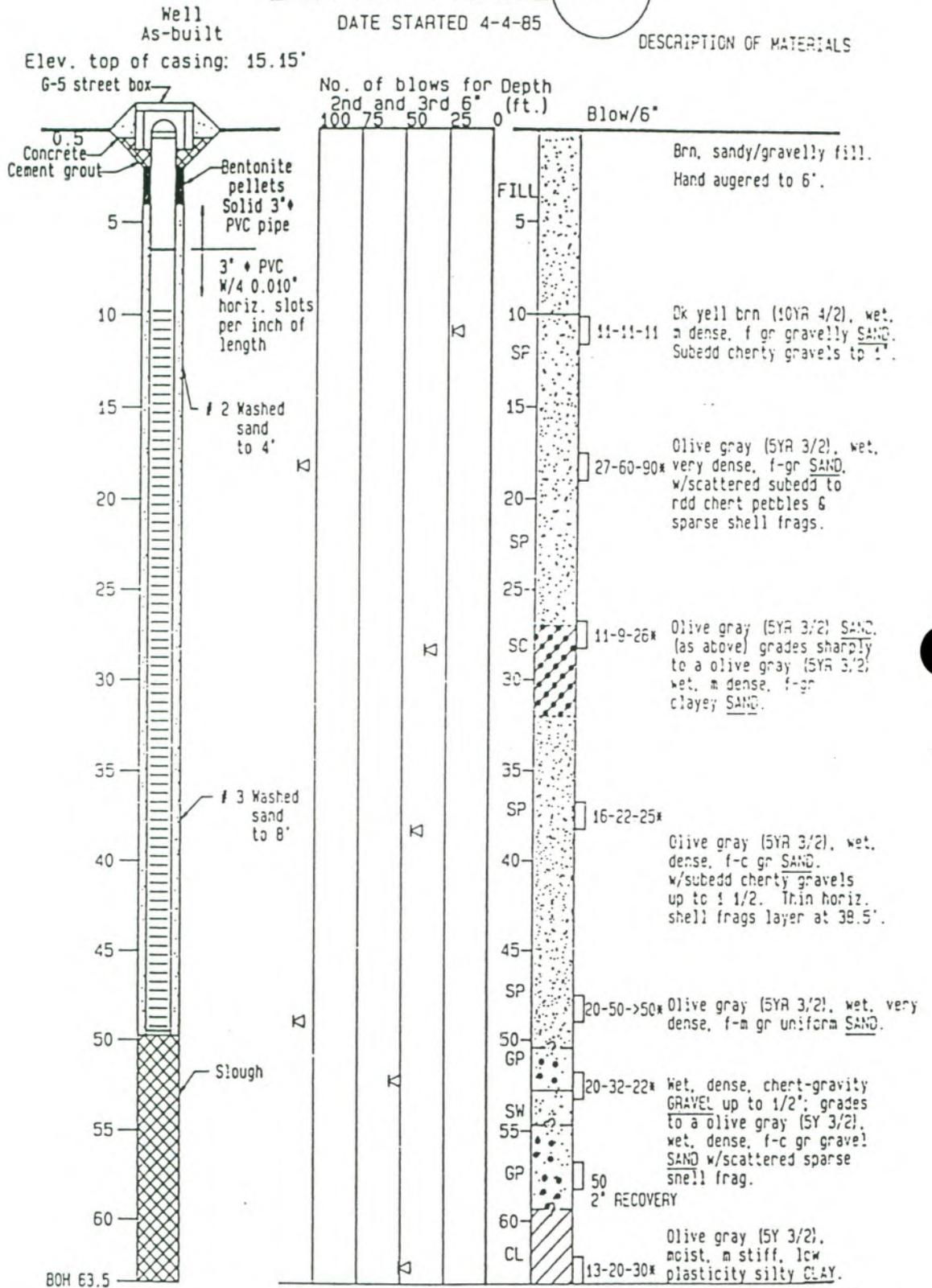
- Hole advanced by PGGE B80 using 12" O.D. hollow stem augers. R. Hendren, R Poe drillers.
- Borehole logged by R. A. McManus.
- Blows are for SPT sampler advanced by 140# hammer falling 30". * denotes hammer under water. Full energy not developed.
- Elevations referenced to BM 6 at MB PP.

BOREHOLE LOGS AND WELL CONSTRUCTION RECORD
MORRO BAY POWER PLANT

BORE HOLE 85-10

DATE STARTED 4-4-85

DESCRIPTION OF MATERIALS



Hole terminated at 63.5' on 4/4/85.

Notes:

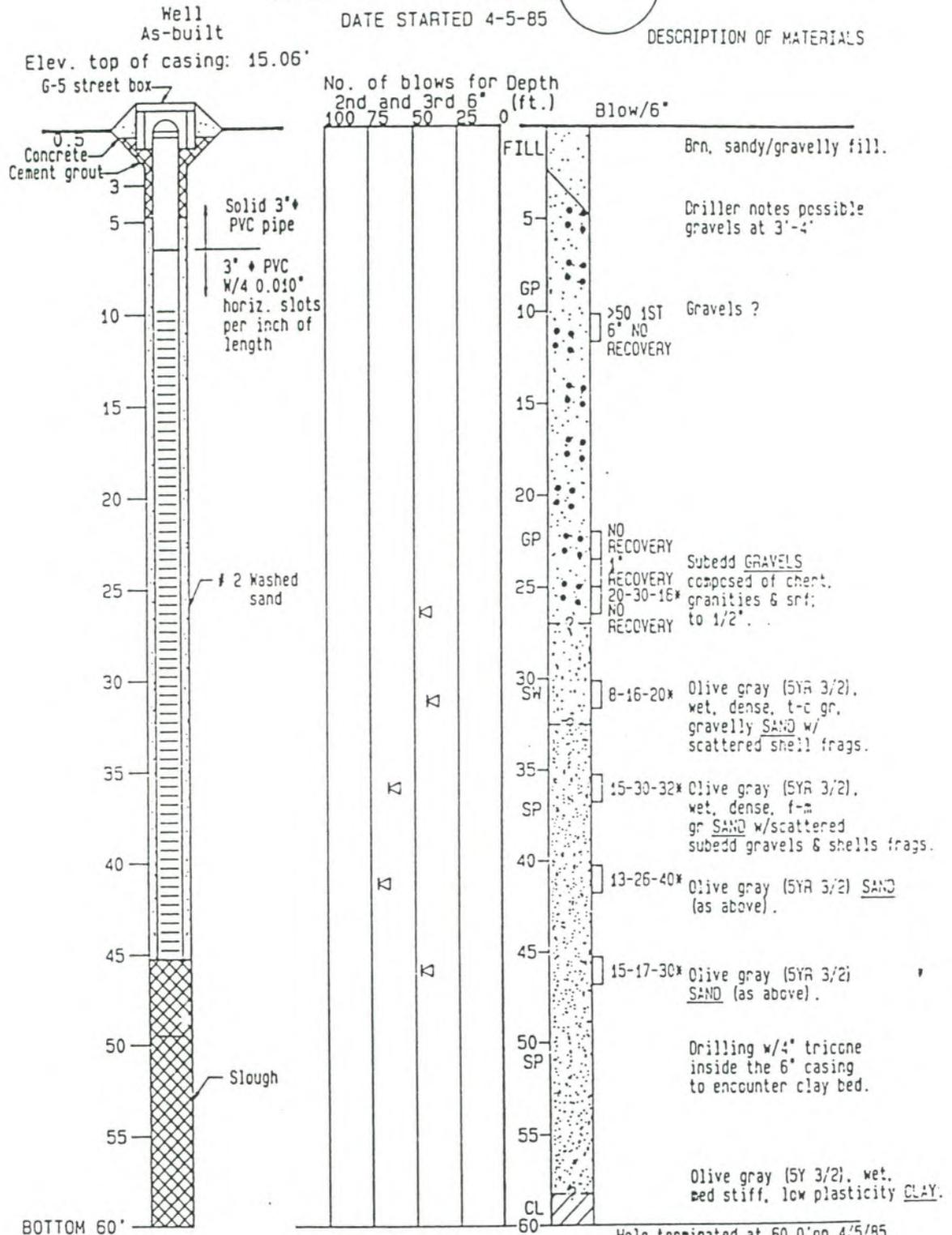
- Holes advanced by PG&E BBO using 6" casing and rock bit. R. Hendren, R. Poe drillers.
- Bore hole logged by L.A. Flora.
- Blows are for SPT sampler advanced by 140# hammer falling 30". * denotes hammer under water. Full energy of blow not developed.
- Elevations referenced to BM 6 at M.B.P.P.

BOREHOLE LOGS AND WELL CONSTRUCTION RECORD
MORRO BAY POWER PLANT

BORE HOLE 85-11

DATE STARTED 4-5-85

DESCRIPTION OF MATERIALS



Notes:

- Holes advanced by PG&E BBO using 6" casing and rock bit. R. Hendren, R. Poe drillers.
- Bore hole logged by L.A. Flora.
- Blows are for SPT sampler advanced by 140# hammer falling 30". * denotes hammer under water. Full energy of blow not developed.
- Elevations referenced to BM 6 at M.B.P.P.

0532C-5

PGandE
MORRO BAY POWER PLANT
HYDROGEOLOGIC ASSESSMENT REPORT (HAR)

November 8, 1985

Revision: 0

APPENDIX B-3

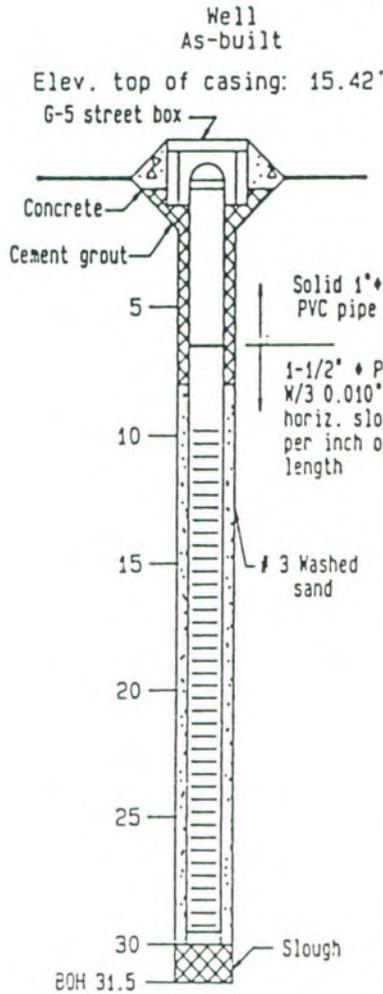
PGandE PIEZOMETER BORING LOGS

BOREHOLE LOGS AND WELL CONSTRUCTION RECORD
MORRO BAY POWER PLANT

BORE HOLE 85-P1

DATE STARTED 4-2-85

DESCRIPTION OF MATERIALS



No. of blows for 2nd and 3rd 6"				Depth (ft.)	Blow/6"	DESCRIPTION OF MATERIALS
100	75	50	25			
				SW		Brn. sandy/gravelly fill
				SP		Dk. yell orange (10YR 6/6), wet, moist, loose, F-M gr SAND (Fill?)
				5		
				10		Med yell brn (10YR 5/4), wet, loose, F-Mgr SAND; uniform.
				SP		
				15		Med yell brn SAND (as above)
				20		All water circulation lost. No cuttings recovered.
				SP?		
				25		
				30		

Hole terminated at 31.5' on 4/2/85.

Notes:

- Holes advanced by PG&E B80 using 6" casing and rock bit. R. Hendren, R. Poe drillers.
- Bore hole logged by L.A. Flora.
- Elevations referenced to BM 6 at M.B.P.P.

