TABLE OF CONTENTS

Page

TABLES

FIGURES

2.0 PROJECT DESCRIPTION

2.1 INTRODUCTION

The Willow Pass Generating Station (WPGS) will consist of new 550 megawatt (MW) natural-gas–fired electric generating facilities and ancillary systems. The project consists of construction of new generating units that will become the WPGS; construction of electric and gas transmission lines adjacent to the WPGS facility; and construction of water supply and wastewater pipelines connecting to the Delta Diablo Sanitation District Wastewater Treatment Plant (DDSD WTP) (Figure 2.1-1).

The new WPGS units, consisting of two power blocks each containing one Siemens Flex Plant 10 (FP10) combined-cycle unit, are to be constructed wholly within the existing Pittsburg Power Plant (PPP) site. The FP10 combined-cycle units will have a generating capacity of approximately 550 MW (net) when both are operated together, assuming a temperature of 75 degrees Fahrenheit (°F) and 54 percent relative humidity. The WPGS units are expected to operate at a 40 to 50 percent capacity factor. The WPGS FP10 units will use air-cooled heat exchanger (ACHE) technology to reduce consumptive water use. The generator output from the WPGS will be stepped-up to 230 kilovolts (kV).

The WPGS site will encompass 26 acres of the approximately 1,000-acre PPP site that are currently occupied by existing power generation Units 1 through 4, which are now retired and which last operated in 2003; an unused surface impoundment; an administration building; an unused #6 fuel oil storage tank (Tank 7); temporary buildings; and other ancillary facilities. Construction of the new power generation facility is expected to occur over a 34-month period (from October 2009 through July 2012). Commercial operation for the FP10 units is expected by summer 2012. Construction (including demolition) is expected to cost approximately $585 million (in 2008 dollars).

As shown on Figure 2.1-2, all construction laydown and parking areas will be within the PPP site and adjacent Pacific Gas and Electric Company (PG&E) switchyard property. The WPGS will be interconnected to the PG&E switchyard adjacent to the WPGS site. The WPGS will use natural gas that will be delivered via a new onsite gas pipeline, which will be constructed to carry natural gas from the existing PPP metering station to the WPGS site. The process water source will be recycled water from the DDSD system. Two new offsite water lines approximately 5 miles long will be constructed to bring recycled water from, and return wastewater to, the DDSD WTP. Potable water will be supplied by the City of Pittsburg from an existing onsite underground potable water piping system. The project also includes the construction of a series of screening walls, located on the eastern portion of the PPP site between existing Tanks 1 through 6, as shown on Figure 2.1-2.

2.2 WPGS SITE LOCATION

Figure 2.2-1 shows the project location in relation to the surrounding area. The WPGS site is located in the City of Pittsburg, within Contra Costa County, California. The WPGS will be situated within the existing PPP site located at 696 West 10th Street, Pittsburg, CA 94565. The WPGS site will be located on a separate legal parcel to be created by adjusting the lot lines of two existing legal parcels at the PPP site, both of which are identified as Assessor’s Parcel Number 085-010-014. The WPGS site is located on Township 2 North, Range 1 East, on the U.S. Geological Survey Honker Bay Topographic Quadrangle Map. The PPP site is located directly south of Suisun Bay and approximately 2 miles west of the center of the City of Pittsburg. The majority of the PPP site was annexed into the City of Pittsburg in June 2008.

The new WPGS parcel will be approximately 26 acres and will be separate from the existing PPP site. The parcel will be purchased by Mirant Willow Pass, LLC (Mirant Willow Pass) from Mirant Delta, LLC (Mirant Delta). The new generating units will be located on the south 23.5 acres of the WPGS site. The north 2.5-acre portion of the WPGS site (adjacent to Suisun Bay) is included to preserve existing riparian water rights; no land disturbance will occur within this area. PG&E owns a 36-acre switchyard adjacent to the PPP site, directly southwest of the WPGS site (Figure 2.2-1).

The WPGS site is currently occupied by the existing retired power generation PPP Units 1 through 4, an unused surface impoundment, an administration building, hazardous materials and hazardous waste materials buildings, Tank 7, temporary buildings, and other ancillary facilities. The project includes the demolition of Units 1 through 4, the administration building, and Tank 7, which are on the WPGS site, as well as replacement of the hazardous materials and hazardous waste buildings. The unused surface impoundment on the WPGS site will be left in place.

2.3 OTHER PROJECT COMPONENT LOCATIONS

The project includes the following components that would be located outside the WPGS site but within the PPP site and the adjacent PG&E switchyard property:

- Approximately 21.5 acres of construction, laydown, parking, and office areas;
- Approximately 2,700 feet of new natural gas line which connects immediately upstream of the existing PPP gas meter station (with a dedicated meter);
- Approximately 1,600 feet of new transmission lines which connect to the PG&E switchyard;
- A new hazardous material building and a new hazardous waste building, which will be located on the PPP site, west of existing Unit 7;
- New screening walls, approximately 48 feet tall, which will be constructed between each of the existing Tanks 1 through 6, located on the eastern boundary of the PPP site.

The above features will all be located on previously disturbed, graded, or paved areas of the PPP and adjacent PG&E switchyard property. As indicated, the gas interconnection line will run from the existing gas supply system upstream of the existing gas metering station within the PPP site, to a new metering station within the WPGS property, through gas conditioning systems, to the WPGS compressor enclosure (see Figure 2.5-1). Electric transmission lines will connect directly to the PG&E switchyard adjacent to the WPGS site (see Figure 2.1-2).

The project will also involve the demolition of one hazardous materials storage building and one hazardous waste storage building that are currently on the WPGS site. New buildings will be constructed outside of the WPGS site and within the PPP site. These new buildings will be used to store hazardous materials and hazardous waste for existing PPP operations as well as the WPGS operations. The project also includes the demolition of the unused surface impoundment west of Tank 1, just north of the WPGS site; this area will be used for construction laydown and parking.

In addition, wholly within WPGS site, the project will include a new potable water line that will connect to an existing potable water line on the PPP property. The existing potable water line connects to the City of Pittsburg water line located along West 10th Street. A new sanitary line will also be constructed to connect the WPGS site to the existing sanitary line on the PPP site. Sanitary waste will be conveyed to DDSD WTP via an existing sewer line. The new potable water line and sanitary line will be located entirely within the WPGS site.

The project also includes an offsite component that extends beyond both the WPGS and PPP site boundaries consisting of 5-mile-long water supply and waste water discharge lines connecting the WPGS site to the DDSD WTP. The water pipeline alignment traverses a portion of the PPP site and continues along Union Pacific Railroad and the Pittsburg-Antioch Highway, entering the DDSD WTP from the south (Figure 2.2-1). Three miles of the five-mile-long route currently contains an unused fuel oil pipeline owned by Mirant Delta, which historically was used to convey oil between the Contra Costa Power Plant and the PPP. The existing pipeline is 10.75 inches in diameter, is now out of service, and will be replaced by the new water pipelines (see Section 2.7.4 for further details). The DDSD WTP is located at 2500 Pittsburg-Antioch Highway in Antioch, California.

2.4 SITE ACTIVITIES THAT ARE NOT PART OF THE PROPOSED PROJECT

The WPGS will be adjacent to the existing PPP operational electrical generating units (Units 5 through 7). Units 5, 6, and 7 currently operate predominantly during the summer months, and have a total generating capacity of approximately 1,311 MW. The PPP site also includes an existing water treatment plant and an ammonia storage facility, as well as water intake and discharge facilities. The PPP site has ongoing maintenance and capital improvement projects that may occur prior to, or during, the development of WPGS.

A number of existing fuel oil storage tanks are also located within the PPP site, in areas outside of the WPGS site. These tanks might be refurbished or reused for purposes unrelated to the WPGS.

In addition, the Trans Bay Cable project is currently being constructed, and includes the installation of underground electrical cables that will traverse the western portion of the PPP site. Construction of the Trans Bay Cable project at the PPP site is expected to be complete by July 2009.

These projects are not directly or indirectly connected to the WPGS and are not part of the project.

2.5 POWER GENERATION FACILITY

The WPGS project will consist of a 550-MW facility with two power blocks. Each power block will contain one Siemens FP10 combined-cycle unit (see Figure 2.5-1). Each combustion turbine and each steam turbine will be connected to separate electric generators. The generators for the WPGS will be interconnected to the PG&E switchyard adjacent to the WPGS site to serve energy needs throughout northern California.

2.5.1 Power Plant Site Arrangement

The following sections describe the power generation facility site arrangement, process flow diagrams, heat and material balances, major equipment, and ancillary systems (including buildings and structures) that constitute the project. The WPGS will be designed, constructed, and operated in accordance with applicable laws, ordinances, regulations, and standards (LORS). In addition, the power plant facilities will be designed and constructed in accordance with the design criteria provided in Appendices A through E.

The site arrangement drawings (plot plans, elevation views, and an oblique aerial view of the power generation facility) are shown on Figures 2.5-1, 2.5-2, and 2.5-3, respectively.

2.5.2 Process Description

This section describes the power generation process that will be employed by the WPGS. The power generation facility will consist of two power block areas, each containing one Siemens FP10 unit (see Figure 2.5-1).

Each Siemens FP10 unit includes one combustion turbine generator (CTG) equipped with ultra low NO_X combustors and inlet air evaporative coolers, one heat recovery steam generator (HRSG), one steam turbine generator (STG), an air-cooled heat exchanger (ACHE), and associated auxiliary systems and equipment (see Figure 2.5-1). Fuel for the CTGs will be pipeline-quality natural gas.

The average net generating capacity of each of the FP10 units will be approximately 275 MW. The actual net output of the system will vary in response to ambient air temperature conditions, use of evaporative coolers, use of power augmentation, amount of auxiliary load, generator power factor, firing conditions of the combustion turbines, and other operating factors. Full load output (net) of the facility under expected operating conditions will range from approximately 265 MW to 285 MW. The FP10 units can operate at partial load, with the CTGs operating down to minimum load (60 percent) while keeping the STG on-line or off-line. Operational modes will be driven by good operating practices, market conditions, and dispatch requirements.

The overall annual availability as measured by Equivalent Availability Factor (EAF) of the FP10 units is expected to be in the range of 92 to 98 percent. The power plant's annual output will depend on market conditions and dispatch requirements. The design of the power plant will provide for operating flexibility (i.e., ability to start up, shut down, turn down, and provide peaking output) so that operations may be readily adapted to changing conditions in the energy and ancillary services markets.

Each FP10 unit is designed to start and ramp up to 150 MW in 10 minutes and still be capable of operating with combined-cycle efficiency. The fast-start capability, evaporative cooling, and power augmentation are advantageous to meet changing market conditions. The FP10 units have the additional benefit of reducing start-up emissions compared to a conventional combined-cycle plant. The HRSG at the CTG exhaust is designed for fast start and incorporates a conventional proven selective catalytic reduction (SCR) design and oxidation catalyst to achieve the guaranteed emissions at load. The FP10 unit design also incorporates an ACHE at the STG exhaust, which eliminates the requirement for a wet cooling tower and allows each unit to operate with minimal water consumption. The compact layout of the FP10 units, low emissions, and low water consumption facilitate plant siting.

The process flow diagram for the FP10 units is shown on Figure 2.5-3. The heat and material balances case descriptions are listed in Table 2.5-1. Three cases shown are: summer design conditions (94°F), average conditions (75°F), and extreme winter conditions (20°F). For the summer and average conditions, evaporative cooling is included for both power blocks. In addition, when operating at 100 percent load, power augmentation may be used in the FP10 units. For the winter case, neither evaporative coolers nor power augmentation are in operation. The winter case is the lowest temperature at which the units would reasonably be expected to operate.

Air will flow through the CTG inlet air filter, evaporative coolers, and associated ductwork to the CTG compressor section. The compressed air from the compressor section flows to the CTG combustor section, where it is mixed with compressed natural gas and the mixture is then ignited. The hot combustion gases flow through the CTG turbine expander section, which drives both the CTG compressor section and the electric generator. The combustion gases exit the turbine expander section and enter the inlet duct of the HRSG.