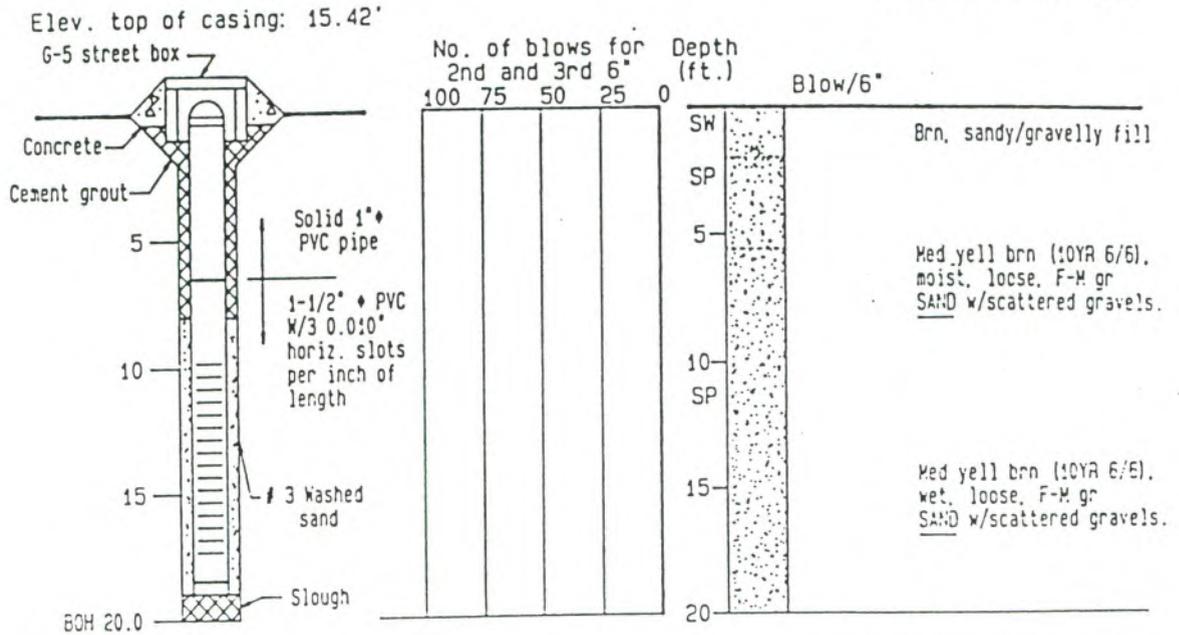
BOREHOLE LOGS AND WELL CONSTRUCTION RECORD
MORRO BAY POWER PLANT

BORE HOLE (85-P2)

Well
As-built

DATE STARTED 4-2-85

DESCRIPTION OF MATERIALS



Hole terminated at 31.5' on 4/2/85.

Notes:

1. Holes advanced by PG&E B80 using 6" casing and rock bit. R. Hendren, R. Poe drillers.
2. Bore hole logged by L.A. Flora.
3. Elevations referenced to BM 6 at M.B.P.P.

APPENDIX 6.3-3

HUSHMAND ASSOCIATES, INC.
BORING LOGS AND CPT LOGS



POINT	NORTHING	EASTING	ELEV	DESC
550	2,335,126.05	5,709,246.49	21.58	B4
551	2,335,135.86	5,709,381.22	21.60	B7
552	2,334,936.78	5,709,417.86	23.33	B8
554	2,334,809.08	5,709,488.78	22.36	C12
556	2,334,979.43	5,709,565.27	22.78	C7
557	2,334,980.55	5,709,614.55	22.83	B7
558	2,335,027.03	5,709,747.19	22.24	C6
559	2,335,202.46	5,709,707.78	21.40	C3
560	2,335,161.38	5,709,553.86	21.59	B2
561	2,335,161.26	5,709,407.49	21.63	C4
562	2,334,812.31	5,709,618.46	21.27	C11
563	2,334,870.31	5,709,733.83	21.02	C10
564	2,334,860.05	5,709,797.06	20.76	B9
565	2,334,608.60	5,709,768.71	23.21	C13
566	2,334,666.32	5,710,043.77	16.44	B12
567	2,334,781.74	5,709,981.39	17.68	B11
568	2,334,914.64	5,709,900.17	19.44	C9
571	2,335,118.57	5,709,874.90	23.20	B6
572	2,335,103.69	5,709,978.81	22.36	B5
573	2,335,107.06	5,709,971.25	22.43	C5
574	2,335,211.78	5,709,827.29	21.06	C2
575	2,335,265.01	5,710,077.22	22.63	C1
576	2,335,094.88	5,710,231.90	15.92	B13
577	2,335,361.74	5,710,581.60	20.97	B15
578	2,335,465.52	5,710,368.50	21.79	B14
584	2,334,270.65	5,709,672.50	15.97	B17
585	2,334,425.71	5,709,298.82	17.07	B18
586	2,334,034.40	5,709,692.88	15.18	B24
588	2,334,717.99	5,709,087.99	20.53	B19
589	2,334,901.09	5,708,828.62	21.40	B20
590	2,335,153.73	5,708,777.02	18.75	B21
591	2,335,318.79	5,708,787.26	16.97	B22
592	2,335,327.71	5,708,783.95	17.06	C14
600	2,333,748.10	5,709,856.48	17.23	B25
601	2,335,468.70	5,708,750.95	18.65	B23
605	2,335,185.72	5,709,887.72	21.43	B1
606	2,335,372.95	5,710,807.99	22.03	B16
607	2,333,749.21	5,709,858.67	15.26	B25
608	2,334,801.00	5,709,481.72		B10

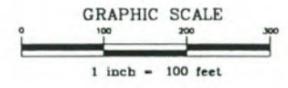
NOTE:
PLANT BOUNDARY AND HORIZONTAL AND VERTICAL COORDINATES OF BOREHOLE LOCATIONS ARE BASED ON THE PSOMAS ALTA SURVEY DATED 6-25-98.

EXPLANATION

- GTG Proposed Gas Turbine Generator
- STG Proposed Steam Turbine Generator
- HRSG Proposed Heat Recovery Steam Generator
- SUB Proposed Substations

APPROXIMATE LOCATION OF EXPLORATORY

- B25 ● Boring
- C14 ▼ Cone Penetration Test (CPT) Sounding
- VII Subsurface soil profile



References: Base topographic map by RRM Design Group (July 2000)

Project No. 00-0620	Morro Bay Power Plant Morro Bay, San Luis Obispo County, CA	SITE PLAN Exploration and Section Location Map	Figure 2
HUSHMAND ASSOCIATES INC.			

APPENDIX A
LOGS OF BORINGS

SOIL CLASSIFICATION SYSTEM-ASTM D2487

MAJOR DIVISION		LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS <small>MORE THAN 30% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE</small>	GRAVEL AND GRAVELLY SOILS <small>MORE THAN 30% OF COARSE FRICTION RETAINED ON NO. 4 SIEVE</small>	CLEAN GRAVELS <small>(LITTLE OR NO FINES)</small>	GW <small>WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR FINES.</small>
		GRAVELS WITH FINES <small>(APPRECIABLE AMOUNT OF FINES)</small>	GP <small>POORLY GRADED-GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES.</small>
		CLEAN SANDS <small>(LITTLE OR NO FINES)</small>	GM <small>SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES.</small>
		SANDS WITH FINES <small>(APPRECIABLE AMOUNT OF FINES)</small>	GC <small>CLAYEY GRAVELS, GRAVEL SAND-CLAY MIXTURES.</small>
	SAND AND SANDY SOILS <small>MORE THAN 30% OF COARSE FRICTION RETAINED ON NO. 4 SIEVE</small>	CLEAN SANDS <small>(LITTLE OR NO FINES)</small>	SW <small>WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR FINES.</small>
		SANDS WITH FINES <small>(APPRECIABLE AMOUNT OF FINES)</small>	SP <small>POORLY GRADED-SANDS, GRAVELLY SAND, LITTLE OR NO FINES.</small>
		SANDS WITH FINES <small>(APPRECIABLE AMOUNT OF FINES)</small>	SM <small>SILTY SANDS, SAND-SILT MIXTURES.</small>
		SANDS WITH FINES <small>(APPRECIABLE AMOUNT OF FINES)</small>	SC <small>CLAYEY SANDS, SAND-CLAY MIXTURES.</small>
FINE GRAINED SOILS <small>MORE THAN 30% OF MATERIAL IS SMALLER NO. 200 SIEVE SIZE</small>	SILTS AND CLAYS <small>LIQUID LIMIT LESS THAN 50</small>	ML <small>INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH LIGHT PLASTICITY.</small>	
		CL <small>INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY GRAVELLY CLAYS SANDY CLAYS, SILTY CLAYS, LEAN CLAYS.</small>	
		OL <small>ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY</small>	
	SILTS AND CLAYS <small>LIQUID LIMIT GREATER THAN 50</small>	MH <small>INORGANIC SILTS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS.</small>	
		CH <small>INORGANIC CLAYS OF HIGH PLASTICITY.</small>	
		OH <small>ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS.</small>	
HIGHLY ORGANIC SOILS		PT <small>PEAT, HUMUS SWAMP SOIL WITH HIGH ORGANIC CONTENTS.</small>	

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDER LINE SOIL CLASSIFICATIONS

- Modified California Split Spoon sampler
- Standard Penetration Test (SPT) sampler
- Shelby Tube Sampler
- Bulk sample
- No recovery in sampler
- Groundwater Surface

SPT "N" = Uncorrected total blow count for last foot of driving.

Equivalent SPT "N" for Modified California sampler=0.7 Blow Count for last foot.

N set to 100 for driving refusal.

- NP = Non-plastic
- TX = Triaxial Compression
- RV = R Value
- CA = Chemical Analysis
- CONS = Consolidation
- SA = Sleeve (particle size) analysis
- COMP = Compaction Test
- EIT = Expansion Index Test
- SE = Sand Equivalent
- UC = Unconfined Compression
- DS = Direct shear
- HA = Hydrometer Analysis
- #200 = Percentage passing No 200 sieve

Project No. 00-0620	Morro Bay Power Project Morro Bay, San Luis Obispo County, CA.	KEY TO BORING LOGS	Figure A1
HUSHMAND ASSOCIATES, INC.			

EXPLORATION LOG

Project: Morro Bay Power Plant		Boring No.: B-1 (1 of 3)
Location: Morro Bay, San Luis Obispo, CA		Elevation: 21.43
Job No.: 00-0620	Client: FCII	Date: 7/9/00
Drill Method: Mud Rotary	Driving Weight: 140 lbs / 30 in	Logged By: EEV, PEM

Depth (Feet)	Lithology	Material Description	Water	Samples			Laboratory Tests		
				Blows Per 6"	C o r e	B u l k	Moisture Content (%)	Dry Density (pcf)	Other Lab Tests
		<u>Silty Sand (SM)</u> : tan; slightly moist to moist; medium dense; fine to medium grained sand; occasional gravel; becomes coarser with orange staining.					1.7		#200 COMP CORR
		<u>Sand with Silt (SP-SM)</u> : fine grained sand; poorly graded.							
5				5 7 15					
				12 19 15					
				12 15 18			21.2		
				8 16 17			21.6		
10		@ 10.0 feet: Becomes loose.		5 4 4					
				5 5 2					
				3 3 3			21.7		
15		<u>Silty Sand to Sandy Silt (SM-ML)</u> : Gray.		2 2 2			36.4		
		<u>Fat Clay (CH)</u> : Gray; wet; soft.		2 1 2			44.0		#200 AL
20							36.0	83.3	
				P			36.1	87.0	CONS
		@ 22.5 feet: lense of loose, wet, dark gray Silty Sand (SM).		2 3 3 3 3					

EXPLORATION LOG - V3 00-0620.GPJ HAI.GDT 8/3/00

PLATE A-1

Hushmand Associates, Inc.

EXPLORATION LOG

Project: Morro Bay Power Plant		Boring No.: B-1 (2 of 3)
Location: Morro Bay, San Luis Obispo, CA		Elevation: 21.43
Job No.: 00-0620	Client: FCII	Date: 7/9/00
Drill Method: Mud Rotary	Driving Weight: 140 lbs / 30 in	Logged By: EEV, PEM

Depth (Feet)	Lithology	Material Description	Water	Samples		Laboratory Tests		
				Blows Per 6"	Core	Moisture Content (%)	Dry Density (pcf)	Other Lab Tests
		@ 25.0 feet: 6 inch thick lense of loose, wet, dark gray Silty Sand (SM).		3				
		Silty Sand with Gravel (SM): Gray; wet; medium dense; sand and gravel in drill cuttings; no recovery.		3				
			3					
				4				
				4				
				6				
				9				
30				8		16.4		#200
				9				
				6				
				8		14.7		
				9				
				3				
35				3		20.8	103.7	#200
				3				AL
				5				
		Clay (CL): Dark gray; wet; stiff.				38.8		
				12				
				3				
				4				
				3				
				3				
40				4				
				8				
				12				
		Sand with Gravel (SM-SP): Dark brown; coarse grained sand.		4				
				4				
				5				
				6				
45				7				#200
				8				
						19.5		
				5				
				7				
				9				
				6				
				7				
				10				

EXPLORATION LOG - V3 00-0620.GPJ HAI.GDT 8/3/00

PLATE A-2

Hushmand Associates, Inc.

EXPLORATION LOG

Project: Morro Bay Power Plant		Boring No.: B-2 (1 of 4)
Location: Morro Bay, San Luis Obispo, CA		Elevation: 21.59
Job No.: 00-0620	Client: FCII	Date: 7/11/00
Drill Method: Mud Rotary	Driving Weight: 140 lbs / 30 in	Logged By: EEV, PEM

Depth (Feet)	Lithology	Material Description	Samples			Laboratory Tests		
			Blows Per 6"	Core	Block	Moisture Content (%)	Dry Density (pcf)	Other Lab Tests
		ARTIFICIAL FILL (Af) Sand with Silt (SP-SM): Brown; moist; medium dense; poorly graded.						
			7	█		4.0	97.6	
			12	█				
			14	█				
5		@ 5.0 feet: Becomes dense.						
			8	█		12.3		#200
			14	█				
			18	█				
						4.2	92.6	
			8	█				
			15	█				
			19	█				
10								
			11	█				
			25	█				
			35	█				
		ESTUARINE DEPOSITS lenses of clay at approximately 13 feet with old stream channel deposits of coarse sand and fine gravel to 14 feet.						
			3	█		24.2	100.4	
			4	█				
			6	█				
15		Silty Sand (SM): Dark gray; wet; loose; fine grained sand; with lenses of sandy silt.						
			2	█		31.6		
			3	█				
			6	█				
		Lean Clay (CL): Dark gray; wet; soft.						
20		@ 20.0 feet: roots.						
			1	█		45.7	73.7	#200 AL
			2	█				
			2	█				
		Silty Sand (SM): Gray; wet; loose.						
		Lean Clay (CL): Dark gray; wet; soft.						
			1	█				
			2	█				

EXPLORATION LOG - V3 00-0620.GPJ HAI.GDT 8/3/00

EXPLORATION LOG

Project: Morro Bay Power Plant		Boring No.: B-2 (2 of 4)
Location: Morro Bay, San Luis Obispo, CA		Elevation: 21.59
Job No.: 00-0620	Client: FCII	Date: 7/11/00
Drill Method: Mud Rotary	Driving Weight: 140 lbs / 30 in	Logged By: EEV, PEM

Depth (Feet)	Lithology	Material Description	Water	Samples		Laboratory Tests		
				Blows Per 6"	C o r e B u c k	Moisture Content (%)	Dry Density (pcf)	Other Lab Tests
				2				
				P				
		@ 27.5 feet: lense of Sandy Silt with Gravel (ML) to Silty Fine Sand with Gravel (SM).						
		@ 29 feet: Becomes coarser with rounded gravel pieces, shell fragments; slightly plastic.						
30		<u>Silty Sand with Gravel (SM)</u> : Gray; wet; loose; fine to coarse grained sand; fine gravel; contains shell fragments.		3		15.8	119.1	
				4				
				5				
		<u>Lean Clay (CL)</u> : Olive brown; wet; firm.						
35				3				
				4				
				4				
40				3		32.9	88.4	#200 AL
				3				
				4				
		Grades to light olive brown Sandy Silt with Clay (ML) to Silty Fine Sand (SM) at 44 feet.						
				P				
45		Grades to Silty Clay (CL-ML) to Clayey Silt (ML) with sand.		0				
				2				
				6				

EXPLORATION LOG - V3 00-0620.GPJ HAI.GDT 8/3/00

PLATE A-5

Hushmand Associates, Inc.

EXPLORATION LOG

Project: Morro Bay Power Plant		Boring No.: B-2 (3 of 4)
Location: Morro Bay, San Luis Obispo, CA		Elevation: 21.59
Job No.: 00-0620	Client: FCII	Date: 7/11/00
Drill Method: Mud Rotary	Driving Weight: 140 lbs / 30 in	Logged By: EEV, PEM

Depth (Feet)	Lithology	Material Description	Samples			Laboratory Tests		
			Water	Blows Per 6"	Core	Moisture Content (%)	Dry Density (pcf)	Other Lab Tests
55				5 7 20	█	18.3	110.8	
60		<p>PLEISTOCENE DEPOSITS <u>Clayey Sand with Gravel to Clayey Gravel with Sand (SC-GC):</u> Mottled reddish- to olive brown to orange; wet; medium dense; gravel to 2 inches.</p>		4 6 8	█	31.2		#200
65		@ 65.0 feet: Becomes dense to very dense.		7 10 14	█	21.2	104.0	#200 AL
70				14 24 29	█	17.5		
				11 12 16	█	26.5	97.5	
		@ 72.5 feet: Very hard drilling, Top of Bedrock.						

EXPLORATION LOG - V3 00-0620.GPJ HAI.GDT 8/3/00

PLATE A-6

Hushmand Associates, Inc.

EXPLORATION LOG

Project: Morro Bay Power Plant		Boring No.: B-2 (4 of 4)
Location: Morro Bay, San Luis Obispo, CA		Elevation: 21.59
Job No.: 00-0620	Client: FCII	Date: 7/11/00
Drill Method: Mud Rotary	Driving Weight: 140 lbs / 30 in	Logged By: EEV, PEM

Depth (Feet)	Lith- ology	Material Description	W a t e r	Samples			Laboratory Tests		
				Blows Per 6"	C o r e	B u l k	Moisture Content (%)	Dry Density (pcf)	Other Lab Tests
		Boring Terminated @ 75 feet Groundwater @ 12.2 feet Borehole backfilled with cement/bentonite grout.							

EXPLORATION LOG - V3 00-0620.GPJ HAI.GDT 8/3/00

PLATE A-7

Hushmand Associates, Inc.

EXPLORATION LOG

Project: Morro Bay Power Plant		Boring No.: B-3 (1 of 3)
Location: Morro Bay, San Luis Obispo, CA		Elevation: 21.60
Job No.: 00-0620	Client: FCII	Date: 7/13/00
Drill Method: Mud Rotary	Driving Weight: 140 lbs / 30 in	Logged By: EEV, PEM

Depth (Feet)	Lithology	Material Description	Water	Samples		Laboratory Tests		
				Blows Per 6"	Core	Moisture Content (%)	Dry Density (pcf)	Other Lab Tests
		ARTIFICIAL FILL (Af) Sand with Silt (SP-SM): Light brown; moist; medium dense; poorly graded.		11 15 16		4.0	94.7	CORR R-VALUE
5				4 9 10				
				6 8 10		5.2	92.7	
10			▼	4 9 10				
		DUNE SANDS wet; becomes darker brown; siltier.		10 15 18				
15				12 15 19		25.4		#200
20				7 9 12				
		ESTUARINE DEPOSITS Lean Clay (CL): Dark gray; wet; firm.		2 3				

EXPLORATION LOG - V3 00-0620.GPJ HAI.GDT 8/3/00

PLATE A-8

Hushmand Associates, Inc.

EXPLORATION LOG

Project: Morro Bay Power Plant		Boring No.: B-3 (2 of 3)
Location: Morro Bay, San Luis Obispo, CA		Elevation: 21.60
Job No.: 00-0620	Client: FCII	Date: 7/13/00
Drill Method: Mud Rotary	Driving Weight: 140 lbs / 30 in	Logged By: EEV, PEM

Depth (Feet)	Lithology	Material Description	Water	Samples		Laboratory Tests		
				Blows Per 6"	C B o r e k	Moisture Content (%)	Dry Density (pcf)	Other Lab Tests
		<u>Silty Sand (SM)</u> : Dark gray; loose.		3				
30		@ 30.0 feet: shell fragments.		P				
35		<u>Lean Clay (CL)</u> : Olive brown; wet; stiff.		2 3 3		27.1	96.8	
40		<u>Clayey Silt with Sand (ML)</u> : Light brown; fine grained sand.		P				
45		Grades to <u>Silty Clay (CL-ML)</u> .		2 3 3				
				3 6				

EXPLORATION LOG - V3 00-0620.GPJ HAI.GDT 8/3/00

PLATE A-9

Hushmand Associates, Inc.

EXPLORATION LOG

Project: Morro Bay Power Plant		Boring No.: B- 4 (1 of 3)
Location: Morro Bay, San Luis Obispo, CA		Elevation: 21.58
Job No.: 00-0620	Client: FCII	Date: 7/13/00
Drill Method: Mud Rotary	Driving Weight: 140 lbs / 30 in	Logged By: EEV, PEM

Depth (Feet)	Lithology	Material Description	Water	Samples			Laboratory Tests		
				Blows Per 6"	Core	Block	Moisture Content (%)	Dry Density (pcf)	Other Lab Tests
		ARTIFICIAL FILL (Af) Sand with Silt (SP-SM): Light brown; slightly moist; medium dense; fine to medium grained sand.		10 12 14	█		3.6	97.1	
5		DUNE SANDS Sand with Silt (SP-SM): Light brown to tan; moist; medium dense; fine to medium grained sand; poorly graded.		5 6 7	█				
				5 8 9	█		21.9	98.7	
10				3 5 6	█				
				5 7 8	█		23.7	94.4	
15				9 12 15	█				
		Silty Sand (SM): Dark gray; wet; loose; medium grained sand.							
20				3 3 5	█				
		ESTUARINE DEPOSITS Clay (CH-CL): Dark gray; wet; firm.		3 3	█		47.7		

EXPLORATION LOG - V3 00-0620.GPJ HAI.GDT 8/3/00

PLATE A-11

Hushmand Associates, Inc.

EXPLORATION LOG

Project: Morro Bay Power Plant		Boring No.: B-4 (2 of 3)
Location: Morro Bay, San Luis Obispo, CA		Elevation: 21.58
Job No.: 00-0620	Client: FCII	Date: 7/13/00
Drill Method: Mud Rotary	Driving Weight: 140 lbs / 30 in	Logged By: EEV, PEM

Depth (Feet)	Lithology	Material Description	Water	Samples		Laboratory Tests		
				Blows Per 6"	Core	Moisture Content (%)	Dry Density (pcf)	Other Lab Tests
30		@ 30.0 feet: Some shell fragments.		3				
35		@ 34.0 feet: mottled olive brown to gray.		5 6 9		20.7	107.6	
40		@ 39.0 feet: Becomes olive brown.						
45				3 4 4				
		<u>Silty Sand (SM):</u> Brown; wet; medium dense; fine grained sand.		5 6		31.1		

EXPLORATION LOG - V3 00-0620.GPJ HAI.GDT 8/3/00

PLATE A-12

Hushmand Associates, Inc.

EXPLORATION LOG

Project: Morro Bay Power Plant		Boring No.: B-4 (3 of 3)	
Location: Morro Bay, San Luis Obispo, CA		Elevation: 21.58	
Job No.: 00-0620	Client: FCII	Date: 7/13/00	
Drill Method: Mud Rotary	Driving Weight: 140 lbs / 30 in	Logged By: EEV, PEM	

Depth (Feet)	Lithology	Material Description	Water	Samples			Laboratory Tests		
				Blows Per 6"	C o r e	B u l k	Moisture Content (%)	Dry Density (pcf)	Other Lab Tests
		Clay (CL to CH): Light olive brown; wet; stiff.		8			20.0		
55		@ 54.0 feet: Becomes gray; wet; Silty Clay (CL-ML) to Clayey Silt (ML) with occasional shell fragments. Silty Sand (SM): Light brown; wet; medium dense; fine grained sand; occasional gravel pieces.		8 12 15					
60		Sand (SP): Reddish brown; wet; loose; medium to coarse grained sand; poorly graded.		P					
65		@ 65.0 feet: lense of light brown/tan clayey silt with sand. Silty Sand (SM): Reddish brown; wet; loose to medium dense.		4 5 5			29.4	90.8	
70		Sand with Gravel (SP): medium to coarse grained sand.							
		@ 71.0 feet: Shattering noise during drilling indicating higher content of gravel in soils. @ 71.5 feet: Drill cuttings bring sharp-edged rock indicating top of bedrock (Morro Rock). Borehole Terminated @ 72 feet Groundwater @ 11.0 feet Borehole backfilled with cement/bentonite grout.							

EXPLORATION LOG - V3 00-0620.GPJ HAI.GDT 8/3/00

EXPLORATION LOG

Project: Morro Bay Power Plant		Boring No.: B-5 (1 of 3)
Location: Morro Bay, San Luis Obispo, CA		Elevation: 22.36
Job No.: 00-0620	Client: FCII	Date: 7/5/00
Drill Method: Mud Rotary	Driving Weight: 140 lbs / 30 in	Logged By: EEV, PEM

Depth (Feet)	Lithology	Material Description	Water	Samples			Laboratory Tests		
				Blows Per 6"	Core	Block	Moisture Content (%)	Dry Density (pcf)	Other Lab Tests
5		<u>Silty Sand (SM)</u> : Light brown to gray; moist; medium dense; some shell fragments; interbedded with occasional lenses of poorly graded Sand with Silt (SP-SM) and with occasional gravel to 2-inches maximum.		12 7 11	█				
				8 20/ 6"	█				
				7 7 8	█				
			▼	1 3 4	█		27.1		
15		@ 15.0 feet: becomes wet; interbedded with lenses of dark gray Sandy Silt (ML).		7 11 12	█				
				2 1 1	█		25.6	97.9	
20		<u>Lean Clay (CL) interbedded Sandy Silt (ML)</u> : Dark gray; wet; soft; trace of roots.		1 1 2	█		34.9		
				2 2	█		33.0	88.8	
		<u>Silty Sand with Gravel (SM)</u> : Dark gray; wet; loose to medium			█				

EXPLORATION LOG - V3 00-0620.GPJ HAI.GDT 8/3/00

PLATE A-14

Hushmand Associates, Inc.