The hot flue gas then enters the HRSG's steam generation section, where heat from the combustion turbine exhaust gases is transferred to water being pumped through the HRSG steam-generation components (economizer, drum, evaporator, and superheater). The water is converted to steam, superheated, and delivered to the STG. Steam expands through the STG, driving the generator. Exhaust steam from the STG enters the ACHE, where it is condensed into water, deaerated, and recycled back to the HRSG as boiler feedwater. The absorbed heat from the ACHE is rejected to the atmosphere.

Power augmentation may be used during peak demand periods by extracting steam from the STG and injecting that steam into the gas turbine compressor discharge and/or combustors to boost power output.

Each HRSG produces high-pressure (HP) steam. The HP system consists of economizer, evaporator, and superheater heating surfaces, and uses a separator and surge tank (drum) for steam/water separation. A feed pump delivers water to the economizer sections where it is preheated before being discharged to the drum. From the steam drum, the steam enters the evaporator sections before entering the superheater. The final steam temperature is controlled by feedwater flow modulation and the use of an attemperator.

Each HRSG will be equipped with an emissions control system to include an SCR and oxidation catalyst, an ammonia system, a continuous emissions monitoring system (CEMS), and stack.

2.5.3 Siemens Flex Plant 10 Equipment

This section describes the major components and systems of the project: the CTGs, HRSGs, STGs, and ACHEs. A list of major mechanical equipment for each power block is provided in Table 2.5-2.

2.5.3.1 Combustion Turbine Generators

Thermal energy will be produced in both of the CTGs through the combustion of natural gas, and be converted into mechanical energy in the CTG turbine that drives the CTG compressor and electric generator which converts the mechanical energy into electric energy. The CTGs are Siemens Model SGT6-5000F (Siemens 5000F) machines and will be supplied by Siemens Power Generation, Inc. The SGT6-5000F CTG is a two-bearing axial exhaust, cold-end-drive design. An air filtration and silencing system is provided for air drawn into the compressor inlet.

Each CTG will consist of a heavy-duty, single-shaft CTG and associated auxiliary equipment. The CTGs will be equipped with ultra low NO_X natural-gas combustors designed to meet the following functional requirements:

- Air emissions at the gas turbine exhaust will not exceed the levels described in Section 7.1, Air Quality.
- Noise emissions will not exceed the near-field and property line levels described in Section 7.5, Noise.
- Each CTG will be capable of operating at a 60 percent or greater load while meeting the required air emission performance.

The CTGs will be equipped with the following accessories required to provide efficient, safe, and reliable operation:

- Inlet air filters and on-line filter cleaning system
- Inlet air evaporative coolers
- On-line and off-line compressor wash system
- Metal acoustical enclosures
- Fire detection and protection system
- Lubrication oil system, including oil coolers and filters
- Generator coolers
- Starting system, auxiliary power system, and control system.

Siemens generators are high-efficiency 3,600 revolution per minute (rpm) single end drive units designed to meet industry standards for design and instrumentation. The generators produce electricity at 16.5 kV and are open air cooled (OAC) with a static excitation system. Space heaters are provided in the generator and excitation enclosures to inhibit moisture condensation during installation and periods of shutdown.

The metal acoustical enclosures contain the CTGs and accessory equipment, which will be located outdoors.

2.5.3.2 Heat Recovery Steam Generators

The HRSGs will transfer heat from the CTG exhaust gases to the feedwater to produce steam. Each HRSG is a single-pressure design with extended fin-tube construction. The design enables the CTG to come up to load rapidly. The design also reduces the time for the STG to start up compared to a conventional unit.

The HRSG scope includes a submerged-tube heat exchanger, which is used to cool the CTG rotor cooling air, improving cycle efficiency by producing additional steam from this heat that would otherwise be lost to the atmosphere.

The HRSGs will be equipped with transition ducts and 21-foot, 4-inch-diameter exhaust stacks approximately 150 feet, 6 inches tall. Pressure components of each HRSG include an economizer, boiler drum, evaporator, and superheater.

Superheated steam is produced in the HRSG and flows to the steam turbine throttle inlet. Steam that is exhausted from the STG is condensed in an ACHE. The condensate goes through an aerator and is then pumped from the deaerator by condensate pumps to boiler feedwater pumps. Boiler feedwater pumps send the feedwater through the economizer and into the boiler drum of the HRSG. Steam from the boiler drum is then evaporated and superheated, thus completing the steam cycle.

Each HRSG is equipped with an SCR system that uses 19 percent aqueous ammonia in conjunction with a catalyst bed to reduce NO_X in the CTG exhaust gases. The catalyst bed is contained in a catalyst chamber located within each HRSG. Ammonia is injected upstream of the catalyst bed. The subsequent catalytic reaction converts NO_X to nitrogen and water, resulting in a reduced concentration of NO_X in the exhaust gases exiting the stack.

An oxidation catalyst located in each HRSG reduces the concentration of CO in the exhaust gases exiting the stack. The oxidation catalyst also reduces the concentration of volatile organic compound (VOC) emissions.

2.5.3.3 Steam Turbine Generators

The STG system will include a Siemens SST-800 back pressure STG; a governor system; a steam admission system; a gland steam system; a lubrication oil system, including oil coolers and filters; and generator coolers. Steam from the HRSG will enter the STG, where it expands and drives the STG. Upon exiting the turbine, the steam will enter the ACHE, where it will be condensed to water.

The SST-800 back pressure STG is a single-case design with a high-efficiency blade path. It transmits torque to its generator at synchronous speed. The design is suitable for base load or cycling operation. The SST-800 is a center-admission unit using demonstrated reverse-flow technology to offset axial thrust. The rotor is machined from a single forging.

Siemens STGs are high-efficiency 3,600 rpm single end drive units designed to meet industry standards for design and instrumentation. The STGs produce electricity at 13.8 kV and are OAC with a brushless excitation system. Space heaters are provided in the generator and excitation enclosures to inhibit moisture condensation during installation and periods of shutdown.

2.5.3.4 Steam Turbine Air-Cooled Heat Exchangers

The heat rejection system of the steam cycle for each STG will consist of an ACHE. The ACHE receives exhaust steam from the STG and condenses it to liquid, for return to the HRSG. The ACHE will be a multicell tubular heat exchanger with wet, saturated steam condensing on the tube side and air flowing across the outside of the tubes to provide cooling. The ACHE is more compact than a conventional air-cooled condenser because its normal operating pressure is above atmospheric pressure. The ACHE is designed to allow 100 percent steam bypass of the steam turbine when required. The STG exhaust steam will enter the ACHE through a main duct and will be distributed among multiple cells. Each cell will have a mechanical draft fan that forces air across finned tubes containing the steam. The air condenses the steam, and the condensate flows down to a collection hot well where makeup water is also added. Condensate from the ACHE hot well flows to the deaerator, where oxygen (O_2) and non-condensable gases are removed.

All auxiliary systems will be air cooled.

Steam Bypass System Valve

The FP10 units are designed with 100 percent steam bypass systems for enhanced plant operating flexibility. The steam bypass valve includes a multi-stage, multiple-orifice trim design for application and operation over a wide turndown range. An integral de-superheater is designed into the valve to reduce the exit temperature to meet downstream system requirements.

Feedwater Pumps

The boiler feedwater pumps supply water to the HRSGs. The pumps are of a centrifugal, horizontal, and electrically driven design.

Feedwater Control Valves

The feedwater control valves are specified and sized for the application to meet steady-state and transient operating requirements. This valve has multi-stage anti-cavitation trim and a wide turndown capability.

Condensate Pumps

The condensate pumps are a vertical wet-pit–type design coupled with vertical constant-speed electric motors.

2.5.3.5 Project Noise Control Features

As part of the facilities design, specific noise control equipment will be incorporated that includes:

- CTG inlet air silencers (85 A-weighted decibels at 3 meters)
- CTG enclosures
- CTG accessory compartment enclosures
- Gas compressors sound attenuation, as required.

The incorporation of these noise control devices has been included in the formulation of equipment noise generation values used in the noise analysis (see Section 7.5).

2.5.4 Major Electrical Systems and Equipment

This section describes the major electrical systems and equipment for the project. A single-line electrical diagram of the major and auxiliary plant electrical systems are presented on Figure 2.5-4.

The bulk of the electric power produced by the facility will be transmitted to the grid. A small amount of electric power will be used on site to power auxiliaries such as pumps and fans, control systems, and general facility loads including lighting, heating, and air conditioning. Some power will also be converted from alternating current (AC) to direct current (DC), which will be used as backup power for control systems and other uses. Transmission and auxiliary uses are discussed in the following subsections.

2.5.4.1 AC Power Transmission

Power will be generated by the two CTGs and two STGs. The CTGs will generate power at 16.5 kV. The STGs will generate power at 13.8 kV. Each of the generators will then be stepped up by a dedicated generator step-up (GSU) transformer to 230-kV for transmission to the grid. The step-up transformers will be filled with oil. Surge arresters will be provided at the high-voltage bushings to protect the transformers from surges on the 230-kV system caused by lightning strikes or other system disturbances. The transformers will be set on concrete pads within containments designed to contain the transformer oil in the event of a leak or spill. For fire protection, concrete blast walls will be constructed. Both CTGs will use one sulfur hexafluoride (SF_6) generator breaker on the low-voltage side of the GSU transformers. The STGs and CTGs will use a 230-kV SF_6 breaker on the high-voltage side of the associated GSU. The generator breakers for the combustion turbines will be connected to the CTGs and GSUs by an iso-phase bus duct. The high-voltage side of the step-up transformers on each FP 10 power block will be connected to one 230-kV transmission connection. The transmission lines will connect to the common SF_6 breaker located in the 230-kV switchyard. The PG&E switchyard, adjacent to the WPGS site, will be the point of interconnection with the transmission system.

2.5.4.2 DC Power Supply System

One 125-volt DC power supply system will be supplied per power block for balance-of-plant and STG equipment. It will consist of one 100 percent capacity battery bank, two 100 percent static battery chargers, a switchboard, and two or more distribution panels. Each combined-cycle gas-turbine generator will be provided with its own separate battery systems and redundant chargers.

Under normal operating conditions, the battery chargers supply DC power to the DC loads. The battery chargers receive 480-volt, three-phase AC power from the AC power supply system, and continuously charge the battery banks while supplying power to the DC loads.

Under abnormal or emergency conditions, when power from the AC power supply system is unavailable, the batteries supply DC power to the DC system loads. Recharging of a discharged battery occurs whenever 480-volt power becomes available from the AC power supply system. The rate of charge depends on the characteristics of the battery, battery charger, and the connected DC load during charging. The anticipated maximum recharge time will be 12 hours.

The 125-volt DC system will also be used to provide control power to the 230-kV generator breakers, 4,160-volt switchgear, 480-volt load centers, critical control circuits, and emergency DC motors.

2.5.4.3 Electrical System for Plant Auxiliaries

Auxiliary power to the CTG and STG power blocks will be supplied at 4,160-volts AC by a double-ended 4,160-volt switchgear lineup. Oil-filled, unit auxiliary step-down transformers will supply primary power to the 4,160-volt switchgear. The high-voltage side of the unit auxiliary transformers will be connected to the outputs of the gas-turbine generators. This connection will allow the switchgear to be powered from the gas-turbine generators in the associated power block or by back-feeding power from the 230-kV switchyard through the unit auxiliary transformer. Generator circuit breakers will be provided for all the gas-turbine generators. These circuit breakers are used to isolate and synchronize the generators, and will be located between the generators and the connections to the auxiliary and GSU transformers. The 4,160-volt switchgear lineup supplies power to the various 4,160-volt motors, to the gas-turbine starting system, and to the load center transformers, rated 4,160 to 480 volts, for 480-volt power distribution. The switchgear will have vacuum interrupter circuit breakers for the main incoming feeds and for power distribution. All 4,160-volt switchgear will be arc-flash resistant.

The load center transformers will be oil-filled, each supplying 480-volt, three-phase power to the double-ended load centers.