EXPLORATION LOG

Project: Morro Bay Power Plant		Boring No.: B-5 (2 of 3)
Location: Morro Bay, San Luis Obispo, CA		Elevation: 22.36
Job No.: 00-0620	Client: FCII	Date: 7/5/00
Drill Method: Mud Rotary	Driving Weight: 140 lbs / 30 in	Logged By: EEV, PEM

Depth (Feet)	Lithology	Material Description	Water	Samples		Laboratory Tests		
				Blows Per 6"	C B o r e k	Moisture Content (%)	Dry Density (pcf)	Other Lab Tests
		dense.		2				
30				3 3 6				
35		@ 35.0 feet: Becomes light brown; coarse grained; pockets/lenses of fine gravel.		6 7 6		16.9	115.4	
40		@ 40.0 feet: Becomes fine to medium grained.		3 7 8				
45				8 12 14				
				12 21				

EXPLORATION LOG - V3 00-0620.GPJ HAI.GDT 8/3/00

PLATE A-15

Hushmand Associates, Inc.

EXPLORATION LOG

Project: Morro Bay Power Plant		Boring No.: B- 5 (3 of 3)
Location: Morro Bay, San Luis Obispo, CA		Elevation: 22.36
Job No.: 00-0620	Client: FCII	Date: 7/5/00
Drill Method: Mud Rotary	Driving Weight: 140 lbs / 30 in	Logged By: EEV, PEM

Depth (Feet)	Lithology	Material Description	Water	Samples		Laboratory Tests			
				Blows Per 6"	Core	Bulk	Moisture Content (%)	Dry Density (pcf)	Other Lab Tests
		@ 50.0 feet: Becomes dense; coarse sand with gravel.		20					
		Clayey Silt (ML) to Silty Clay (CL-ML): Dark gray; wet; firm.							
55	[Hatched Pattern]			3 3 3	[Black Bar]		27.7	93.2	AL
		Borehole Terminated @ 55.5 feet Groundwater @ 11.5 feet Borehole backfilled with cement/bentonite grout.							

EXPLORATION LOG - V3 00-0620.GPJ HAI.GDT 8/3/00

PLATE A-16

Hushmand Associates, Inc.

EXPLORATION LOG

Project: Morro Bay Power Plant		Boring No.: B-6 (1 of 3)
Location: Morro Bay, San Luis Obispo, CA		Elevation: 23.20
Job No.: 00-0620	Client: FCII	Date: 7/5/00
Drill Method: Mud Rotary	Driving Weight: 140 lbs / 30 in	Logged By: EEV, PEM

Depth (Feet)	Lithology	Material Description	Water	Samples			Laboratory Tests		
				Blows Per 6"	C o r e	B u i l k	Moisture Content (%)	Dry Density (pcf)	Other Lab Tests
		<u>Silty Sand (SM)</u> : Light brown; moist; medium dense; fine to medium grained sand; occasional gravel; rock in sampler.		14 22 25					
5		<u>Sand with Silt (SP-SM)</u> : poorly graded; occasional gravel pieces.		9 6 7					
10				2 2 2					
				3 3 4			25.1	92.3	
		@ 14.0 feet: Oxidation and traces of organic matter (roots); interbedded with lenses/layers of gray to brown Sand Silty (ML) and Silty Sand (SM) and fine gravel; with occasional roots (below 17 feet).		2 3 5					
15				7 4 2					
		<u>Lean Clay (CL)</u> : Gray; wet; firm; some lenses/layers of Silty Sand (SM).		1 2 2			32.4		
20				4 3			27.3	96.5	

EXPLORATION LOG - V3 00-0620.GPJ HAI.GDT 8/3/00

PLATE A-17

Hushmand Associates, Inc.

EXPLORATION LOG

Project: Morro Bay Power Plant		Boring No.: B- 6 (2 of 3)
Location: Morro Bay, San Luis Obispo, CA		Elevation: 23.20
Job No.: 00-0620	Client: FCII	Date: 7/5/00
Drill Method: Mud Rotary	Driving Weight: 140 lbs / 30 in	Logged By: EEV, PEM

Depth (Feet)	Lithology	Material Description	Water	Samples			Laboratory Tests		
				Blows Per 6"	C o r e	B u l k	Moisture Content (%)	Dry Density (pcf)	Other Lab Tests
				2					
30				4 6 7					
35		@ 35.0 feet: Clay becomes very stiff.		5 7 9			27.3	94.0	
40		@ 39.0 feet; Becomes sandy; interbedded with loose to medium dense Clayey Sand (SC).		4 5 5					
45		Sand with Gravel (SP): Gray; wet; medium dense; coarse grained sand; poorly graded; interbedded with coarse Silty Sand with gravel.		12 14 7			15.9	112.8	
				12 14					

EXPLORATION LOG - V3 00-0620.GPJ HAI.GDT 8/3/00

PLATE A-18

Hushmand Associates, Inc.

EXPLORATION LOG

Project: Morro Bay Power Plant		Boring No.: B-6 (3 of 3)
Location: Morro Bay, San Luis Obispo, CA		Elevation: 23.20
Job No.: 00-0620	Client: FCII	Date: 7/5/00
Drill Method: Mud Rotary	Driving Weight: 140 lbs / 30 in	Logged By: EEV, PEM

Depth (Feet)	Lithology	Material Description	Samples			Laboratory Tests		
			Water	Blows Per 6"	Core	Bulk	Moisture Content (%)	Dry Density (pcf)
		Borehole Terminated @ 50.5 feet Groundwater @ 12.0 feet Borehole backfilled with cement/bentonite grout.		15				

EXPLORATION LOG - V3 00-0620.GPJ HAI.GDT 8/3/00

EXPLORATION LOG

Project: Morro Bay Power Plant		Boring No.: B-7 (2 of 3)
Location: Morro Bay, San Luis Obispo, CA		Elevation: 22.83
Job No.: 00-0620	Client: FCII	Date: 7/12/00
Drill Method: Mud Rotary	Driving Weight: 140 lbs / 30 in	Logged By: EEV, PEM

Depth (Feet)	Lithology	Material Description	Water	Samples		Laboratory Tests		
				Blows Per 6"	C B o r e k	Moisture Content (%)	Dry Density (pcf)	Other Lab Tests
	(Hatched pattern)			2	█			AL
30	(Dotted pattern)	<u>Silty Sand with Shell Fragments (SM)</u> : Dark gray; wet; loose to medium dense; fine to coarse grained sand; contains a few particles of reddish Franciscan chert.		2 2 2 3 5 7	█ █ █ █ █ █	15.4	118.7	#200
35	(Dotted pattern)	Lenses of Sandy Lean Clay at 34.3 - 34.7 and 35.0 - 35.5.		6 2 2	█ █ █			
40	(Hatched pattern)	<u>Clay (CL)</u> : Dark gray; wet; firm.		5 6 12 2 2 3	█ █ █ █ █ █	23.8	98.4	
45	(Dotted pattern)	MORRO CREEK STREAM CHANNEL DEPOSITS <u>Silty Sand with Gravel (SM)</u> : Brown; wet; medium dense; fine to coarse grained sand.		9 12 12	█ █ █			
	(Dotted pattern)			8 8	█ █	13.4	124.4	#200

EXPLORATION LOG - V3 00-0620.GPJ HAI.GDT 8/3/00

PLATE A-21

Hushmand Associates, Inc.

EXPLORATION LOG

Project: Morro Bay Power Plant		Boring No.: B-7 (3 of 3)
Location: Morro Bay, San Luis Obispo, CA		Elevation: 22.83
Job No.: 00-0620	Client: FCII	Date: 7/12/00
Drill Method: Mud Rotary	Driving Weight: 140 lbs / 30 in	Logged By: EEV, PEM

Depth (Feet)	Lithology	Material Description	Water	Samples		Laboratory Tests		
				Blows Per 6"	C B u r e k	Moisture Content (%)	Dry Density (pcf)	Other Lab Tests
55				11				
				15 16 19				
60		@ 60.0 feet: Becomes coarser grained.		5 12 15		13.3	121.7	
65		@ 66.0 feet: Shattering noise indicated the presence of higher amounts of gravel or Bedrock; cuttings contain dark gray, very hard rock.		5 7 8		21.1	101.9	#200
		Boring Terminated @ 68 feet Groundwater @ 13.3 feet Borehole backfilled with cement/grout bentonite.						

EXPLORATION LOG - V3 00-0620.GPJ HAI.GDT 8/3/00

EXPLORATION LOG

Project: Morro Bay Power Plant		Boring No.: B- 8 (1 of 4)
Location: Morro Bay, San Luis Obispo, CA		Elevation: 22.33
Job No.: 00-0620	Client: FCII	Date: 7/12/00
Drill Method: Mud Rotary	Driving Weight: 140 lbs / 30 in	Logged By: EEV, PEM

Depth (Feet)	Lithology	Material Description	Water	Samples		Laboratory Tests		
				Blows Per 6"	C B u r e k	Moisture Content (%)	Dry Density (pcf)	Other Lab Tests
5		ARTIFICIAL FILL (A1) Sand with Silt (SP-SM): Tan; dry to slightly moist; loose to medium dense; poorly graded. @ 4.0 feet: Becomes slightly moist.		3		6.5	91.8	
				4				
				8				
10		NATIVE Sand with Silt (SP-SM): Dark gray; very moist; medium dense; some shells; possible anthropic soil.		6		15.8	96.3	
				11				
				17				
15		@ 20.0 feet: Trace of orange staining.		4		15.6	98.4	
				6				
				9				
20		ESTUARINE DEPOSITS		5		24.1	99.6	
				7				
				10				
				6				
				8				
				12				
				15				
				9				
				10				
				12				
				11				
				11				

EXPLORATION LOG - V3 00-0620.GPJ HAI.GDT 8/3/00

EXPLORATION LOG

Project: Morro Bay Power Plant		Boring No.: B- 8 (2 of 4)
Location: Morro Bay, San Luis Obispo, CA		Elevation: 22.33
Job No.: 00-0620	Client: FCII	Date: 7/12/00
Drill Method: Mud Rotary	Driving Weight: 140 lbs / 30 in	Logged By: EEV, PEM

Depth (Feet)	Lithology	Material Description	Water	Samples		Laboratory Tests		
				Blows Per 6"	Core	Moisture Content (%)	Dry Density (pcf)	Other Lab Tests
		<u>Sand with Silt (SP-SM):</u> Gray; traces of roots (former ground surface).		6				
30		@ 29.0 feet: Grades to dark gray Silty Sand (SM). <u>Lean Clay (CL):</u> Dark gray; wet; soft.		2 2 2		33.9	84.9	#200 AL
35		@ 36.0 feet: Lense of dark gray wet Silty Sand with few fragments of shells.		P				
40		<u>Lean Clay (CL-CH):</u> Olive gray; wet; firm.		2 2 3		29.9	91.2	#200
45		@ 49.0 feet: 6-inch thick lense/pocket of gray Silty Sand.		2 2		30.0	88.9	

EXPLORATION LOG - V3 00-0620.GPJ HAI.GDT 8/3/00

PLATE A-24

Hushmand Associates, Inc.

EXPLORATION LOG

Project: Morro Bay Power Plant		Boring No.: B- 8 (3 of 4)
Location: Morro Bay, San Luis Obispo, CA		Elevation: 22.33
Job No.: 00-0620	Client: FCII	Date: 7/12/00
Drill Method: Mud Rotary	Driving Weight: 140 lbs / 30 in	Logged By: EEV, PEM

Depth (Feet)	Lithology	Material Description	Water	Samples		Laboratory Tests		
				Blows Per 6"	C B o r e k	Moisture Content (%)	Dry Density (pcf)	Other Lab Tests
		@ 49.0 feet: Becomes sandy.		2				
55		<u>Clayey Silt with Sand (ML) to Silty Clay with Sand (CL-ML):</u> Tan; wet; soft.		P				
60		Grades from olive gray <u>Sandy Clay (CL)</u> to <u>Clayey Silt with Sand</u> to gray <u>Silty medium to coarse Sand (SM)</u> .		3 3 7				
65		TERRESTRIAL SANDS <u>Silty Sand (SM):</u> Reddish brown; wet; medium dense; fine to medium grained sand.		7 9 12		23.9		#200
70		MORRO CREEK FLOOD PLAIN DEPOSITS <u>Lean Clay with Sand (CL-CH):</u> Reddish brown; wet; very stiff.		5 9 7		26.4		
		<u>Silty Sand with Gravel (SM):</u> Light olive brown; moist; very		12 35		9.5	132.8	

EXPLORATION LOG - V3 00-0620.GPJ HAI/GDT 8/3/00

PLATE A-25

Hushmand Associates, Inc.

EXPLORATION LOG

Project: Morro Bay Power Plant		Boring No.: B- 8 (4 of 4)
Location: Morro Bay, San Luis Obispo, CA		Elevation: 22.33
Job No.: 00-0620	Client: FCII	Date: 7/12/00
Drill Method: Mud Rotary	Driving Weight: 140 lbs / 30 in	Logged By: EEV, PEM

Depth (Feet)	Lithology	Material Description	Samples		Laboratory Tests				
			Water	Blows Per 6"	Core	Block	Moisture Content (%)	Dry Density (pcf)	Other Lab Tests
		dense; medium to coarse grained sand; slightly plastic.		50/3"					
		<u>BEDROCK - PASO ROBLES FORMATION</u> <u>Interbedded Sandstone, Siltstone, Claystone</u> : Unconsolidated to well consolidated;		75/4"			13.1		
80									
				50/3"					
85		Boring Terminated @ 84.8 feet Groundwater @ 15.2 feet Borehole backfilled with cement/bentonite grout.							

EXPLORATION LOG - V3 00-0620.GPJ HAI.GDT 8/3/00

EXPLORATION LOG

Project: Morro Bay Power Plant			Boring No.: B-9 (1 of 3)					
Location: Morro Bay, San Luis Obispo, CA			Elevation: 20.76					
Job No.: 00-0620		Client: FCII	Date: 7/11/00					
Drill Method: Mud Rotary		Driving Weight: 140 lbs / 30 in	Logged By: EEV, PEM					
Depth (Feet)	Lithology	Material Description	Water	Samples		Laboratory Tests		
				Blows Per 6"	Core	Moisture Content (%)	Dry Density (pcf)	Other Lab Tests
		SAND DUNE DEPOSITS Sand with Silt (SP-SM): Light brown; moist; medium dense; poorly graded.		6 8 10	█	3.6	99.0	
5				4 6 6	█			
				3 5 6	█	20.6		
10				2 4 6	█			
		@ 13.0 feet: Interbedded with lenses/pockets of Sandy Silt (ML) and Sandy Gravel (GP); a few inches in thickness.		2 4 8	█	31.8	86.9	
15		Sandy Silt (ML): Black; wet; loose.		7 2 2	█			
		ESTUARINE DEPOSITS Lean Clay (CL): Dark gray; wet; soft.		2 2 2	█	39.5	78.0	
20				2 2	█			

EXPLORATION LOG - V3 00-0620 GPJ HAI.GDT 8/3/00

EXPLORATION LOG

Project: Morro Bay Power Plant		Boring No.: B-9 (2 of 3)
Location: Morro Bay, San Luis Obispo, CA		Elevation: 20.76
Job No.: 00-0620	Client: FCII	Date: 7/11/00
Drill Method: Mud Rotary	Driving Weight: 140 lbs / 30 in	Logged By: EEV, PEM

Depth (Feet)	Lithology	Material Description	Water	Samples		Laboratory Tests		
				Blows Per 6"	Core	Moisture Content (%)	Dry Density (pcf)	Other Lab Tests
30	[Hatched]	<u>Silty Sand (SM)</u> : Dark gray to black; wet; soft; abundant shell fragments.	3	4 6 9	[Black]	16.7	116.0	
35	[Hatched]	<u>Lean to Fat Clay (CL-CH)</u> : Dark gray; wet; stiff.	3	3 6 8	[Hatched]	32.5		
40	[Hatched]	<u>Lean Clay (CL)</u> : Dark gray; wet; soft to firm.	2	2 2 2	[Black]	23.4	117.8	
45	[Hatched]	<u>Silty Clay with Sand (CL-ML)</u> : Becomes sandier, less clayey; interbedded with layer of Sandy Silt (ML) and Silty Sand (SM); fine grained sand.	3	3 3 4	[Hatched]			
	[Hatched]	<u>Sand with Silt (SP-SM) and gravel to Gravelly Sand (SP)</u> :	3	6	[Black]	20.0	106.5	

EXPLORATION LOG - V3 00-0620.GPJ HAI.GDT 8/3/00

PLATE A-28

Hushmand Associates, Inc.

EXPLORATION LOG

Project: Morro Bay Power Plant		Boring No.: B-9 (3 of 3)
Location: Morro Bay, San Luis Obispo, CA		Elevation: 20.76
Job No.: 00-0620	Client: FCII	Date: 7/11/00
Drill Method: Mud Rotary	Driving Weight: 140 lbs / 30 in	Logged By: EEV, PEM

Depth (Feet)	Lithology	Material Description	Water	Samples		Laboratory Tests		
				Blows Per 6"	C o r e B u l k	Moisture Content (%)	Dry Density (pcf)	Other Lab Tests
		Light brown; wet; medium dense; medium to coarse grained sand; poorly graded; fine to medium gravel.		8				
55		From 50 - 55 feet: Fragments of sharp-edged stone broken by men (according to archaeologist) observed in drill cuttings.		18 15 12				
		Consist of Clayey to Sandy Silt.		2 3				
60		<u>Clayey to Silty Sand with Gravel (SC-SM):</u> Orange brown to tan; medium dense.		3 4 11 12 3 6 12		11.7		
65		<u>PLEISTOCENE DEPOSITS</u> <u>Silty to Clayey Sand with Gravel (SM-SM):</u> Mottled orange, tan, gray; very dense.				10.9		
70		<u>BEDROCK</u> rock fragments are gray in color; with sharp edges.		75/ 5.5"				
		Boring Terminated @ 71 feet Groundwater @ 12.2 Borehole backfilled with cement/bentonite grout.						

EXPLORATION LOG - V3 00-0620.GPJ HAI.GDT 8/3/00

PLATE A-29

Hushmand Associates, Inc.

EXPLORATION LOG

Project: Morro Bay Power Plant		Boring No.: B-10 (1 of 4)
Location: Morro Bay, San Luis Obispo, CA		Elevation: 22.36
Job No.: 00-0620	Client: FCII	Date: 7/10/00
Drill Method: Mud Rotary	Driving Weight: 140 lbs / 30 in	Logged By: EEV, PEM

Depth (Feet)	Lithology	Material Description	Samples		Laboratory Tests			
			Water	Blows Per 6"	Core	Block	Moisture Content (%)	Dry Density (pcf)
		SAND DUNE DEPOSITS						
		<u>Sand with Silt (SP-SM):</u> Tan; moist; medium dense; fine grained sand; porous.						
5		@ 5.0 feet: Becomes brown.						
		@ 8.0 feet: Shell fragments; charcoal.						
		@ 8.0 feet: Becomes tan.						
10		@ 12.0 feet: Becomes medium dense with occasional fine/medium gravel pieces.						
		@ 16.0 feet: Some porosity observed.						
20		@ 20.0 feet: Becomes gray.						
		@ 23.0 feet: Some roots.						
		<u>Clayey Silt with Sand (ML):</u> Gray; wet; firm; fine grained sand; interbedded with Silty Clay (CL-ML) and occasional						

EXPLORATION LOG - V3 00-0620.GPJ HAI.GDT 8/3/00

PLATE A-30

Hushmand Associates, Inc.

EXPLORATION LOG

Project: Morro Bay Power Plant		Boring No.: B-10 (2 of 4)
Location: Morro Bay, San Luis Obispo, CA		Elevation: 22.36
Job No.: 00-0620	Client: FCII	Date: 7/10/00
Drill Method: Mud Rotary	Driving Weight: 140 lbs / 30 in	Logged By: EEV, PEM

Depth (Feet)	Lithology	Material Description	Water	Samples		Laboratory Tests		
				Blows Per 6"	C B u r e k	Moisture Content (%)	Dry Density (pcf)	Other Lab Tests
		lenses or layers of dark gray Silty Sand (SM).		3				
				P		33.1	93.0	CONS
30				2 2 2				
		@ 32.0 feet: Abundant shell fragments.		P				
35				2 3 4		25.9		
		<u>Silty Sand (SM)</u> : Gray; wet; loose; fine to medium grained sand; interbedded with lenses of Sandy Silt.		3 4 4		23.5	101.4	#200
40				3 3 4				
		@ 40.0 feet: Becomes medium dense.		7 10 12				
		@ 43.0 feet: 1.5-foot thick layer of Clay with Sand (CL); gray; wet; stiff; some shell fragments in Silty Sand (SM) below.		4 4 7		41.4		
45				11 12 16				
				11 17 19		19.2		#200
		ESTUARINE DEPOSITS <u>Sand with Silt (ML)</u> : poorly graded; some gravel, possible affected blow count.		18 25 40				

EXPLORATION LOG - V3 00-0620.GPJ HAI.GDT 8/3/00

PLATE A-31

Hushmand Associates, Inc.

EXPLORATION LOG

Project: Morro Bay Power Plant		Boring No.: B-10 (3 of 4)
Location: Morro Bay, San Luis Obispo, CA		Elevation: 22.36
Job No.: 00-0620	Client: FCII	Date: 7/10/00
Drill Method: Mud Rotary	Driving Weight: 140 lbs / 30 in	Logged By: EEV, PEM

Depth (Feet)	Lithology	Material Description	Water	Samples		Laboratory Tests		
				Blows Per 6"	Core	Moisture Content (%)	Dry Density (pcf)	Other Lab Tests
55		@ 56.0 feet: Sand becomes very fine grained.		18 28 35				
				20 28 32				
				9 21 26				
				11 22 33		22.6	101.1	#200
				15 30 45				
60				25 35 45				
		<u>Lean Clay (CL):</u> Gray; wet; stiff; some shell fragments.		9 7 6		20.1		#200 AL
				4 4 7		30.4	91.9	
65		@ 65.0 feet: Abundant orange stained roots.		5 7 9				
				6 7 8				
		@ 70.0 feet: Becomes sandier.		4 4 4		26.7	95.5	
70				P				
		<u>Silty Sand with Gravel (SM):</u> Light brown; wet; medium to coarse grained sand.		18 24		16.4		

EXPLORATION LOG - V3 00-0620.GPJ HAI.GDT 8/3/00

EXPLORATION LOG

Project: Morro Bay Power Plant		Boring No.: B-10 (4 of 4)
Location: Morro Bay, San Luis Obispo, CA		Elevation: 22.36
Job No.: 00-0620	Client: FCII	Date: 7/10/00
Drill Method: Mud Rotary	Driving Weight: 140 lbs / 30 in	Logged By: EEV, PEM

Depth (Feet)	Lithology	Material Description	Water	Samples		Laboratory Tests		
				Blows Per 6"	C B U o r e k	Moisture Content (%)	Dry Density (pcf)	Other Lab Tests
				21	█	18.8		#200
		Clayey Sand with Gravel (SC) to Clayey and Sandy Gravel (GC): Orange brown; medium to coarse grained sand.		9	█			
		Shattering noise indicating Bedrock; very hard drilling.		45	█			
				50/3"	█			
		Boring Terminated @ 78 feet Groundwater @ 14 feet Borehole backfilled with cement/bentonite grout.						

EXPLORATION LOG - V3 00-0620.GPJ HAI.GDT 8/3/00

EXPLORATION LOG

Project: Morro Bay Power Plant		Boring No.: B-11 (1 of 3)
Location: Morro Bay, San Luis Obispo, CA		Elevation: 17.68
Job No.: 00-0620	Client: FCII	Date: 7/8/00
Drill Method: Mud Rotary	Driving Weight: 140 lbs / 30 in	Logged By: EEV, PEM

Depth (Feet)	Lithology	Material Description	Water	Samples		Laboratory Tests		
				Blows Per 6"	C o r e B u l k	Moisture Content (%)	Dry Density (pcf)	Other Lab Tests
		<u>Silty Sand (SM)</u> : Brown; moist; very dense; [Probably compacted fill].		23		10.2	120.7	#200
5		<u>Sand with Silt (SP-SM)</u> : Brown; moist; medium dense; poorly graded.		8 10 12				
		<u>Lean Clay (CL)</u> : Dark gray; wet; very soft; with lenses of dark gray Silty Sand (SM) and occasional pieces of gravel [Hydraulic Fill?].	▼	1 1 1		21.7		
10		<u>Silt with Sand (ML)</u> : Dark gray to black; wet; very soft.		1 1 1		35.7		
15		<u>Lean to Fat Clay (CL to CH)</u> : Dark gray; wet; soft.		P				
20		<u>Silty Sand with occasional Gravel (SM)</u> : Dark gray; wet; medium dense; piece of wood recovered with soil cuttings.		1 2 2		42.4	77.5	
				3 4		19.8	107.1	

EXPLORATION LOG - V3 00-0620.GPJ HAI.GDT 8/3/00

PLATE A-34

Hushmand Associates, Inc.