The load centers will provide power through feeder breakers to the various 480-volt motor control centers (MCCs). The MCCs will distribute power to 480-volt motors, to 480-volt power distribution panels, and lower voltage lighting and distribution panel transformers. Power for the AC power supply (120-volt/ 208-volt) system will be provided by the 480-volt MCCs and 480-volt power panels. 480-120/208-volt dry-type transformers will provide transformation of 480-volt power to 120/208-volt power.

2.5.4.4 Uninterruptible Power Supply System

The combustion turbine and steam turbine power blocks will also have an essential service 120-volt AC, single-phase, 60-hertz uninterruptible power supply (UPS) to supply AC power to essential instrumentation, critical equipment loads, and unit protection and safety systems that require uninterruptible AC power.

Redundant UPS inverters will supply 120-volt AC single-phase power to the UPS panel boards that supply critical AC loads. The UPS inverters will be fed from the station's 125-volt DC power supply system. Each UPS system will consist of one full-capacity inverter, a static transfer switch, a manual bypass switch, an alternate source transformer, and two or more panel boards.

The normal source of power to the system will be from the 125-volt DC power supply system through the inverter to the panel board. A solid-state static transfer switch will continuously monitor both the inverter output and the alternate AC source. The transfer switch will automatically transfer essential AC loads without interruption from the inverter output to the alternate source upon loss of the inverter output.

A manual bypass switch will also be included to enable isolation of the inverter for testing and maintenance without interruption to the essential service AC loads.

Distributed control system (DCS) operator stations will be supplied from the UPS. CEMS equipment, DCS controllers, and input/output (I/O) modules will be fed using either UPS or 125-volt DC power directly.

2.5.5 Fuel Gas Supply and Consumption Use

Natural gas will be delivered to the WPGS via a new 12-inch gas line connection, which will run from within the existing gas metering station within the PPP site to the WPGS site, as shown on Figure 2.1-2. A new dedicated metering station will be provided within the western portion of the WPGS site, as shown on Figure 2.5-1.

The natural gas pressure will be increased by gas compressors to a pressure of approximately 600 pounds per square inch gauge (psig), filtered, and pressure-regulated before entering the CTG.

Safety pressure relief valves will be provided to protect the natural gas system components from overpressurization.

A fuel gas heater will be located upstream of the gas compressor enclosure. The maximum heat input for this system is 5 mmBtu/hr.

Chapter 5, Natural Gas Supply, provides more detail on the connection, routing, processing, and quality of natural gas to be used for the WPGS.

2.5.6 Water Supply and Treatment

This section provides estimated consumptive use of water and describes its source, quality, and water treatment systems for the WPGS. The power plant's various water uses will include makeup water for the HRSGs, water for the CTG inlet air evaporative coolers, water for power augmentation, service water and potable water. Water balance diagrams for the WPGS for winter, average, and maximum conditions are presented on Figure 2.5-5.

2.5.6.1 Water Source and Quality

The WPGS will use recycled water from the DDSD WTP for raw water makeup. The new offsite water pipeline will be approximately 5 miles long and will be constructed to bring recycled water from the DDSD to the WPGS. A representative water analysis of the recycled water supply is summarized in Table 2.5-3. This water source will require ammonia removal treatment at the WPGS site to remove the nutrient source for *nitrobacter* and *nitrosomonus* bacteria that would otherwise cause fouling and microbiologically influenced corrosion within the plant. It is possible that some modifications, such as larger capacity filters, may be required by the DDSD to accommodate the supply for WPGS; however, all required upgrades would be mechanical in nature, would occur within the existing footprint of the DDSD WTP, and would not require additional land disturbance outside of the installation of the water pipeline alignment from the WPGS to the DDSD WTP.

Chapter 6, Water Supply, includes a more extensive discussion of the project's water supply and conveyance.

2.5.6.2 Water Treatment Requirements

Water treatment requirements for the project will vary depending on the specific use of the water. The following describes the main water treatment requirements:

- Raw recycled water containing ammonia will be delivered to WPGS from the DDSD WTP. The recycled water will be processed through nitrification facilities to reduce ammonia to less than 0.3 milligrams per Liter (mg/L). The nitrified water will then flow to the 1.6 million-gallon Nitrified Water Storage Tank.

- The nitrified water will serve as process makeup water for the entire plant. A portion of the raw water will be treated with a corrosion inhibitor and used as makeup to the service water system.

- Water pre-treatment will consist of Reverse Osmosis (RO) prefilters, followed by first and second pass RO membranes. A portion of the first pass RO permeate will be blended with nitrified water for makeup to the evaporative coolers. This prevents aspiration of compounds that could foul or damage the combustion turbines and extends the life of the packing material used inside the evaporative coolers without adding chemicals.

- Feedwater will be produced for the HRSGs by further processing of second pass RO permeate using onsite electrodeionization membranes. Electrodeionization uses no chemicals.

- The following plant demineralized water uses are anticipated:

  – Demineralized water will be needed for power augmentation. The demineralized water will be used to produce steam in the HRSG for injection into the combustion turbines of the FP10 units during power augmentation operation.

  – Demineralized water will be needed for boiler feedwater makeup to maintain a constant quality and quantity of water within the system.

  – Demineralized water will also be used for miscellaneous plant uses, such as periodic combustion-turbine-compressor washes, makeup of various chemical feeds, and cleaning solutions.

  Note: The FP10 combustion turbines will use dry ultra low NO_X burners; therefore, water injection for NO_x control will not be necessary.

- Demineralized product water will be stored in an 800,000-gallon demineralized water storage tank, which provides sufficient capacity for approximately 1 day of peak load operation coinciding with an outage of the water treatment system.

2.5.6.3 Consumptive Water Requirements

Daily and annual water consumptive requirements of the WPGS are summarized in Table 2.5-4. Average daily water requirements depend on the ambient temperature, capacity factor, and operating profile. The capacity factors for the FP10 units are expected to be 40 to 50 percent.

Maximum daily requirements are based on water consumption at maximum operating conditions of 94ºF and 32 percent relative humidity with evaporative cooling and power augmentation in operation. Daily average conditions reflect operation of both evaporative cooling and power augmentation at 75ºF and 54 percent relative humidity.

The annual water consumption value is the estimated total amount of water that will be used by the facility, in acre-feet. The annual water use for the FP10 units assumes that the units will operate approximately 50 percent of the time during the year. Therefore, total estimated annual water use at the WPGS is expected to be approximately 781 acre-feet per year.

Figure 2.5-5 provides the estimated daily continuous water flow rates in gallons per minute, corresponding to the heat and material balance case descriptions presented in Table 2.5-1 and Figure 2.5-3. The major consumptive uses of water at the site are for power augmentation and combustion turbine inlet air evaporative cooling.

The water balance diagram (Figure 2.5-5) shows the water treatment processes of the WPGS and the distribution of treated water. Water treatment will vary according to the quality required for each of the plant's water uses: CTG inlet air evaporative coolers, HRSG makeup water, and power augmentation and service water. The following sections describe water uses of the WPGS.

CTG Evaporative Coolers

Makeup water for the CTG evaporative coolers will be a blend of first-stage RO permeate and raw water. Water evaporates in the CTG evaporative coolers and passes through the CTG. Because evaporation will concentrate minerals in the remaining water that is not evaporated, a quantity of water will be removed continuously as blowdown to prevent minerals from concentrating to levels above the CTG design limits. The blowdown will maintain the water in the evaporative cooler sumps at approximately two cycles of concentration. The blowdown will be discharged to the plant's wastewater storage tank (WWST) for discharge to the DDSD system. As required, water will be added to the evaporative coolers to replace the water that is lost to evaporation and blowdown.

HRSG Makeup

Water for the HRSGs must meet stringent specifications for suspended and dissolved solids. To meet these specifications, demineralized water will be used for HRSG makeup water.

Additional conditioning of the condensate and feedwater circulating in the steam cycle will be provided by means of a chemical feed system. To minimize corrosion, aqueous ammonia will be injected into the condensate system downstream of the condensate pumps and directly upstream of the HRSG economizers. Additionally, a phosphate solution will be fed into the steam drums of the HRSGs. The chemical feed system includes one phosphate container for each HRSG. Aqueous ammonia will be supplied from totes (one for each HRSG). Two full-capacity metering pumps will be provided for each chemical.

A steam-cycle sampling and analysis system will monitor the water quality at various points in the plant's steam cycle. The resulting water quality data are used to guide adjustments in the water treatment processes and to determine the need for other corrective operational or maintenance measures. Steam and water samples will be routed to sample panels, where steam samples are condensed, and the pressure and temperature of all samples are reduced as necessary. The samples are then directed to automatic analyzers for continuous monitoring of conductivity and pH. All monitored values are indicated at the sample panels, and critical values are transmitted to the plant control room. Grab samples will be obtained periodically at the sample panel for chemical analyses that provide information on a range of water quality parameters.

Power Augmentation Makeup

Power augmentation is the practice of adding steam downstream to the combustion chamber of the gas turbine to boost power output. The steam is produced in the HRSG and is, therefore, subject to the usual water treatment required for HRSG use. The steam that is injected is ultimately discharged to the atmosphere by way of the combustion turbine exhaust stack.

Service Water

Utility or hose stations at various locations around the FP10 units will provide service water to wash down tools, equipment, and areas adjacent to the utility station.

Potable Water

The facility will require potable water for personnel consumption, eyewash stations, showers, and sanitary needs. Potable water will tie into an existing potable water line on the PPP property, and no onsite treatment is required.

2.5.7 Waste Management

This section describes the waste management processes leading to proper collection, treatment, and disposal of wastes. Wastes include process wastewater, solid nonhazardous waste, and hazardous waste. Additional information on waste management is provided in Section 7.13, Waste Management.

2.5.7.1 Wastewater

The water balance diagram (Figure 2.5-5) shows the expected wastewater streams and flow rates for the various plant processes. The flow rates shown are based on daily average, annual average, and peak conditions.

The WPGS will have two separate wastewater collection systems—one for collecting sanitary wastewater and the other for collecting process wastewater. The sanitary wastewater system collects sanitary wastewater from sinks, toilets, and other sanitary facilities. Sanitary wastewater will be discharged to the public sanitary sewer system via a separate sanitary discharge pipeline to the DDSD WTP. The estimated quantity of sanitary wastewater that will be generated by the WPGS is provided on Table 2.5-4.

The plant's process wastewater system collects wastewater from the CTG evaporative coolers and HRSGs, water treatment system, settling basin, chemical feed area drains, and general plant drains. The water balance diagram (Figure 2.5-6) shows the expected wastewater streams and flow rates for the various plant processes. The flow rates shown are based on daily average, annual average, and peak conditions. The estimated total quantity of process wastewater that will be generated by the WPGS is provided on Table 2.5-3.

Most of the process wastewater streams will be sent directly to the WPGS' WWST. This tank has a storage capacity of approximately 0.6 million gallons. Wastewater collected in this tank will be discharged via a new 10-inch-diameter pipeline to the final effluent structure at the DDSD WTP. The WTP has a capacity of 16.5 million gallons per day (mgd) and provides secondary treatment, disinfection, and dechlorination prior to discharging the treated effluent to New York Slough. Discharges from the WTP are permitted in accordance with DDSD's NPDES Permit No. CA 0038547, issued by the San Francisco Bay Region Regional Water Quality Control Board. The WPGS process wastewater will be conveyed directly to the DDSD WTP final effluent structure, where it will receive chlorination and de-chlorination treatment prior to discharge. Discharge of process wastewater to DDSD will be covered under an agreement to be entered into with DDSD. The discharge limits in this agreement will be derived from DDSD's NPDES discharge requirements. The estimated composition of the WPGS wastewater stream is shown in Table 2.5-5.

The plant's process wastewater streams are described below.