EXPLORATION LOG

Project: Morro Bay Power Plant		Boring No.: B-11 (2 of 3)
Location: Morro Bay, San Luis Obispo, CA		Elevation: 17.68
Job No.: 00-0620	Client: FCII	Date: 7/8/00
Drill Method: Mud Rotary	Driving Weight: 140 lbs / 30 in	Logged By: EEV, PEM

Depth (Feet)	Lithology	Material Description	Water	Samples		Laboratory Tests		
				Blows Per 6"	C O r e B u c k	Moisture Content (%)	Dry Density (pcf)	Other Lab Tests
				8				
		<u>Lean Clay (CL): Olive gray; wet; soft.</u>						
30				1 2 2		31.2		
		<u>Silty Clay (CL-ML) to Clayey Silt (ML): Olive gray; wet; soft.</u>						
35				1 1 1		32.1	89.9	#200
				P		31.9	93.9	CONS
40				2 2 2				
		<u>Lean Clay (CL): Olive gray; wet; soft to firm.</u>						
45				P				

EXPLORATION LOG - V3 00-0620.GPJ HALGDT 8/3/00

PLATE A-35

Hushmand Associates, Inc.

EXPLORATION LOG

Project: Morro Bay Power Plant		Boring No.: B-11 (3 of 3)
Location: Morro Bay, San Luis Obispo, CA		Elevation: 17.68
Job No.: 00-0620	Client: FCII	Date: 7/8/00
Drill Method: Mud Rotary	Driving Weight: 140 lbs / 30 in	Logged By: EEV, PEM

Depth (Feet)	Lithology	Material Description	Water	Samples		Laboratory Tests		
				Blows Per 6"	Core	Moisture Content (%)	Dry Density (pcf)	Other Lab Tests
55	[Hatched Pattern]	<u>Silty Sand with occasional Gravel (SM)</u> : Dark gray; wet; medium dense; piece of wood recovered with soil cuttings.		2 2 2		35.1	88.4	
		<u>Silty Sand (SM)</u> : Gray; wet; loose; fine to medium grained sand. @ 57.5 feet: Becomes reddish brown; medium dense; coarser; fine gravel.		2 2 2		31.9	88.7	
60				6 11 9				
65		@ 66.0 feet: Clast of green Franciscan Chert; shattering noise during drilling.		35 65/ 6"		13.6		
		Boring Terminated @ 68 feet Groundwater @ 6.9 feet Borehole backfilled with cement/bentonite grout.						

EXPLORATION LOG - V3 00-0620.GPJ HAL.GDT 8/3/00

EXPLORATION LOG

Project: Morro Bay Power Plant		Boring No.: B-12 (1 of 3)
Location: Morro Bay, San Luis Obispo, CA		Elevation: 16.44
Job No.: 00-0620	Client: FCII	Date: 7/9/00
Drill Method: Mud Rotary	Driving Weight: 140 lbs / 30 in	Logged By: EEV, PEM

Depth (Feet)	Lithology	Material Description	Water	Samples		Laboratory Tests		
				Blows Per 6"	C o r e B u r k	Moisture Content (%)	Dry Density (pcf)	Other Lab Tests
		<u>Silty Sand (SM)</u> : Light brown; wet; dense; occasional gravel; abundant shell fragments; (possible hydraulic fill).		12 15 18	█	4.4	116.1	
		<u>Silt (ML)</u> : Dark gray; wet; very soft.		2 2 2	█	31.2		#200
5		@ 8.0 feet: Lense of dark gray Silty Sand (SM).	▼	2 2 2	█	27.8	94.6	
10		@ 10.0 feet: Becomes sandier.		4 3 3	█			
		No Recovery at 13.0'-14.5'.		2 2 5	▧	46.8		
15		No Recovery at 14.5'-16.0'.		1 1 1 1 2 2	▧	37.9	82.9	
		<u>Lean Clay (CL)</u> : Gray; wet; very soft.						
20		<u>Silty Sand with occasional Gravel (SM)</u> : Gray; wet; medium to coarse grained sand.		P				
		@ 24.0 feet: Medium dense.		8 11	█	16.2		#200

EXPLORATION LOG - V3 00-0620.GPJ HAI.GDT 8/3/00

EXPLORATION LOG

Project: Morro Bay Power Plant		Boring No.: B-12 (2 of 3)
Location: Morro Bay, San Luis Obispo, CA		Elevation: 16.44
Job No.: 00-0620	Client: FCII	Date: 7/9/00
Drill Method: Mud Rotary	Driving Weight: 140 lbs / 30 in	Logged By: EEV, PEM

Depth (Feet)	Lithology	Material Description	Water	Samples			Laboratory Tests		
				Blows Per 6"	C o r e	B u c k	Moisture Content (%)	Dry Density (pcf)	Other Lab Tests
		<u>Lean Clay (CL): Olive gray; wet; stiff.</u>		12					
30				4 5 5	█		26.6	96.6	
35		@ 35.0 feet: Becomes firm.		3 4 5	█		34.4	83.6	
40				2 2 3	█		31.9	88.1	
45		@ 44.0 feet: Becomes olive brown.		4 4 4	█		38.8	81.0	
				P					

EXPLORATION LOG - V3 00-0620.GPJ HAI.GDT 8/3/00

EXPLORATION LOG

Project: Morro Bay Power Plant		Boring No.: B-12 (3 of 3)
Location: Morro Bay, San Luis Obispo, CA		Elevation: 16.44
Job No.: 00-0620	Client: FCII	Date: 7/9/00
Drill Method: Mud Rotary	Driving Weight: 140 lbs / 30 in	Logged By: EEV, PEM

Depth (Feet)	Lithology	Material Description	Water	Samples			Laboratory Tests		
				Blows Per 6"	C	B	Moisture Content (%)	Dry Density (pcf)	Other Lab Tests
		@ 50.0 feet: Becomes soft.		P					
		@ 52 to 53 feet: Becomes more granular, less clayey.							
55		No Recovery at 55 feet.		3 3 2					
		@ 56.0 feet: Becomes dark gray with lenses of Sandy Silt.		3 3 3		32.3	88.7		
		No Recovery at 59.0'-60.5' and 60.5'-62.0'.		2 2					
60		Clayey Silt (ML) to Silty Clay (CL-ML): Dark gray to black; wet; soft to firm.		3					
				3 3 3		25.1	97.8		
65		@ 65.0 feet: Silt becomes sandier with medium dense lenses of dark gray to black Silty Sand; with pieces of wood at 65.0'; interbedded with lenses of lean clay.		4 10 40		27.1	93.3		
		From 66 feet cuttings consist of mostly grey rock fragments with sharp edges.							
		Boring Terminated @ 69 feet Groundwater @ 5.7 feet Borehole backfilled with cement/bentonite grout.							

EXPLORATION LOG - V3 00-0620.GPJ HAI.GDT 8/3/00

EXPLORATION LOG

Project: Morro Bay Power Plant		Boring No.: B-13 (1 of 3)
Location: Morro Bay, San Luis Obispo, CA		Elevation: 15.92
Job No.: 00-0620	Client: FCII	Date: 7/8/00
Drill Method: Mud Rotary	Driving Weight: 140 lbs / 30 in	Logged By: EEV, PEM

Depth (Feet)	Lithology	Material Description	Water	Samples		Laboratory Tests		
				Blows Per 6"	C B o r e k	Moisture Content (%)	Dry Density (pcf)	Other Lab Tests
		ARTIFICIAL FILL (Af) Clayey Silt with Sand (ML) to Silty Clay (CL-ML): Mottled light to dark brown; moist; firm; with chunks of lean clay (CL).						
		@ 4.0 feet: Interbedded layers/lenses of light brown, wet Silty Sand (SM); sand is medium to coarse grained.						
5				2 3 3		28.4	89.4	
		Silty Clay with Sand (CL-ML): Dark brown to black; wet; soft to firm.						
				3 2 2		25.4	94.3	
10		YOUNG ALLUVIUM/LAGOONAL DEPOSITS Lean to Fat Clay (CL to CH): Light olive brown; wet; soft to firm. Brown.						
		@ 13.0 feet: Very soft.						
15				1 1 1		33.5 41.2	86.7	
		@ 19.0 feet: Becomes gray.						
20				1 1 2		41.1	75.5	
		@ 23.0 feet: Becomes olive brown to gray.						
				1 3 3		35.2		

EXPLORATION LOG - V3 00-0620.GPJ HAI.GDT 8/3/00

EXPLORATION LOG

Project: Morro Bay Power Plant		Boring No.: B-13 (2 of 3)
Location: Morro Bay, San Luis Obispo, CA		Elevation: 15.92
Job No.: 00-0620	Client: FCII	Date: 7/8/00
Drill Method: Mud Rotary	Driving Weight: 140 lbs / 30 in	Logged By: EEV, PEM

Depth (Feet)	Lithology	Material Description	Water	Samples		Laboratory Tests		
				Blows Per 6"	C B o r e k	Moisture Content (%)	Dry Density (pcf)	Other Lab Tests
30	Lense/Layer of Silty to Clayey Sand (SM to SC) with fine gravel; sand is medium to coarse grained.			8 8 9	█			
35	Lean Clay (CL): Olive brown; wet; soft to firm.			P	█			
40				2 3 3	█	38.7	81.9	
45	@ 44.0 feet: Becomes olive gray.			2 2 2	█	29.3	92.6	
	Sandy to Clayey Silt (ML): Gray; wet; soft to firm.			P	█			

EXPLORATION LOG - V3 00-0620.GPJ HAI.GDT 8/3/00

PLATE A-41

Hushmand Associates, Inc.

EXPLORATION LOG

Project: Morro Bay Power Plant		Boring No.: B-13 (3 of 3)
Location: Morro Bay, San Luis Obispo, CA		Elevation: 15.92
Job No.: 00-0620	Client: FCII	Date: 7/8/00
Drill Method: Mud Rotary	Driving Weight: 140 lbs / 30 in	Logged By: EEV, PEM

Depth (Feet)	Lithology	Material Description	Water	Samples		Laboratory Tests		
				Blows Per 6"	C B o r e k	Moisture Content (%)	Dry Density (pcf)	Other Lab Tests
55		@ 54.0 feet: Becomes very soft to soft.	P	1 2 2	█	26.5	95.1	
60		<u>OLDER ALLUVIUM / MARINE DEPOSITS</u> Silty Sand with Gravel (SM): Dark gray; gravel piece blocked shoe and may have affected blow count; No Recovery at 59'-61'.	P	8 17 30 60/ 6"	█			
65		Clayey Sand with Gravel to Clayey Gravel with Sand (SC-GC): Possible top of weathered rock / Pleistocene deposits at 68'. Boring Terminated @ 68.5 feet Groundwater @ 3.5 feet.						

EXPLORATION LOG - V3 00-0620.GPJ HAI.GDT 8/3/00

EXPLORATION LOG

Project: Morro Bay Power Plant		Boring No.: B-14
Location: Morro Bay, San Luis Obispo, CA		Elevation: 21.79
Job No.: 00-0620	Client: FCII	Date: 7/7/00
Drill Method: Mud Rotary	Driving Weight: 140 lbs / 30 in	Logged By: EEV, PEM

Depth (Feet)	Lithology	Material Description	Water	Samples			Laboratory Tests		
				Blows Per 6"	C o r e	B u l k	Moisture Content (%)	Dry Density (pcf)	Other Lab Tests
0 - 4.5		ARTIFICIAL FILL (Af) Silty Sand (SM): Light brown; moist; loose; occasional gravel and shell fragments.		4 4 5			22.3		
4.5 - 9.4		Clayey Silt with Sand (ML): Light brown; moist; firm; interbedded with occasional layers/lenses of loose Silty Sand (SM) and Sandy Lean Clay (CL).		3 3 3					
9.4 - 10.0		@ 10.0 - 14.0: Very clayey.	▼	1 2 2			32.0	87.3	
10.0 - 13.5				2 2 2			33.2		
13.5 - 15.5				2 2 2			30.9	90.8	
15.5 - 17.5				2 2 2			30.5	91.1	
		Boring Terminated @ 17.5 feet Groundwater @ 9.4 feet Borehole backfilled with cement/bentonite grout.							

EXPLORATION LOG - V3 00-0620.GPJ HAI.GDT 8/3/00

EXPLORATION LOG

Project: Morro Bay Power Plant		Boring No.: B-15
Location: Morro Bay, San Luis Obispo, CA		Elevation: 20.97
Job No.: 00-0620	Client: FCII	Date: 7/7/00
Drill Method: Mud Rotary	Driving Weight: 140 lbs / 30 in	Logged By: EEV, PEM

Depth (Feet)	Lithology	Material Description	Water	Samples		Laboratory Tests		
				Blows Per 6"	Core	Moisture Content (%)	Dry Density (pcf)	Other Lab Tests
		ARTIFICIAL FILL (Af) <u>Silty Sand with Gravel (SM)</u> : Brown; moist; medium dense; fine to coarse grained sand.		4 7 8		10.4	109.2	
		<u>Silty Sand with Gravel (SM)</u> : Dark brown; wet; medium dense; fine to coarse grained sand; soil cuttings contain plastic.		8 12 14				
5				6 7 7		11.2	114.0	
		@ 8.0 feet: Abundant gravel.	▼					
10				8 12 14		13.7		
		<u>Sand with Silt (ML)</u> : Light brown to tan; wet; soft to firm.		2 2 2		33.7	87.3	
15				2 2 2		29.6		
		<u>Lean Clay with Sand (CL)</u> : Light brown to tan; wet; soft to firm.						
		Boring Terminated @ 17.5 feet Groundwater @ 9.0 feet Borehole backfilled with cement/bentonite grout.						

EXPLORATION LOG - V3 00-0620.GPJ HAI.GDT 8/3/00

EXPLORATION LOG

Project: Morro Bay Power Plant		Boring No.: B-16
Location: Morro Bay, San Luis Obispo, CA		Elevation: 22.03
Job No.: 00-0620	Client: FCII	Date: 7/7/00
Drill Method: Mud Rotary	Driving Weight: 140 lbs / 30 in	Logged By: EEV, PEM

Depth (Feet)	Lithology	Material Description	Water	Samples		Laboratory Tests			
				Blows Per 6"	C o r e	B u l k	Moisture Content (%)	Dry Density (pcf)	Other Lab Tests
		<u>Sandy Silt (ML):</u> Brown; moist; stiff.		4 5 5	█		15.1	101.0	
5		<u>Silty Sand with Gravel (SM):</u> Dark brown; wet; medium dense; fine to coarse grained sand.		5 8 7	█				
			▼	4 5 6	█		13.7	116.9	
10				6 10 12	█				
				2 2 2 2	█		22.4	100.6	
15		<u>Lean Clay (CL):</u> Dark gray; wet; soft.		2 2 2	█		25.0	93.8	
		Boring Terminated @ 17.5 feet Groundwater @ 8.0 feet Borehole backfilled with cement/bentonite grout.							

EXPLORATION LOG - V3 00-0620.GPJ HAI.GDT 8/3/00

PLATE A-45

Hushmand Associates, Inc.

EXPLORATION LOG

Project: Morro Bay Power Plant		Boring No.: B-18
Location: Morro Bay, San Luis Obispo, CA		Elevation: 17.07
Job No.: 00-0620	Client: FCII	Date: 7/6/00
Drill Method: Mud Rotary	Driving Weight: 140 lbs / 30 in	Logged By: EEV, PEM

Depth (Feet)	Lithology	Material Description	Water	Samples			Laboratory Tests		
				Blows Per 6"	Core	Block	Moisture Content (%)	Dry Density (pcf)	Other Lab Tests
		Silty Sand (SM) to poorly graded Sand with Silt (SP-SM) Tan; moist; dense; fine to medium grained sand.		7 14 15	█		4.0	100.6	
5				7 12 14	█				
				5 8 12	█		7.9	100.5	
10		@ 10.0 feet: Becomes brown.		5 7 11	█				
		@ 13.0 feet: Becomes wet.	▼	7 8 11	█		23.7		
15				7 8 12	█				
		Boring Terminated @ 17.5 feet Groundwater @ 12.3 feet Borehole backfilled with cement/bentonite grout.							

EXPLORATION LOG - V3 00-0620.GPJ HAI.GDT 8/3/00

PLATE A-47

Hushmand Associates, Inc.

EXPLORATION LOG

Project: Morro Bay Power Plant		Boring No.: B-20
Location: Morro Bay, San Luis Obispo, CA		Elevation: 21.40
Job No.: 00-0620	Client: FCII	Date: 7/6/00
Drill Method: Mud Rotary	Driving Weight: 140 lbs / 30 in	Logged By: EEV, PEM

Depth (Feet)	Lithology	Material Description	Water	Samples		Laboratory Tests		
				Blows Per 6"	Core	Moisture Content (%)	Dry Density (pcf)	Other Lab Tests
5		<u>Silty Sand (SM):</u> Brown; slightly moist; loose; fine grained sand. @ 4.0 feet: Becomes medium dense.	▼	5		7.8	100.9	
				3				
				3				
				4		13.7	96.2	
				6				
				6				
10		<u>Sand with Silt (SP-SM):</u> poorly graded.	▼	4		13.7	96.2	
				8				
				4				
				4		13.7	96.2	
				8				
				9				
15		Boring Terminated @ 17.5 feet Groundwater @ 12.3 feet Borehole backfilled with cement/bentonite grout.	▼	8		13.7	96.2	
				4				
				14				
				9				
				17				
				18				

EXPLORATION LOG - V3 00-0620.GPJ HAI.GDT 8/3/00

EXPLORATION LOG

Project: Morro Bay Power Plant		Boring No.: B-23 (1 of 4)
Location: Morro Bay, San Luis Obispo, CA		Elevation: 18.65
Job No.: 00-0620	Client: FCII	Date: 7/6/00
Drill Method: Mud Rotary	Driving Weight: 140 lbs / 30 in	Logged By: EEV, PEM

Depth (Feet)	Lithology	Material Description	Water	Samples			Laboratory Tests		
				Blows Per 6"	Core	Block	Moisture Content (%)	Dry Density (pcf)	Other Lab Tests
		<u>DUNE SAND DEPOSITS</u> Silty Sand (SM): Brown Medium brown; moist; firm.		6	█		11.9	107.9	
		@ 4.0 feet: Grades to (SP-SM).		2	█		22.5		#200
		@ 7.0 feet: Occasional gravel to 3/4-inch.		5	█				
				6	█				
				6	█				
				2	█		19.9		
				4	█				
				2	█				
		<u>BEACH SANDS</u> Silty Sand with Gravel (SM): Gray; wet; medium dense; fine to medium grained sand; occasional layers of coarse sand; interbedded with lenses or pockets of Sandy Silt (ML).		8	█		23.8	100.1	
				8	█				
				10	█				
				6	█				
				6	█				
				9	█				
				7	█		23.1	96.5	
				15	█				
				23	█				
				P					

EXPLORATION LOG - V3 00-0620.GPJ HAI.GDT 8/3/00

EXPLORATION LOG

Project: Morro Bay Power Plant		Boring No.: B-23 (2 of 4)
Location: Morro Bay, San Luis Obispo, CA		Elevation: 18.65
Job No.: 00-0620	Client: FCII	Date: 7/6/00
Drill Method: Mud Rotary	Driving Weight: 140 lbs / 30 in	Logged By: EEV, PEM

Depth (Feet)	Lithology	Material Description	Water	Samples		Laboratory Tests		
				Blows Per 6"	C o r e B u r e k	Moisture Content (%)	Dry Density (pcf)	Other Lab Tests
30				P				
35		Fat to Lean Clay (CH-CL): Dark gray; wet; firm to stiff.		12 18 20				
35				1 3 3		39.6	78.1	
40				4 7 8		29.2	92.3	
45		@ 22.0 feet: Black gray.		4 5 7		27.2	96.1	
				3 3				

EXPLORATION LOG - V3 00-0620.GPJ HAI.GDT 8/3/00

EXPLORATION LOG

Project: Morro Bay Power Plant		Boring No.: B-23 (3 of 4)
Location: Morro Bay, San Luis Obispo, CA		Elevation: 18.65
Job No.: 00-0620	Client: FCII	Date: 7/6/00
Drill Method: Mud Rotary	Driving Weight: 140 lbs / 30 in	Logged By: EEV, PEM

Depth (Feet)	Lithology	Material Description	Water	Samples			Laboratory Tests		
				Blows Per 6"	Core	Block	Moisture Content (%)	Dry Density (pcf)	Other Lab Tests
55		<p>LATE PLEISTOCENE DEPOSITS SANDS Silty Sand / Clayey Sand (SM/SC): Reddish brown; medium dense.</p> <p>@ 59.0 feet: Becomes coarser with increasing amounts of fine gravel.</p>		3 3 3 3 4 4 5 6 6 8 9			22.7	#200 AL	
60				12 22 25					
65									
70									

EXPLORATION LOG - V3 00-0620.GPJ HAI.GDT 8/3/00

EXPLORATION LOG

Project: Morro Bay Power Plant		Boring No.: B-23 (4 of 4)
Location: Morro Bay, San Luis Obispo, CA		Elevation: 18.65
Job No.: 00-0620	Client: FCII	Date: 7/6/00
Drill Method: Mud Rotary	Driving Weight: 140 lbs / 30 in	Logged By: EEV, PEM

Depth (Feet)	Lith- ology	Material Description	W a t e r	Samples			Laboratory Tests		
				Blows Per 6"	C o r e	B u l k	Moisture Content (%)	Dry Density (pcf)	Other Lab Tests
		Boring Terminated @ 75 feet Groundwater @ 11.6 feet Borehole backfilled with cement/bentonite grout.							

EXPLORATION LOG - V3 00-0620.GPJ HAI.GDT 8/3/00

EXPLORATION LOG

Project: Morro Bay Power Plant		Boring No.: B-24
Location: Morro Bay, San Luis Obispo, CA		Elevation: 15.18
Job No.: 00-0620	Client: FCII	Date: 7/6/00
Drill Method: Mud Rotary	Driving Weight: 140 lbs / 30 in	Logged By: EEV, PEM

Depth (Feet)	Lithology	Material Description	Water	Samples			Laboratory Tests		
				Blows Per 6"	C o r e	B u l k	Moisture Content (%)	Dry Density (pcf)	Other Lab Tests
		SAND DUNE DEPOSITS Silty Sand (SM): Tan; moist; very dense; fine to medium grained sand.		15	█		5.6	117.5	
				17	█				
				19	█				
5				7	█				
				8	█				
		@ 8.0 feet: Becomes wet.		5	█		17.8	99.7	
				7	█				
				7	█				
10		@ 10.0 feet: Layer of lens of brown to grey, wet lean clay; several to four feet in thickness.		2	█				
				4	█				
				4	█				
				5	█		21.6	100.9	
				6	█				
				8	█				
15				5	█				
				5	█				
				4	█				
				5	█				
				6	█				
				6	█				
20		Borehole Terminated @ 20.5 feet Groundwater @ 11.5 feet Borehole backfilled with cement/bentonite grout.							

EXPLORATION LOG - V3 00-0620.GPJ HAI.GDT 8/3/00

EXPLORATION LOG

Project: Morro Bay Power Plant		Boring No.: B-25
Location: Morro Bay, San Luis Obispo, CA		Elevation: 15.26
Job No.: 00-0620	Client: FCH	Date: 7/6/00
Drill Method: Mud Rotary	Driving Weight: 140 lbs / 30 in	Logged By: EEV, PEM

Depth (Feet)	Lith- ology	Material Description	W a t e r	Samples			Laboratory Tests		
				Blows Per 6"	C o r e	B u l k	Moisture Content (%)	Dry Density (pcf)	Other Lab Tests
5		<u>Silty Sand (SM)</u> : Brown; moist; medium dense; fine grained sand.		10 11 11					
				3 4 6					
				3 6 6					
		Boring Terminated @ 9.0 feet Underground concrete structure resulted in drilling refusal Borehole backfilled with cement/bentonite grout.							

EXPLORATION LOG - V3 00-0620.GPJ HAI.GDT 8/3/00



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BORING NUMBER B-1

PAGE 1 OF 1

CLIENT RRM Design Group **PROJECT NAME** Morro Creek Multi-Use Trail and Bridge

PROJECT NUMBER _____ **PROJECT LOCATION** Morro Bay, SLO County, CA

DATE STARTED 8/6/13 **COMPLETED** 8/6/13 **GROUND ELEVATION** 23 ft **HOLE SIZE** 8" inches

DRILLING CONTRACTOR S&G Drilling **GROUND WATER LEVELS:**

DRILLING METHOD HSA - CME 75 **AT TIME OF DRILLING** ---

LOGGED BY E. Pongracz **CHECKED BY** _____ **AT END OF DRILLING** 18.50 ft / Elev 4.50 ft

NOTES *Drill Rod and Auto Hammer Used **AFTER DRILLING** ---

BENGAL GEOTECH BH V5 - BENGAL MOD GINT STD US LAB 2-10-10.GDT - 11/6/13 09:52 - C:\PROGRAM FILES (X86)\GINT\PROJECTS\MORRO CREEK.GPJ

ELEV (ft)	DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	GRAPHIC LOG	MATERIAL DESCRIPTION	UNDRAINED SHR STRENGTH (tsf)	MOISTURE CONTENT (%)	DRY UNIT WT. (pcf)	ATTERBERG LIMITS			FINES CONTENT (%)	OTHER TESTS
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX		
0					Asphalt Concrete (AC)								
					Earth Fill (ef) Sand (SP/SM) - golden brown, medium dense to dense, slightly moist, occasional piece of gravel								
20		SPT 1	7-11-8 (19)		Eolian Dune Sand (Qds)		4						
	5	MC 2	6-10-17 (27)		Fine-grained Sand (SP) with thin interbeds of Gravelly Sand - light brown, dense, slightly moist		3	102					
15													
10		SPT 3	6-9-11 (20)		same as above (SP), less gravel		5						
10													
15		SPT 4	5-9-12 (21)		Very fine-grained Sand (SP) - light brown, dense, moist (increasing moisture content)		4						
5													
	20	SPT 5	6-11-14 (25)		same as above (SP), dense, wet (catcher used)		20						

GW measured at 18.5' below grade at conclusion of drilling.
 Boring backfilled with native materials.
 Bottom of borehole at 20.5 feet.