Filter Backwash

Backwash from the nitrification filters and RO prefilters will be processed through a 150,000-gallon settling basin. The settling basin will be sized for 24 hours of settling time based on daily maximum flow. This will allow sufficient time for particles 100 microns or larger to settle, and will ensure that the suspended solids concentration at the DDSD outfall will be below the discharge permit limit (30 mg/L total suspended solids). The clear supernatant from the settling basin will be combined with the effluent from the WWST and then discharged into the new 10-inch-diameter pipeline. The sediments collected in the settling basin will be cleaned out as needed and will be shipped offsite for disposal.

Evaporative Cooler Blowdown

The blowdown stream from the CTG evaporative coolers will be sent directly to the WWST without treatment.

HRSG Blowdown

Water circulating in the plant's steam cycle will accumulate dissolved solids, which must be maintained below given limits to prevent deposition in the HRSG and on the steam turbine blades. The concentration of dissolved solids is maintained below such limits by withdrawing a portion of the water from the HRSG steam drums (i.e., HRSG blowdown) and replacing it with product water from the demineralization process described in Section 2.5.6.2. HRSG flashed blowdown is cooled by mixing with service water and the routed directly to the plant WWST.

Oil-Water Separator System

An oil-water separator (OWS) system will be installed on site to collect wastewater from equipment washdowns and leakage, sample drains, and miscellaneous plant drains. Water from areas that may accumulate small amounts of oil and miscible chemicals will be collected in a system of floor drains, equipment drains, curbed area drains, sumps, and piping, and routed through the OWS. After passing through the OWS, water from the clear effluent chambers will be discharged to the WWST. The chemical feed area will be provided with a containment area to keep any spilled chemicals out of the plant drainage system. Wastewater collected in service water drains in areas that do not have the potential for contact with oils or chemicals is discharged directly to the WWST.

Domestic/Sanitary Wastewater

The domestic waste system will collect discharge from sinks, toilets, and other sanitary facilities and discharge to the plant's sanitary sewer collection system. The sanitary system will include gravity-drainage piping, manholes, and lift stations as required. The system will discharge to the existing PPP sanitary sewer, which connects to the DDSD WTP.

2.5.7.2 Stormwater Runoff

Stormwater runoff from open areas within the WPGS site will be discharged to Suisun Bay, either directly as sheet flow or via the existing PPP stormwater Outfalls E001 and E009 in accordance with the National Pollutant Discharge Elimination System (NPDES) General Industrial Permit requirements. Stormwater from the new parking lots will be directed to the existing PPP OWS and then directed to the existing Outfall E001.

Stormwater runoff from areas that collect miscible chemicals or volatile liquids and from process areas that could collect nonmiscible oil will be directed to a new OWS system. Oil leakage from equipment is expected to be minimal. Nonetheless, all equipment that has potential for leakage of oil or hazardous chemicals will be located within spill containment areas. After passing through the OWS, water from the clear effluent chambers will be discharged to the WWST, combined with the process wastewater and then conveyed via the new 10-inch-diameter process wastewater discharge pipeline to the DDSD WTP final effluent structure.

The oil from the oil containment chambers of the existing PPP OWS and the new WPGS OWS will be collected and shipped off site for recycling.

2.5.7.3 Solid Nonhazardous Waste

The construction, operation, and maintenance of the WPGS will generate nonhazardous solid wastes typical of power generation facilities. Potential wastes generated during demolition generally include scrap metal, soil, concrete, and fuel oil residual. Construction wastes generally include soil, scrap wood, excess concrete, empty containers, scrap metal, and insulation. Typical wastes generated during operation and maintenance include scrap metal and plastic, insulation material, paper, glass, empty containers, and other miscellaneous solid wastes. These materials are collected for recycling or transfer to landfills in accordance with applicable regulatory requirements. A description of the types of wastes likely to be generated and their related quantities is included in Section 7.13, Waste Management, and shown in Tables 2.5-6 and 2.5-7 for construction and operation, respectively.

2.5.7.4 Hazardous Waste

Hazardous wastes will be generated as a result of project construction, operation, and maintenance, as discussed below, and further detailed in Section 7.12, Hazardous Materials Handling.

Construction

Demolition will generate hazardous waste, including asbestos-containing material and lead-based paint from PPP Units 1 through 4 and the equipment and pipeline insulation associated with Tank 7. Additional hazardous waste generated from demolition activities will include boiler brick, stack gunite lining, light ballast, fluorescent tubes, and mercury switches. Liquid hazardous wastes will also be generated during construction, such as waste oil and other lubricants from machinery operations, solvents used for cleaning and materials preparation, waste paints, and other material coatings. A description of the types and quantities of hazardous wastes that are likely to be generated is given in Section 7.12, Hazardous Materials Handling, and listed in Table 2.5-6.

Operation

The methods used to properly collect and dispose or recycle hazardous waste generated by the plant will depend on the nature of the waste. Hazardous wastes generated by the WPGS will include spent SCR and oxidation catalyst, used oil filters, used oil, and chemical cleaning wastes. Spent SCR and oxidation catalyst will be recycled by the catalyst supplier, if possible. Used oil filters will be drained and disposed of in an offsite disposal facility. Used oil will be recovered and recycled by a waste oil recycling contractor.

Chemical cleaning wastes consist of acid and alkaline cleaning solutions used for pre-operational chemical cleaning of the HRSG pressure parts and steam-cycle piping systems; acid cleaning solutions used for periodic chemical cleaning of the HRSGs; and wash water used in periodic cleaning of the HRSG, CTG, and STG. These wastes, which may have elevated concentrations of metals, will be tested. These and all other hazardous solid and liquid wastes will be disposed of in accordance with applicable LORS. A description of the types and quantities of hazardous wastes that are likely to be generated during operation is given in Section 7.12, Hazardous Materials Handling, and shown in Table 2.5-7.

Hazardous waste will be stored in a new building that would be constructed within the PPP site. The building would store hazardous waste for both existing PPP operations as well as future WPGS operations. All waste materials from existing PPP operations and the WPGS will be segregated and regulated independently.

Workers will be trained to handle waste generated at the site, as described in Section 7.7, Worker Safety and Health.

2.5.8 Hazardous Material Management

2.5.8.1 Construction

Hazardous materials used during construction of the project will be located within the construction laydown areas. Appropriate measures will be provided, including approved dual-wall fuel tanks, fueling equipment, containment, supply of absorbent material, and disposal containers for waste lubricants. Temporary containments will be sized to hold the appropriate volumes. The Emergency Action Plan developed for the project will include a section that addresses accidental releases of hazardous materials. A hazardous material emergency response team will be assigned and trained to manage a hazardous material release. Stored hazardous materials will be inspected daily for leaks and container failure. These inspections are part of the safety daily routine and are integrated parts of the Safe Behavior Observation and Pre-Task Planning processes.

2.5.8.2 Operation

A variety of hazardous reagents and materials would be stored and used at WPGS in conjunction with operation and maintenance of the project, as described in Table 7.12-4. In general, the type and character of these materials will be the same as for comparable current operations at PPP's Units 5 through 7. Hazardous materials that may be routinely stored in bulk and used in conjunction with the project include, but are not limited to, petroleum products, flammable and/or compressed gases, acids and caustics, aqueous ammonia, water treatment and cleaning chemicals, paints, and some solvents.

Curbs, berms, and concrete pits will be used where accidental release of hazardous chemicals may occur. All containment areas will be constructed in accordance with the applicable LORS. Containment areas will be drained to appropriate collection sumps or neutralization tanks for recycling or offsite disposal. Piping and tanks exposed to potential traffic hazards will be protected by traffic barriers.

The storage, handling, and use of hazardous materials will be in accordance with applicable LORS. A new building will be constructed within the PPP site to store hazardous materials. This new building will also contain hazardous materials for existing operations. All materials from existing operations and WPGS will be segregated and regulated independently. Bulk tanks will be provided with secondary containment to contain leaks or spills. Safety showers and eyewashes will be provided in appropriate chemical storage and use areas. Personnel with potential to handle hazardous materials will be properly trained to perform their duties safely and to respond to emergency situations that may occur in the event of an accidental spill or release.

The aqueous ammonia storage tank for the SCR systems will be provided with containment structures and other safety features, as described in Section 2.6.9, Ammonia Storage Facility, and shown on Figure 2.6-3.

Safety showers and eyewashes will be provided in the chemical feed areas. Service water hose connections will be provided near the chemical feed areas to facilitate flushing of leaks and spills of materials that are not reactive in water to the chemical feed area drains. Appropriate safety gear will be provided for plant personnel for use during the handling, use, and cleanup of hazardous materials. Plant personnel will be properly trained in the handling, use, and cleanup of hazardous materials used at the plant, and procedures to be followed in the event of a leak or spill. Adequate supplies of appropriate cleanup materials will be stored on site.

All electrical equipment will be specified to be free of polychlorinated biphenyls. A list of the hazardous materials anticipated to be used at the plant is provided in Table 7.12-4. Each material is identified by type, intended use, and estimated quantity to be stored on site. Additional information on hazardous materials management is provided in Section 7.12, Hazardous Materials Handling.

2.5.9 Air Emissions Control and Monitoring

Air emissions from the combustion of natural gas in the CTGs will be controlled by state-of-the-art systems. Controlled emissions will include NO_X, CO, VOCs, fine particulate matter (PM_{10}), and sulfur dioxide (SO_2). A continuous emissions monitoring system will be installed to monitor the stack emissions. All emissions values stated in the following subsections are based on parts per million by volume, dry basis (ppmvd) corrected to 15 percent O_2. Complete information on air quality matters, including startup emissions, is provided in Section 7.1, Air Quality.

2.5.9.1 NO_X Emissions Control

Ultra low NO_X combustors in the CTGs, followed by SCRs in the HRSGs, will control stack emissions of NO_X to a maximum 2.0 ppmvd (corrected to 15 percent O_2, 1-hour average excluding startups). The ultra low NO_X combustors control NO_X emissions to approximately 9.0 ppmvd at the CTG exhausts by pre-mixing fuel and air immediately before combustion. Pre-mixing inhibits NO_X formation by minimizing the flame temperature and the concentration of O_2 at the flame front.

The SCR process will use aqueous ammonia as a reagent. Stack emissions of ammonia, referred to as "ammonia slip," will not exceed 5 ppmvd. The SCR system includes a catalyst chamber located within each FP10 HRSG, catalyst bed, ammonia storage system, ammonia vaporization system, and ammonia injection system. The catalyst chamber contains the catalyst bed and is located in a temperature zone of the FP10 HRSG where the catalyst is most effective over the range of loads at which the plant will operate. The ammonia injection grid is located upstream of the catalyst chamber. It is expected that the 20,000-gallon aqueous ammonia storage tank will have a 10-day storage capacity.

2.5.9.2 CO and VOC Emissions Control

An oxidation catalyst will be provided to limit CO emissions to less than 3 ppmvd, and VOC emissions to less than 2 ppmvd (corrected to 15 percent O_2). These emission levels correspond to current California best available control technology. This catalytic system will promote the oxidation of CO to carbon dioxide, and VOC to carbon dioxide and water vapor, without the need for additional reagents.

2.5.9.3 PM_{10} and SO_2 Emissions Control

PM_{10} emissions consist primarily of hydrocarbon particles formed during combustion. PM_{10} emissions will be controlled by inlet air filtration and by the use of natural gas fuel, which contains essentially zero particulate matter.

SO_2 emissions will be controlled by the use of pipeline-quality natural gas, which contains only trace quantities of sulfur from the injected mercaptan odorant.

2.5.9.4 Continuous Emissions Monitoring

The CEMS uses dilution and/or direct extractive sampling techniques for in-stack monitoring. For each CTG, a separate CEMS will sample, analyze, and record fuel gas flow rate, NO_x and CO concentration levels, and percentage of O_2 in the exhaust gas from the stacks. The CEMS systems will transmit data to a data acquisition system that will store the data and generate emission reports in accordance with permit requirements. The data acquisition system will also include alarm features that will send signals to the plant DCS when the emissions approach or exceed pre-selected limits.