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BORING NUMBER B-2

PAGE 1 OF 2

CLIENT RRM Design Group **PROJECT NAME** Morro Creek Multi-Use Trail and Bridge

PROJECT NUMBER _____ **PROJECT LOCATION** Morro Bay, SLO County, CA

DATE STARTED 8/6/13 **COMPLETED** 8/6/13 **GROUND ELEVATION** 18 ft **HOLE SIZE** 8" inches

DRILLING CONTRACTOR S&G Drilling **GROUND WATER LEVELS:**

DRILLING METHOD HSA - CME 75 **AT TIME OF DRILLING** 10.50 ft / Elev 7.50 ft

LOGGED BY E. Pongracz **CHECKED BY** _____ **AT END OF DRILLING** ---

NOTES *Drill Rod and Auto Hammer Used **AFTER DRILLING** ---

ELEV (ft)	DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	GRAPHIC LOG	MATERIAL DESCRIPTION	UNDRAINED SHR STRENGTH (tsf)	MOISTURE CONTENT (%)	DRY UNIT WT. (pcf)	ATTERBERG LIMITS			FINES CONTENT (%)	OTHER TESTS
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX		
0					Eolian Dune Sand (Qds)								
15		BULK MC 1	2-3-4 (7)		Fine-grained Sand (SP) - light brown, slightly dense, slightly moist		1	102				1	MAX, SV
5		GB 2	1-2-1 (3)		same as above (SP) with occ. small gravel, slightly moist								
		SPT 3											
10		MC 4	1-3-6 (9)		same as above (SP), moist		3	99				5	DS, SV
10		SPT 5	2-2-5 (7)		same as above (SP), medium dense, very moist to wet in lower 6" of sample.		16					4	SV
		SPT 6	1-5-5 (10)		same as above (SP) in sharp contact with Sandy Gravel (GP) - brown, medium dense, wet		18						
		SPT 7	3-4-5 (9)		Fine-grained Sand with Gravel (SP-SM) - brown to light brown, dense, wet, poor recovery		15					8	SV
5		SPT 8	6-15-16 (31)		Fine-grained Sand (SP) with occ. very small gravel - light brown, very dense, wet		24					3	SV
15		SPT 9	6-13-20 (33)		Alluvium (Qal) same as above (SP) - olive brown to light olive, very dense, wet		22					2	SV
		SPT 10	1-14-24 (38)		same as above (SP) - dense to very dense; in sharp contact with fine-grained Sand (SP) with shell hash and Gravelly Sand / Sand with Gravel (SW/SP)		22					3	SV
0		SPT 11	3-24-50/5"				21					3	SV
20		SPT 12	4-9-24 (33)		*Begin to add drilling mud to augers.		12					3	SV
		SPT 13	4-5-7 (12)		Sand with scattered small gravel (SW) - light brown to orange brown in sharp contact with 1/2" Clayey Sand (SC) and fine-grained Sand (SP) - gray to dark gray, dense, wet		26					14	SV
-5		SPT 14	0-1-1 (2)		Sandy Clay (SC) in sharp contact with Silty Clay (CL) - dark gray, soft, wet		46						
25		MC 15	1-2-3 (5)		Sandy, Silty Clay (CL) - dark gray, slightly stiff, wet, scattered shells/shell fragments		26	102					CONS
-10		SPT 16	2-7-15 (22)		Fine-grained Sand (SP) with some Silt to Silty Sand (SM) - dark gray, dense, moist, scattered very small shell fragments		23						
30		SPT	4-18-18		Fine-grained Silty Sand (SM/SP) to Sand with Silt - dark		21						

(Continued Next Page)



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BORING NUMBER B-2

PAGE 2 OF 2

CLIENT RRM Design Group PROJECT NAME Morro Creek Multi-Use Trail and Bridge
 PROJECT NUMBER _____ PROJECT LOCATION Morro Bay, SLO County, CA

BENGAL GEOTECH BH V5 - BENGAL MOD GINT STD US LAB 2-10-10.GDT - 11/6/13 09:52 - C:\PROGRAM FILES (X86)\GINT\PROJECTS\MORRO CREEK.GPJ

ELEV (ft)	DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	GRAPHIC LOG	MATERIAL DESCRIPTION	UNDRAINED SHR STRENGTH (tsf)	MOISTURE CONTENT (%)	DRY UNIT WT. (pcf)	ATTERBERG LIMITS			FINES CONTENT (%)	OTHER TESTS
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX		
30		17	(36)		gray, very dense, very moist, last 9" of sample contains abundant shells								
-15		SPT 18	1-2-3 (5)		Silty Clay (CL) with trace Sand grading to Silty Clay (CL/CH) - dark gray, medium stiff, very moist, scattered to abundant rootlets and scattered shell fragments Silty Clay (CH) - blue-gray, stiff, very moist		44						
35		MC 19	1-6-7 (13)				34	89					DS, CONS
-20		SPT 20	1-1-2 (3)		Silty Clay (CL/CH) - olive green to blue gray (mottled), medium stiff, very moist		37						
40		MC 21	2-5-6 (11)				35	92					DS, CONS
-25		SPT 22	1-1-2 (3)		Silty Clay (CL) - olive green to olive brown (mottled), medium stiff, very moist grading to olive green Silt (ML) - slightly stiff, wet Silty Clay (CL/CH) and Clayey Silt (ML) - olive green, medium stiff, moist, mottled; grading to Clay (CL/CH) w/ scatt. small gravel - dark gray, medium stiff, very moist		36						
45		MC 23	2-2-3 (5)				35	90					DS, CONS
-30		SPT 24	1-3-10 (13)		Silty Clay / Clay (CL/CH) grading to Sandy Clay (SC) and Gravelly Sand (SW) with clay - olive green to olive brown, stiff to medium dense Silty Clay (CL/CH), Clayey Gravel (GC), and fine-grained Silty Sand (SM) - olive green, stiff/medium dense, very moist to wet		29						
50		SPT 25	5-7-3 (10)				19						

GW measured at 10.5' to 12.5' below grade at various times during drilling. Boring backfilled with native materials.
 Bottom of borehole at 50.5 feet.



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BORING NUMBER B-3

PAGE 1 OF 2

CLIENT RRM Design Group **PROJECT NAME** Morro Creek Multi-Use Trail and Bridge

PROJECT NUMBER _____ **PROJECT LOCATION** Morro Bay, SLO County, CA

DATE STARTED 8/7/13 **COMPLETED** 8/7/13 **GROUND ELEVATION** 19 ft **HOLE SIZE** 8" inches

DRILLING CONTRACTOR S&G Drilling **GROUND WATER LEVELS:**

DRILLING METHOD HSA - CME 75 **AT TIME OF DRILLING** 13.50 ft / Elev 5.50 ft

LOGGED BY E. Pongracz **CHECKED BY** _____ **AT END OF DRILLING** ---

NOTES *Drill Rod and Auto Hammer Used **AFTER DRILLING** ---

BENGAL GEOTECH BH V5 - BENGAL MOD GINT STD US LAB 2-10-10.GDT - 11/06/13 09:52 - C:\PROGRAM FILES (X86)\GINT\PROJECTS\MORRO CREEK.GPJ

ELEV (ft)	DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	GRAPHIC LOG	MATERIAL DESCRIPTION	UNDRAINED SHR STRENGTH (tsf)	MOISTURE CONTENT (%)	DRY UNIT WT. (pcf)	ATTERBERG LIMITS			FINES CONTENT (%)	OTHER TESTS
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX		
0					Eolian Dune Sand (Qds)								
15		SPT 1	2-2-2 (4)		Fine-grained Sand (SP) - light brown, slightly dense, slightly moist		3						
5													
10		MC 2	6-8-12 (20)		same as above (SP) - light brown, slightly dense, moist		6	101			5	SV	
10		SPT 3	3-4-4 (8)		same as above (SP) with scatt. small gravel		7						
5		MC 4	9-22-24 (46)		<input checked="" type="checkbox"/> Fine-grained Sand with occasional gravel (SP) - brown to grayish brown, dense, wet		17	113			4	DS, SV	
15		SPT 5	4-8-8 (16)		Fine-grained Sand (SP) - light brown, medium dense, wet; in sharp contact with 5" bed of Gravelly Sand (SW) - dense, wet		23						
0		SPT 6	0-1-4 (5)		Fine-grained Sand (SP) - light brown, medium dense; 3" thick Sandy Gravel (GP/GW) in sharp contact with gray Fine-grained Sand/Silty Sand with roots and 1" thick, gray Silty Clay (CL) - loose/soft, wet (Qes ?)		22				10	SV	
0		SPT 7	7-15-22 (37)		Alluvium (Qal) Fine-grained Sand (SP) with widely scattered, small gravel and shell fragments - light gray to olive, very dense, very moist to wet		20						
20		SPT 8	5-16-50/3"		Fine-grained Sand (SP) with some Silt - light gray to olive, very dense, wet, scatt. small shell fragments		20				3	SV	
20		SPT 9	10-4-6 (10)		2" thick gray Clay (CL) in sampler tip		15						
-5		MC 10	2-2-3 (5)		Sand to Gravelly Sand (SW) - olive brown, loose, wet; in sharp contact with Clayey Silt/Silty Clay (ML/CL) - gray, slightly stiff, very moist to wet		23	118					CONS
25													
25		MC 11	1-3-9 (12)		Clay / Silty Clay (CL) with interbedded Sand / Pebbly Sand (SW) - gray to light gray, soft to medium dense, wet		23	101					DS
		SPT 12	5-7-16 (23)		Gravelly Sand (SW) grading to fine-grained Sand (SP) with some Silt to Silty Sand (SM) - gray, dense, wet, scattered shell fragments		22				10	SV	
-10		MC 13	6-11-2 (13)		same as above (SP)		20				7	SV	
30													

(Continued Next Page)



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BORING NUMBER B-3

PAGE 2 OF 2

CLIENT RRM Design Group PROJECT NAME Morro Creek Multi-Use Trail and Bridge
 PROJECT NUMBER _____ PROJECT LOCATION Morro Bay, SLO County, CA

ELEV (ft)	DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	GRAPHIC LOG	MATERIAL DESCRIPTION	UNDRAINED SHR STRENGTH (tsf)	MOISTURE CONTENT (%)	DRY UNIT WT. (pcf)	ATTERBERG LIMITS			FINES CONTENT (%)	OTHER TESTS
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX		
30													
		SPT 14	2-1-4 (5)		same as above (SP); contains 2" thick and 3/4" thick brown Clayey Silt (ML) seams		22					10	SV
		SPT 15	3-10-13 (23)				21					14	SV
-15		MC 16	5-8-6 (14)		same as above (SP)		24	107				2	DS, SV
35		SPT 17	1-1-1 (2)				*Begin to add water to augers.	24				5	SV
		SPT 18	1-2-5 (7)		Gray, fine-grained Clayey Sand (SC) in sharp contact with blue-gray Silty Clay (CL) - medium dense to stiff, wet to very moist Silty Clay (CL/CH) - gray, stiff, very moist with organics; grading to olive green to gray, mottled Silty Clay (CH) - stiff, very moist		30						
-20		MC 18	2-8-12 (20)				27						
40		SPT 19	4-5-9 (14)		Fine-grained Sand (SP) in sharp contact with gray, mottled 3" thick Silty Clay (CL); grading to Clay with scatt., small gravel (CL) - stiff/medium dense, very moist to wet Silty Clay (CL/CH) - olive brown to light gray (rusty mottling), stiff, very moist		22					46	SV
		MC 20	2-5-7 (12)				35					90	DS, CONS
-25		SPT 21	0-1-3 (4)		Clayey Silt (ML/MH) - olive green, slightly stiff, very moist; in sharp contact with Clay (CL/CH) with some sand and occasional pebble - dark gray, stiff, very moist Clayey Silt / Silty Clay (ML/CL) - olive brown, slightly stiff; grading to Silty Clay (CL) and Sandy Clay (SC) - olive brown, medium stiff, very moist		26						
		SPT 22	0-1-4 (5)				25						
-30		SPT 23	2-1-1 (2)		Older Alluvium (Qoal) Fine-grained Sandy Clay and Clayey Sand (SC) - orange brown to gray and reddish brown, medium stiff, very moist to wet		20						

GW measured at 13.5' below grade during drilling. Boring backfilled with native materials.
 Bottom of borehole at 50.5 feet.

BENGAL GEOTECH BH V5 - BENGAL MOD GINT STD US LAB 2-10-10.GDT - 11/6/13 09:52 - C:\PROGRAM FILES (X86)\GINT\PROJECTS\MORRO CREEK.GPJ