2.5.10 Fire Protection

The plant fire protection system will be designed to protect personnel and limit property loss and plant downtime in the event of a fire. The system will include a fire protection water system, CO_2 fire suppression systems for the CTGs, and portable fire extinguishers. The primary source of fire protection water will be the existing PPP plant fire protection system, which uses water from Suisun Bay. New fire loops will be designed to protect the WPGS, as shown in Figure 2.5-6. The system is designed in accordance with:

- Federal, state, and local fire codes, occupational health and safety regulations, and other jurisdictional requirements;
- California Building Code; and
- National Fire Protection Association (NFPA) standard practices.

The firewater supply and pumping system provides an adequate quantity of fire-fighting water to yard hydrants, hose stations, and water spray and sprinkler systems. The system is capable of supplying maximum water demand for any automatic sprinkler system, plus water for fire hydrants and hose stations. Hydraulic calculations will be performed to demonstrate that the fire protection loop has sufficient capacity to provide all the required fire-fighting water for the new power plant. A plant firewater loop, designed and installed in accordance with NFPA 24, is provided to reach all parts of the facility. The existing PPP fire pumps will discharge to the new dedicated extension of the existing underground firewater loop piping system. Both the fire hydrants and the fixed suppression systems will be supplied from the firewater loop. The firewater system has sectionalizing valves to allow a failure in any part of the system to be isolated, so that the remainder of the system can continue to function properly.

Fixed fire suppression systems will be installed at determined fire risk areas such as the transformers and turbine lube oil equipment. Sprinkler systems or FM-200 waterless fire protection systems will also be installed in the administration and control building as required by NFPA 24 and local code requirements. Hydrants and hose houses will be placed at appropriate spacing around the plant in accordance with NFPA 24 and local fire codes. Handheld fire extinguishers of the appropriate size and rating will be located in accordance with NFPA 10 throughout the facilities. Valves requiring periodic testing will be made accessible.

Local building fire pull boxes and audible alarms will be provided. Flashing lights are used in addition to audible alarms in high noise areas.

The CO_2 fire-suppression system provided for each CTG will include a CO_2 storage tank, CO_2 piping and nozzles, fire detection sensors, and a control system. The control system will automatically shut down the affected CTG turbines, turn off ventilation, close ventilation openings, and release CO_2 upon detection of a fire. The CO_2 fire-suppression systems will cover the turbine enclosure and accessory equipment enclosure of each CTG.

Portable CO_2 and dry chemical extinguishers are located throughout the power plant site, including switchgear rooms, with size, rating, and spacing in accordance with NFPA 10. Handcart CO_2 extinguishers are provided for the turbine area as needed for specific hazards. Table 2.5-8 lists fire protection system design conditions.

2.5.11 Plant Auxiliary and Safety Systems

The plant auxiliary systems described below will support, protect, and control the power plant.

2.5.11.1 Lighting System

The plant lighting system provides personnel with illumination for plant operation under normal conditions, means of egress under emergency conditions, emergency lighting to perform manual operations during a power outage of the normal power source, and construction lighting in areas where early installation is feasible. The lighting system will be designed in accordance with Illuminating Engineering Society of North America and calculated average illumination levels with 0.8 maintenance factor, as shown on Table 2.5-9. Components of the lighting plan will include:

- Photo cells will control all outdoor lighting.
- Frequently switched indoor lighting (such as office and maintenance areas) will be controlled by wall-mounted lighting switches. Infrequently switched indoor lighting (such as the equipment buildings) will be controlled by panel board circuit breakers.
- Self-contained battery-backed emergency lighting and exit signs will be furnished to provide safe personnel egress from buildings during a total loss of plant power. Emergency lighting will be designed to maintain the necessary illumination for a minimum of 90 minutes.
- All 120-V outdoor receptacles will be fed from CFCI-type receptacles. All 120-V receptacles will be located so equipment at grade can be reached with a 75-foot extension cord.
- Fixtures will be placed to offer maximum illumination of operating work areas in compliance with Occupational Safety and Health Administration (OSHA) safety standards, and will include shielding to minimize offsite illumination.

2.5.11.2 Grounding System

The electrical system is susceptible to ground faults, lightning, and switching surges that result in high voltage, which constitutes a hazard to site personnel and electrical equipment. The station grounding system provides an adequate path to permit the dissipation of current to ground created by these events. The station grounding grid will be designed for adequate capacity to dissipate the ground fault current from the ground grid under the most severe conditions in areas of high ground fault current concentration. The grid spacing will maintain safe voltage gradients. Bare conductors will be installed below-grade in a grid pattern. Each junction of the grid will be bonded together by an exothermic weld. Ground resistivity readings will be used to determine the necessary numbers of ground rods and grid spacing to ensure safe step and touch potentials under severe fault conditions. Grounding conductors will be brought from the ground grid to connect to building steel and non-energized metallic parts of electrical equipment.

2.5.11.3 Distributed Control System

The DCS provides modulating control, digital control, monitoring, and indicating functions for the plant power block systems.

The following functions will be provided:

- Controlling the STGs, CTGs, HRSGs, and other systems in a coordinated manner;
- Controlling the balance-of-plant systems in response to plant demands;
- Monitoring controlled plant equipment and process parameters and delivery of this information to plant operators;

- Providing control displays (printed logs, LCD video monitors) for signals generated within the system or received from I/O;
- Providing consolidated plant process status information through displays presented in a timely and meaningful manner;
- Providing alarms for out-of-limit parameters or parameter trends, displaying on alarm video monitors(s), and recording on an alarm log printer; and
- Providing storage and retrieval of historical data.

The DCS will be a redundant microprocessor-based system and will consist of the following major components:

- PC-based operator consoles with LCD video monitors;
- Engineer work station;
- Distributed processing units;
- I/O cabinets;
- Historical data unit;
- Printers;
- Network Cabinet; and
- Data links to the CTG and STG control systems.

The DCS will have a functionally distributed architecture comprising a group of similar redundant processing units linked to a group of operator consoles and the engineer workstation by redundant data highways. Each processor will be programmed to perform specific dedicated tasks for control information, data acquisition, annunciation, and historical purposes. With redundant systems, no single processor failure can cause or prevent a unit trip. The DCS will interface with the control systems furnished by the CTG and STG supplier to provide remote-control capabilities, as well as data acquisition, annunciation, and historical storage of turbine and generator operating information.

The system will be designed with sufficient redundancy to preclude a single device failure from significantly affecting overall plant control and operation. This also will allow critical control and safety systems to have redundancy of controls, as well as a UPS.

As part of the quality control program, daily operator logs will be available for review to determine the status of the operating equipment. The DCS will also transmit selected information to the California Independent System Operator remote terminal unit for grid and generation control purposes.

2.5.11.4 Cathodic Protection System

The need for cathodic protection for buried metallic piping and tank bottoms will be determined, based on specific site parameters and local codes or requirements. The cathodic protection system will be designed to control the electrochemical corrosion of designated metal piping buried in the soil. Depending on the corrosion potential and the site soils, either passive or impressed current cathodic protection will be provided.

2.5.11.5 Freeze Protection Systems

Freeze protection for above-grade and below-grade piping and instrumentation lines will be evaluated and installed, as necessary, based on the expected minimum ambient temperature at the plant. For a minimum temperature of 20°F for the Pittsburg area, freeze protection is not expected to be required for large piping, but may be required for smaller instrumentation air tubing.

2.5.11.6 Service Air System

The service air system will supply compressed air to hose connections located at intervals throughout the power plant. Compressors deliver compressed air at a regulated pressure to the service air piping network.

2.5.11.7 Instrument Air System

The instrument air system will provide dry, filtered air to pneumatic operators and devices throughout the power plant. Air from the service air system is dried, filtered, and pressure-regulated before delivery to the instrument air piping network. The system consists of redundant electric-motor driven air compressors and two dual-tower air dryers, each with pre-filter and after-filter for each CTG. A dry air receiver, instrument air headers, and distribution piping are also provided for each CTG.

2.6 POWER PLANT CIVIL/STRUCTURAL FEATURES

The following sections describe civil/structural features of the WPGS, as illustrated in the plot plan presented on Figures 2.5-1. Figures 2.6-1 and 2.6-2 illustrate the site's existing topography, existing facilities, construction site grading and drainage plan, and access roads. Table 2.6-1 lists the major structures of the power plant and gives their dimensions. In addition to the features described in this section, descriptions of the electric transmission interconnection, gas supply pipeline, and water supply and discharge pipelines are provided in Chapters 4, 5, and 6—Transmission Facilities, Natural Gas Supply, and Water Supply, respectively.

2.6.1 CTGs, HRSGs, STGs, and Balance-of-Plant Equipment

The CTGs, HRSGs, and STGs will be supported at grade elevation on reinforced-concrete mat foundations. The unit auxiliary transformers, the main generator step-up transformers, and balance of plant mechanical and electrical equipment are also supported at grade elevation on reinforced-concrete foundations. It is anticipated that deep foundations (such as driven piling up to a maximum depth of 70 feet) may be required in certain areas. The reinforced-concrete foundation design will be finalized as required by the final geotechnical report.

2.6.2 Stacks

Each FP10 HRSG unit will be provided with a self-supporting steel stack. The FP10 stacks will be approximately 21 feet, 4 inches in inside diameter, and approximately 150 feet, 6 inches tall. Each stack will include U.S. Environmental Protection Agency (U.S. EPA) sampling ports, ladders, side-step platforms, and electrical grounding. Aviation lighting is not anticipated, but will be provided if required by the Federal Aviation Administration.

2.6.3 Buildings

Plant buildings and enclosures will include the new administration building (including warehouse, shops, IT, engineering, and production offices), control room building, water treatment building, and gas compressor enclosure. The new administration building will be used for both PPP and WPGS operations. Building columns will be supported on reinforced-concrete foundations or individual spread footings. Ground floors will consist of reinforced concrete. Approximately 50 parking spaces will be provided on site to accommodate all employee and visitor vehicles, including handicapped parking. The administration building will also be designed to meet handicapped accessibility requirements.

2.6.4 Water Storage Tanks

Major water storage facilities for the WPGS will consist of four tanks:

• Nitrified Water Storage Tank (NWST)	1,600,000 gallons
• Reverse-Osmosis Permeate Storage Tank (ROPST)	900,000 gallons
• Demineralized-Water Storage Tank (DWST)	800,000 gallons
• Wastewater Storage Tank (WWST)	600,000 gallons

Service water will be provided from the NWST. Each water storage tank will consist of a vertical, cylindrical, field-erected steel tank supported on a suitable foundation consisting of either a reinforced-concrete mat or a reinforced-concrete ring wall with an interior bearing layer of compacted sand supporting the tank bottom.

A new 150,000-gallon below ground settling basin will also be constructed near the new water treatment building. The basin will be lined with an impervious liner at least 10 mils thick.

2.6.5 Roads and Fencing

The WPGS site will be accessed via the existing entrance to the PPP site off West 10th Street. Chain-link security fencing is already in place around the existing PPP site.

2.6.6 Sanitary Wastewater System

Sanitary wastes will be discharged to PPP's existing sanitary sewerline, conveyed via the public sewerline to the DDSD WTP.

2.6.7 Site Drainage

The preconstruction site topography is shown on Figure 2.6-1. The grading plan and post-construction drainage is shown on Figure 2.6-2. The drainage flows shown on Figure 2.6-2 are based on the maximum 24-hour, 25-year storm event. The stormwater system will be designed in accordance with the Contra Costa Countywide stormwater requirements. Preliminary calculations to size the system are provided in Appendix F. The existing points of discharge will be maintained. Stormwater will be collected in the plant site from areas not anticipated to have any oil contamination, using catch basins and a storm drain system. Stormwater runoff will be discharged to Suisun Bay through the PPP's existing stormwater outfalls.

2.6.8 Earthwork

Earthwork on the power plant site will consist of excavation and compaction of earth to create the plant grade, and excavation for foundations and underground systems. Materials suitable for compaction will be stored in stockpiles at designated locations using proper erosion prevention methods. Any contaminated materials encountered during excavation will be disposed of in accordance with applicable LORS.

Compaction will be performed in uniform layers of specified thickness. Materials in each layer will be moistened properly to facilitate compaction to the specified density. To verify compaction, representative density and moisture content tests will be performed in the field during compaction. Structural fill material supporting foundations, roads, parking areas, etc., will be compacted. Before fill materials are placed, subgrades will be examined for loose or soft areas and further excavated as necessary.

The estimated volumes of soil that will be handled are as follows, based on the full construction of the two units and the preliminary grading shown on Figure 2.6-2:

- Cut = 8,305 cubic yards
- Fill = 83,828 cubic yards
- Net import = 75,523 cubic yards

These volumes do not include the anticipated removal of an estimated 23,124 cubic yards of asphalt (assuming a 4-inch average thickness). The final grading plans that will be prepared during design may result in a different balance of cut and fill volumes. However, for the purposes of this AFC, the preliminary design assumes that there will be a requirement to import soil. A potential source of imported soil is Brentwood Decorative Rock, located at 6745 Brentwood Blvd, Brentwood, CA 94513. Soil sources requiring greenfield disturbance will not be used. Any source used will be verified free of potential hazardous material contamination.

2.6.9 Ammonia Storage Facility

Operation of the SCR NO_X emission control system will include the use of aqueous ammonia, a solution consisting of water and ammonia that results in a 19 percent (by weight) ammonia solution.

This solution will be stored in an aqueous ammonia storage facility in the western portion of the WPGS site. The FP10 power blocks will share this facility (see Figure 2.5-1). The storage tank within the facility will be located in a dedicated concrete containment area and have a tanker truck offloading facility within a containment berm. The general design of the storage and receiving facility is shown on Figure 2.6-3. The capacity of the storage tank will be 20,000 gallons.

The location for the aqueous ammonia unloading and storage facilities has been selected largely on the basis of safety considerations. The location ensures adequate distance from the property lines, reducing any potential offsite impacts due to a spill, while minimizing the piping distances to the HRSGs and SCRs. In addition, the location was chosen for its relatively small number of underground utilities and their easy access for delivery trucks. The location also maintains the aqueous ammonia storage system at an appropriate distance from combustion equipment and plant operations personnel.

As shown on Figure 2.6-3, the horizontally mounted storage tank will be supported on concrete foundations within a walled containment basin. Below the containment basin is a containment sump sized to contain the entire volume of the tank and the rainfall that could collect within the containment over a 24-hour maximum recorded rainfall period (3.4 inches of rainfall in 24-hours recorded within the past 25 years). This design specification assumes a worst-case failure event of complete rupture and drainage of the tank at the end of the worst 24-hour-long rainstorm that has occurred in the site locality within the past 25 years. This design is intended to limit the volatilization of an accidental release of aqueous ammonia, because any spilled solution would rapidly flow into the covered sump, where it would only be exposed to the atmosphere through the two drains. Although the sump will be sized to accommodate rainfall in accordance with applicable codes, a sump pump will be provided to keep the sump free of rainwater. The sump pump will be interlocked with the ammonia monitoring system so that it will not operate if ammonia vapors are detected. The storage tank will be made of carbon steel and constructed in accordance with the International Building Code (IBC) and American Society of Mechanical Engineers Boiler and Pressure Vessel Code Section VIII, Division 1, Rules for Construction of Pressure Vessels. The maximum design pressure and temperature for the tank will be about 50 psig and 110°F, respectively.

The tank will have stainless-steel fill- and vapor-recovery lines. A drain hole with an opening will be located beneath the tank to immediately drain any spilled aqueous ammonia into the sump. The drain hole will be covered with metal grating to prevent workers from falling into the sump. The drain hole will immediately restrict the potential surface area of a spill, and will thus minimize evaporation of ammonia into the atmosphere. In the event of a tank failure, ammonia will drain by way of the drain hole into the covered sump. The entire contents of the tank will drain through the opening in less than 1 minute with less than 1 foot of backup, including considerations for the grating. Pumps used to unload and forward the aqueous ammonia to the units will also be located on skids within the containment basin. Stairs and/or platforms will be provided for access to the tank.

A tanker truck offloading facility will be adjacent to each storage facility to receive aqueous ammonia deliveries. The offloading facility will include a spill containment to collect any ammonia solution spilled during offloading. The unloading stations will consist of an ammonia fill line, through which aqueous ammonia is fed from the delivery truck to the tank; and a vapor return line, where vapor pressure between the tank and the truck is equalized. A double-basket strainer can be used to remove solid impurities in the aqueous ammonia as it is unloaded from the tanker trucks. The concrete slab of the unloading facility will be sloped to drain any accidental tanker truck releases through a drain and pipe. The pipe will lead to the sumps under the ammonia storage tank. The drainage system will be designed so that the drain openings will have at least twice the area of the delivery hose, enabling near-immediate drainage in the event of a spill. In case of an accidental release, if contents meet the discharge regulations, sump contents will either be discharged to the process drains system or emptied by means of a submersible sump pump into a vacuum truck for treatment.

Ammonia piping located outside the containment basins both above ground and below ground will include double-wall containment piping systems. The piping carrying ammonia will be encased in a guardian pipe to contain any potential leakage. The systems will be equipped with leak detection systems that include sensors to detect the presence of any ammonia leakage into the interstitial space. Control consoles will be provided with audible alarms and alarm lamps to report any detected leakage.

Safety features of the ammonia storage facility will include:

- Ammonia area monitoring system with audible and visible alarms;
- Eyewash and shower stations;
- Piping and connections for washdown of containment basins with clean water;
- Permanent lighting;
- Lightning protection;
- Truck barrier posts;
- Liquid-level indication and high-level alarms for the tank that are easily visible from the unloading positions;
- Tank level and pressure indicators, pressure relief valves, and alarms in the plant control room;
- Shutoff valves on the tank fill lines, which will close automatically if the emergency high-level alarms are triggered;
- Local manual shut-offs for all pumps;
- Vacuum breaker valves on the tank;
- Safety equipment for personnel, including face shields, 10-minute air escape bottles, ammonia-resistant gloves, ammonia-resistant boots, ammonia-resistant pants and jackets/ slickers, first aid kits, and fire extinguishers; and
- Wind detection indicators.

Area sensors will be installed in the ammonia unloading and storage facilities and vaporization skid areas to monitor for ambient ammonia concentrations. Alarms will be designed to annunciate in the control room with local audible alarms for ammonia releases at the facilities.

Maximum ammonia demand for the WPGS will be 76 pounds of ammonia per hour (38 pounds per hour [lbs/hr] per SCR unit).

2.6.10 Nitrogen System

The Siemens FP10 units require a nitrogen system for protection when the gas turbines are shut down. During normal plant operation, the nitrogen system will not be in service. The nitrogen will be used for the ACHE, the HRSG HP system, and the HP main steam system. It will supply gaseous nitrogen to maintain a positive pressure in the systems on plant shutdown. Upon plant shutdown, steam condensation due to cooling causes a pressure drop in the steam systems. If the system pressure is allowed to fall below atmospheric pressure, air ingress may occur and CO_2 entrainment will contaminate the steam system. This will preclude fast startup of the plant until the water chemistry can be restored. The nitrogen system will pressurize the steam systems, preventing air ingress and thus maintaining the correct water chemistry for fast startup of the plant.

The nitrogen system includes a 6,000-gallon (558,700-standard-cubic-foot) cryogenic liquid storage tank protected by a pressure safety relief device, two ambient air vaporizers, and a pressure and temperature control system. The vaporizers convert the cryogenic liquid nitrogen into a gas by using heat from the surrounding air. Since the ambient air is much warmer than the cryogenic fluid (-280°F to -420°F), the heat is transferred across the fins of the vaporizer into the cryogenic liquid. A safety relief valve sized for the maximum flow capacity will provide protection for the system. A remote monitoring system will also be provided to monitor gas supply usage rates. The equipment area will be protected by a fence.

The supply pressure at the connection point will be between 200 and 250 psig, with a minimum temperature of 40°F. The pressure will be regulated to 150 psig before distribution to the equipment. The 50- to 100-psig difference is adequate to account for piping losses. The typical monthly nitrogen volume required is approximately 500,000 standard cubic feet (5,370 gallons).

There are no specific NFPA requirements regarding the location of the equipment because nitrogen is an inert gas and does not support combustion. The only health caution in effect is for nitrogen relates to inhalation in high concentrations as it has the potential to cause asphyxiation; this is not a concern for the WPGS because the equipment will be located outside and not within a confined space.

Service requirements for the equipment include a 120 VAC, 20 amp power supply and an analog phone line; these are to support the remote monitoring system. Additional power is required for lighting in case of a nighttime delivery.

Adequate tanker access will be provided. The liquid nitrogen will be transferred from the tanker using special transfer pipes and valves designed for handling cryogenic liquids. It is expected that a delivery will be required approximately once a month. Figure 2.5-1 shows the location of the WPGS nitrogen system, which will be situated in the central portion of the WPGS site between the two FP10 units.

2.7 PROJECT CONSTRUCTION

Engineering, procurement, construction (EPC), and start-up of the WPGS are estimated to take approximately 42 months. Demolition and construction are estimated to take 34 months (see Figure 2.7-1). The project construction schedule, construction staff, craft manpower, and average frequency of vehicle traffic are detailed in the sections below.

2.7.1 Power Generation Facility

Site mobilization of the project is expected to ensue following receipt of certification. Onsite construction is expected to commence in October 2009. Construction and startup of the FP10 units would be completed by July 2012. The schedule has been estimated based on a single-shift, 10-hour day and 50-hour week. The majority of construction operations are expected to take place between 6:00 a.m. and 6:00 p.m. However, longer workdays or work weeks may be necessary to make up schedule delays or complete critical construction activities. During the start-up and testing phase of the project, some activities may continue 24 hours per day, 7 days per week.

Projected construction staff by month is shown in Table 2.7-1a, and on Figure 2.7-2. The onsite workforce will consist of laborers, craftsmen, supervisory personnel, support personnel, and construction management personnel. The estimated construction workforce (craft) by trade is shown in Table 2.7-1a. The onsite workforce is expected to reach its peak of 390 individuals in June 2011. Construction access to the site will be via the main PPP site entrance off West 10th Street. The estimated average and peak numbers of construction staff vehicle round trips per day, and the estimated number of average and peak truck deliveries per day are shown in Table 2.7-2 and on Figure 2.7-5. Truck deliveries normally will be on weekdays between 7:00 a.m. and 5:00 p.m. Construction equipment usage by month is shown on Table 2.7-3.

2.7.2 Demolition Plan

Several existing structures on the WPGS site will be demolished as part of the project. The demolition will occur within the limits of the demolition work zone shown on Figure 2.7-3. The workforce and equipment associated with the demolition are included in the construction workforce and construction equipment usage tables (Tables 2.7-1a and 2.7-3).

The project will include the following:

- Demolition of retired PPP Units 1 through 4, including four existing 211-foot stacks, four 160-foot boilers, four turbine generators, and other associated equipment and structures. These units commenced operation in 1954, and have not been operated since 2003. The Units 1 through 4 basement structure will remain in place. A structural wall will be constructed in the basement between Unit 4 and Unit 5. The Units 1 through 4 basement void will be backfilled with suitable structural fill.

- Demolition of unused #6 fuel oil storage Tank 7 (approximately 150,000 barrel capacity) and associated fuel lines. This tank, which was constructed in 1969/1970, was formerly used for oil storage, but has been unused since 1994. Most of the former contents (#6 fuel oil) have been removed, with only residual amounts remaining below pump suction levels. This residual oil will be collected for recycling or transfer to landfills in accordance with applicable regulatory requirements.

- Demolition of an unused surface impoundment situated west of Tank 1 (within the 3.5-acre construction laydown and parking area).

- Demolition of the administrative building and associated parking area. The administrative building was constructed in 1954 and has been used primarily for office purposes. A new administration building and associated parking will be constructed at the southern portion of the WPGS site (see Figure 2.5-1). The north section of the new administration building will also serve as a warehouse to replace the small temporary structures currently on the WPGS site.

- Demolition of one hazardous materials storage building and one hazardous waste building. New buildings will be constructed on the PPP site, just west of existing Unit 7 (see Figure 2.5-1).

The unused surface impoundment on the far north end of the WPGS site (adjacent to Suisun Bay) and existing Tanks 1 through 6 (and associated containment areas around these tanks) will not be demolished and will be left in place.

The workforce and equipment associated with the demolition are included in the construction workforce and construction equipment usage tables (Tables 2.7-1 and 2.7-3).

Table 2.5-6 lists the waste associated with demolition to existing grade. Utilities will be relocated prior to commencing with demolition. Below grade utilities will either be abandoned in place during the demolition phase or remain in place. A water line that serves PPP Units 1 through 4 will be relocated and the section below the new FP10 footprint will be removed.

Before Tank 7 is dismantled, it will be emptied. The clean tank bottom and foundations will be inspected for any possible signs of product release. All suspected release locations will be thoroughly investigated to determine whether a release has occurred.

Where deemed necessary, soil samples and/or groundwater will be collected, analyzed, and evaluated. If it is determined that a release has occurred, the extent of the release will be determined and all responsible and interested parties will be notified. A work plan will be developed to address remediation of the release. Activities addressed in the work plan will be promptly carried out to accommodate the project schedule.

To reduce demolition impacts, existing storm drains and catch basins will remain, and Best Management Practices (BMPs) will be employed. The BMPs will include maintaining and using all concrete and asphalt pavements, sweeping and dampening pavements as necessary to prevent dust nuisances, watering for dust suppression, and covering all truck loads prior to exiting the demolition work zone.

The concrete containment wall will be removed and reused onsite or hauled offsite to an appropriate recycling (e.g., Antioch Building Materials in Pittsburg, California) or disposal facility (e.g., Keller Canyon in Pittsburg, California).

Wastewater generated during demolition may include shower water, oily water, turbid dust suppression drainage, and storm drain water. Shower water that may contain asbestos will be filtered per U.S. EPA regulations prior to being discharged into self-contained units and disposed of off site. Oily water will be captured and containerized, and recycled or disposed off site. Existing dust suppression and storm-drain water will be managed by existing storm-drain inlets and distribution lines.

2.7.3 Construction Plan

An EPC contractor will be selected for the design, procurement, construction, and start-up of the facility. The EPC contractor will select subcontractors for certain specialty work as required.

2.7.3.1 Mobilization

The EPC contractor construction force will mobilize in approximately October 2009. Site preparation work will include site grading and stormwater control. Crushed rock will be used for temporary roads, laydown, and work areas that are not currently paved.

2.7.3.2 Construction Staffing

Construction staffing is presented in Table 2.7-1. This table includes staffing required for all project components, including installation of the gas line, electrical transmission, and offsite water supply and wastewater discharge pipelines. During peak construction in June 2011 (i.e., Month 21), 390 construction staff are expected to be on site. It is expected that the majority of the construction workers will commute daily 90 minutes or less each way to the project site within Contra Costa County. Given the size of the labor force within commuting distance of the site, construction laborers are not expected to relocate for the construction period. It is expected that there would be enough construction workers/laborers available within the study area to meet project demands during the construction period.

2.7.3.3 Construction Laydown Areas, Offices, and Parking

Approximately 21.5 acres within the PPP and adjacent PG&E switchyard property will be used for construction laydown, offices, and parking. This will occur in three separate areas, as shown on Figure 2.7-4 and listed below:

- An 11.2-acre area southwest of the WPGS, partially located on the PPP site and partially located on the PG&E switchyard property;
- A 6.8-acre area located along the eastern boundary of the PPP site, adjacent to existing Tanks 1 through 6. This area will be used primarily for parking and offices, and possibly some equipment laydown. Tanks 1 through 6 and their surrounding containment structures will be left in place. An existing berm that is 15 feet tall, located along the east boundary of the PPP site, will also be left in place. A series of five screening walls, approximately 48 feet in height, will be constructed within the area between each of the existing Tanks 1 through 6, within this construction laydown and parking area;
- A 3.5-acre area located north of the WPGS site. The existing unused surface impoundment in this area will be demolished as part of the project.

Mobile trailers or similar suitable facilities (e.g., modular offices) will be used as construction offices for contractor and subcontractor personnel. Site access will be controlled for personnel and vehicles. As necessary, temporary security fences will be installed around the construction laydown areas.

Access between the onsite laydown areas and the WPGS site will be on internal PPP plant roads. Deliveries to the onsite laydown areas will be via West 10th Street.

The construction laydown and parking areas will be graded (as necessary) and surfaced with 4 inches of crushed rock. The crushed rock surfacing will provide erosion protection. The laydown areas will be fenced around their perimeter. Gates will be provided for access control. At the end of construction, these areas will be cleaned up, but the crushed rock surfacing and fencing may remain in place. No additional restoration will be required at the end of construction.

2.7.3.4 Construction Materials and Equipment Delivery

Construction traffic (trucks and passenger vehicles) will use the PPP site entrance off West 10th Street. The traffic route to this entrance will be from east or the west on State Route 4, exiting either to the north on Railroad Avenue, and turning on Willow Pass Road/West 10th Street to the PPP site entrance; or Bailey Road and then turning on to Parkside Drive to Range Road, turning north and continuing on Willow Pass Road/West 10th Street to the PPP site entrance.

Construction materials such as concrete, pipe, wire and cable, fuels, reinforcing steel, and small tools and consumables will be delivered to the WPGS site by truck, as shown on Table 2.7-2. Most of the heavy equipment and its components will be transported by rail to the existing spur at the site. The rail spur on the PPP site will be reconditioned, as required, for a portion of its length up to the 11.2-acre construction laydown area. Potential candidates for rail shipment are the combustion turbines, generators, GSU transformers, and HRSG modules. Shipments will be off-loaded at the laydown yard. A heavy haul transport will be used to move the equipment to its foundations or assembly point. Truck deliveries and trucks per day by month for the duration of project construction are shown on Figure 2.7-5. Truck deliveries normally will be on weekdays between 7:00 a.m. and 5:00 p.m.

Table 2.7-3 shows the average construction equipment expected to be onsite during project construction.

2.7.3.5 Emergency Facilities

Emergency services will be coordinated with the Contra Costa Fire Department and Community Hospital. An urgent care facility will be contacted to set up non-emergency physician referrals. At least one person trained in first aid will be part of the construction staff. Fire extinguishers will be located throughout the site at strategic locations at all times during construction.

2.7.3.6 Construction Utilities and Site Services

During construction, temporary utilities will be provided for the construction offices, the laydown area, and the project site. Temporary construction power will be furnished via the existing backfeed power distribution system. Area lighting will be provided and strategically located for safety and security.

Construction water will be supplied by the existing PPP water system and by water truck deliveries as necessary. Average daily use of construction water is estimated to be 10,000 gallons, as shown on Table 2.7-4. The maximum monthly water usage is estimated at 1,500,000 gallons, during hydrotesting of the HRSGs and associated piping. Approximately 150,000 gallons of water will be needed to hydrotest each of the HRSGs. The hydrotest water will be tested, and if suitable will be reused or discharged appropriately. If the water quality is not suitable for discharge, the water will be transported by trucks to an approved offsite disposal facility.

The following site services will be provided during construction:

- Environmental health and safety training;
- Site security;
- Site first aid;
- Construction testing;
- Site fire protection and extinguisher maintenance;
- Furnishing and servicing of sanitary facilities;
- Trash collection and disposal; and
- Disposal of hazardous materials and waste in accordance with local, state, and federal regulations.

2.7.4 Offsite Construction

Two new 5-mile-long water pipelines will be constructed as part of the project in order to bring recycled water from, and return wastewater to, the DDSD WTP (see Figures 2.3-1 and 2.3-2). Three miles of the five-mile-long route currently contains an unused fuel oil pipeline owned by Mirant Delta, which historically was used to convey oil between the Contra Costa Power Plant and the PPP. The existing pipeline is 10.75 inches in diameter, is now out of service, and will be replaced by the new water pipelines. Figure 2.2-1 shows the portion of the proposed pipelines that will be installed within the route of the existing unused fuel oil pipeline (identified on the figure as “Mirant Existing Easement”) and the portion of the water pipelines that will be installed outside of this area (identified on the figure as “New Easement”).

The water pipeline alignment runs through the PPP site, crosses under Willow Pass Road/West 10th Street and Burlington Northern Santa Fe Railroad, then turns east and runs adjacent to the Union Pacific Railroad. The alignment crosses beneath railroad tracks in several locations (consistent with the location of the existing unused fuel oil pipeline). The east section of the water pipeline alignment crosses under Pittsburg-Antioch Highway, runs along the north side of the Highway, and continues north on Arcy Lane to the DDSD WTP.

The construction of the water pipelines will require a construction disturbance corridor, including laydown and staging, of a maximum width of 15 feet. This may be reduced to a minimum of 5 feet to avoid environmental resources or minimize traffic disruption during construction adjacent to the Pittsburg-Antioch Highway. The pipelines will be laid at an average depth of 5 feet. The offsite water pipelines will be constructed primarily using a cut and cover trenching method, except where the pipelines cross environmentally sensitive areas, such as creeks, or cross under existing railroad tracks. In these areas, to minimize disturbance, a jack-and-bore method will be used. This construction method, also known as auger boring, allows the pipeline to be constructed beneath streams, roads, railway tracks, and other obstacles without causing surface disturbance. As the method requires the excavation of an entrance and exit pit at each end of the boring area, these would be located at least 100 feet from the stream channel to avoid disturbance to the stream bed or banks. Spoils will be reused as fill wherever possible.

The one instance where the jack-and-bore method will not be used in a creek area is where the water pipeline alignment will turn north from Pittsburg-Antioch Highway on Arcy Lane. Due to the large elevation difference between grade level and the excavated channel of Kirker Creek at this location, installation of the pipeline under the creek via jack-and-bore is not feasible. At this location, the pipelines will be installed and buried under the creek through a 4-foot-wide open-cut trench.

The water pipelines will be located underground, except at the intersection of Harbor Street, where the pipeline will cross overhead adjacent to the railroad tracks, consistent with the location of the existing unused fuel oil pipeline.

No offsite roadway improvements are required for the WPGS.

2.7.5 Construction Land Disturbance Control Measures

The WPGS site is within the existing PPP property. The EPC contractor will implement the following fugitive dust control measures during construction at the project site to minimize the formation of fugitive dust:

- Water unpaved roads and disturbed areas frequently (at least twice a day). Frequency of watering will be increased when wind speeds exceed 15 miles per hour (mph).
- Limit speed of vehicles within construction areas to no more than 15 mph.
- Sweep paved internal roads after the evening peak period.
- Sweep public roadways adjacent to the project site that are used by construction and worker vehicles as necessary.
- Treat the entrance roadways to the construction site with soil stabilization compounds.
- Install windbreaks (optional and as necessary) at the windward sides on construction areas before soil is disturbed. The windbreaks will remain in place until the soil is stabilized or permanently covered. Watering of excavation areas before, during, and after excavation should make use of windbreaks unnecessary.
- Replace ground cover in disturbed areas as quickly as possible.
- Use gravel ramps before entering a public roadway to limit accumulated mud and dirt deposited on public roadways.

- Cover all trucks hauling dirt, sand, soil, or other loose materials, and maintain a minimum of 6 inches of freeboard between the top of the load and the top of the trailer.
- Limit equipment idle times (no more than 15 consecutive minutes).
- Use electric-motor–driven construction equipment when feasible.
- Apply covers or dust suppressants to soil storage piles and disturbed areas.
- Pre-wet soil to be excavated during construction.
- Designate a person to oversee the implementation of the fugitive dust control program.

As discussed in Section 7.1, Air Quality, the fugitive dust mitigation measures listed above are expected to control more than 90 percent of the fugitive dust that occurs during onsite construction.

In addition, a construction Stormwater Pollution Prevention Plan (SWPPP) will be prepared and implemented. A draft construction SWPPP is provided in Appendix G. This plan includes BMPs to be used to minimize erosion.

2.7.5.1 Site-Specific Heath and Safety Plan

A site-specific health and safety plan (HSP) will be developed by the EPC contractor for its scope of work. The HSP will incorporate information and procedures to be followed by onsite personnel for the completion of the work. The HSP will outline requirements and provide guidance for control of construction safety hazards in compliance with safety standards and protection of public health.

2.7.5.2 Air Monitoring and Dust Control Measures

Personal monitoring and OSHA standards are addressed in the HSP. Dust control will comply with the following:

- All structure and building materials will be wet continually for the duration of the demolition to control dust generated during the course of the demolition.
- To control fugitive dust or particles, the operation will conform to Bay Area Air Quality Management District rules and regulations.
- Personnel protective measures will be implemented and monitored as needed.

2.7.6 Construction Security Plan

It is a customary practice for a construction company's employees to work in and around existing facilities and not enter areas designated as unauthorized. Accordingly, contractors typically have established work rules and consequences for being in an unauthorized area.

As indicated in Figure 2.7-4, a number of construction laydown areas are in and around the existing PPP facility and adjacent PG&E switchyard property. It will be necessary to control the entry of construction personnel into these areas. In the range of 15 to 25 construction employees will require access into the laydown areas on a somewhat routine basis—particularly in the early stages of construction—for unloading, loading, and trucking materials into the project work site.

2.7.6.1 Security Plan for Construction Areas

The PPP has an existing perimeter fence; all construction activities will be within the fenced area. A guard will be stationed at the designated gates to control access.

2.7.6.2 Training

All construction employees will be trained in the requirements for entry and exit into the construction areas, and the requirement to stay out of unauthorized areas. A map of the plant site (similar to Figure 2.1-2) will be provided to construction personnel showing the areas they can access. All other areas are unauthorized for entry unless special permission is granted by the applicant's onsite representative. All employees will be trained in the requirements for entry into unauthorized areas.

2.7.6.3 Work Rules

If the construction companies do not have an established work rule for entry into unauthorized areas, such a rule will be created. Typical disciplinary techniques will include a written warning, suspension, and termination for the first, second, and third offense, respectively, though actual disciplinary action will be determined on a case-by-case basis.

2.8 FACILITY OPERATION

The WPGS operation will be controlled and monitored by highly trained operators during each operating shift. In addition, maintenance and supervisory personnel generally will be present during the day shift, and as required by specific operations or maintenance activities, during night shifts. Plant operation will require approximately 20 full-time permanent Mirant Willow Pass personnel (Table 2.8-1), with 12 employees working a day shift and 8 employees working a rotating shift. The plant will be staffed 7 days a week, 24 hours a day. When the plant is not operating, personnel will be present as necessary for maintenance and to prepare the plant for start-up.

Power produced by the WPGS will be sold into the northern California wholesale power market and serve electric demand in northern California. Depending on market demand and the provisions of bilateral sales, in any given hour the plant may be operating at peak load, base load, or part load, with both or with one FP10 unit operating. Peak-load operation most likely will occur during summer peak hours, and minimum-load operation during off-peak hours. Shutdown periods for annual maintenance will be scheduled during extended periods of low demand, which typically occur in the autumn or spring.

Ancillary services provided by the plant will be sold to market participants. These services include regulation, operation reserves to the extent the plant is not operating at full load, and reactive power production. Black start capability will not be provided.

The design of the WPGS provides for a wide range of operating flexibility; that is, an ability to start up quickly and operate efficiently across its dispatch range. Overall annual availability of the power plant as measured by EAF is expected to be in the range of 92 to 98 percent. The power plant's output will depend on market conditions and dispatch requirements.

2.9 SAFETY AND RELIABILITY

2.9.1 Facility Safety

The WPGS will be designed for safe operation. Potential hazards that could affect project facilities include earthquake, flood, and fire. Safe operation includes safety for the plant operating personnel, who will be trained to provide the proper response to hazards and to avoid unsafe operating conditions.

2.9.1.1 Natural Hazards

A summary of geologic hazards in the WPGS vicinity is provided in Section 7.15, Geologic Hazards and Resources. This summary includes a review of potential geologic hazards, seismic ground motion, and soil liquefaction. The principal natural hazard associated with the site is the potential seismic hazard; the site is located in Seismic Design Category D. All project structures will be designed in conformance with California Building Code (CBC, 2007) criteria for Seismic Design Category D to ensure safety for operating personnel, and adequate protection against structural and equipment damage. The WPGS site is within 500 feet of an earthquake fault. The structural and seismic design criteria for project buildings and equipment are provided in Appendix B.

According to the 1987 Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map, the WPGS site is in the FEMA designated 100-year floodplain, which has a base flood elevation of 7 feet mean sea level (msl) (National Geodetic Vertical Datum, 1929) (see Figure 7.14-4). Recent topographic surveys of the site, however, indicate that elevations within most of the WPGS site generally range from approximately 8 to 9 feet above mean sea level (msl). There are a few locations where elevations are lower, ranging from 5 to 8 feet, including the unused surface impoundment in the northernmost portion of the site and the drainage channel and surrounding area to the south of Tank 7. The highest existing grade on the WPGS site is at Tank 7, which is approximately 16 feet above msl. Other than this high point, the site is essentially flat, with topographic relief limited to slope faces along the shoreline, and around buildings, tanks, or other developed features. The project will be constructed in compliance with the Contra Costa County Floodplain Management Ordinance. Approximately 23.5 acres of the 26 acre WPGS site will be graded, which represents approximately 90 percent of the site. Elevations after regrading will range from approximately 8 feet to approximately 13 feet. Therefore, the WPGS facilities (e.g., the FP10 units and the administrative building) will be above the 100-year flood elevation.

2.9.1.2 Onsite Fire Protection Systems

Onsite fire protection systems will be provided to the WPGS to limit personnel injury, property loss, and plant downtime resulting from a fire. The fire protection systems are described in Section 2.5.10, Fire Protection. The facility will have a Fire Protection Plan as outlined in Section 7.7, Worker Safety and Health.

2.9.1.3 Local Fire Protection Services

The WPGS will receive fire protection services from the nearest fire station, which is 1 mile east of the site. The project's Hazardous Materials Business Plan, described in Section 7.12, Hazardous Materials Handling, will provide necessary information on hazardous materials to ensure that safe and effective fire-fighting measures are used. Additional information on local emergency services can be found in Section 7.8, Socioeconomics.

2.9.1.4 Personnel Safety Programs

The WPGS will implement the personnel safety programs described in Section 7.7 to provide for personnel safety and ensure compliance with federal and state occupational safety and health requirements.

2.9.2 Reliability and Availability

This section discusses plant reliability and availability, equipment redundancy, fuel availability, water availability, and project quality control measures.

2.9.2.1 Plant Reliability and Availability

The planned operational life of the WPGS is at least 30 years. For this operational life to be realized and the plant to operate reliably, a preventive maintenance program will be implemented for the project. This program will begin during engineering and procurement for the project, when designs and specifications will be reviewed for reliability and maintainability of plant systems and equipment. During the operational phase of the project, the preventive maintenance program will consist of monitoring, record-keeping, and maintenance work to detect and rectify deterioration in systems and equipment before such deterioration results in a forced outage or prolonged maintenance outage.

It is expected that the preventive maintenance program will result in high plant availability. Plant availability refers to the plant's available generating capability during a given period of time. The EAF is a weighted average measure of plant availability considering both full and partial outages. In determining the EAF, outages are weighted by magnitude (i.e., fractional reduction in available generating capacity) and duration. Outages consist of planned overhauls, maintenance outages, and forced outages. The annual EAF of the WPGS is expected to be in the range of 92 to 98 percent.

2.9.2.2 Equipment Redundancy

The following subsections identify equipment redundancy as it applies to project availability. Equipment redundancy provides a means for avoiding outages and reducing the magnitude of outages. For example, because the WPGS will include two boiler feed pumps, each of which has 100 percent capacity, an outage of a single pump would not result in a plant outage or derating. Also, because the ACHE will consist of multiple cells, loss of one fan would result in only a minor curtailment (i.e., minor reduction in available generating capacity) rather than a full outage. Redundancy of major equipment is shown in Table 2.9-1. Note that some elements may be subject to modification in the final design.

2.9.2.3 Flex Plant 10 Power Blocks

Each FP10 power block includes a single CTG/HRSG train. The two FP10 power blocks will operate in parallel. Each CTG will provide approximately 67 percent of the combined-cycle power block output. The heat input from the exhaust gas from each combustion turbine will be used in the HRSG to produce steam. Thermal energy in the steam from the HRSG will be converted to mechanical energy, and ultimately into electrical energy in the STG. The expanded steam from the STG will be condensed and recycled to the feedwater system. Power from the STG will contribute approximately 33 percent of the total combined cycle power block output.

Major components of the FP10 power blocks will consist of the following subsystems:

- **CTG.** The CTG subsystems will include the combustion turbine, inlet air filtration and evaporative cooling system, generator and excitation systems, and turbine control and instrumentation. Thermal energy will be produced in both of the CTGs through the combustion of natural gas, and be converted into mechanical energy in the CTG turbine that drives the CTG compressor and electric generator that convert the mechanical energy into electric energy. Exhaust gas from the combustion turbine will be used to produce steam in the associated HRSG. The generator will be air-cooled. The generator excitation system will be a solid-state static system. Combustion turbine control and instrumentation (interfaced with the DCS) will include the turbine governing system, the protective system, and sequence logic.

- **HRSG.** The HRSG subsystems will consist of the HRSG and blowdown systems. The HRSG system will provide for the transfer of heat from the exhaust gas of a combustion turbine for the production of steam. This heat transfer will produce steam at the pressures and temperature required by the STG. Each HRSG system will consist of ductwork, heat transfer sections, an SCR system, and an oxidation catalyst module. The blowdown system will provide drains for each HRSG boiler drum and include a continuous and intermittent blowdown for each HRSG to control boiler feedwater quality.

- **STG.** The STG will convert the thermal energy in the steam to mechanical energy to drive the generator, which converts the mechanical energy into electrical energy. The basic subsystems will include the steam turbine and auxiliary system, turbine lube oil system, generator, and generator exciter system. The generator will be air-cooled.

- **Boiler Feedwater.** The boiler feedwater system will transfer feedwater from the de-aerator to the HP sections of the HRSGs. The system will consist of two 100 percent boiler feed pumps per CTG/HRSG train. The pumps will be multistage, electric motor-driven. The system will include regulation control valves, minimum flow recirculation control, and other associated piping and valves.

- **Condensate.** The condensate system will provide a flow path from the condensate hot well of the ACHE to the deaerator. The condensate system will include a multiple-fan ACHE; a condensate hot well; and two 100 percent capacity, motor-driven condensate pumps.

- **Air-cooled Heat Exchanger**. Each FP10 unit will have its own 12-cell ACHE, which provides for the rejection of heat to the atmosphere.

Balance of Plant systems include:

- **Distributed Control System.** The DCS will be a redundant microprocessor-based system that will provide control, monitoring, and alarm functions for plant systems and equipment. Redundancy will be such that no single processor failure can cause or prevent a unit trip. The DCS will interface with the control systems furnished by the CTG, STG, and water treatment system suppliers to provide remote control capabilities, data acquisition, annunciation, and historical storage of turbine and generator operating information. Plant operation will be controlled from the operator panel, which will be in the control room. The operator control panel consists of individual CRT/keyboard consoles and an engineering workstation.

- **Makeup Water Systems.** The water systems are designed to provide demineralized water for the power-cycle makeup on a continuous basis. They also will be used in the combustion turbine evaporative coolers and power augmentation. The new water storage tanks will provide one day of water capacity at full-load peak conditions if the water system is down.

- **Compressed Air.** The compressed air system will consist of two skids each with two 50 percent compressors containing the instrument air and service air subsystems. The service air subsystem will have service air headers, and distribution piping and hose connections. The instrument air subsystem will supply dry, compressed air at the required pressure and capacity for all control air demands, including pneumatic controls, transmitters, instruments, and valve operators. The instrument air system will include one dual-tower air dryer with prefilters and after filters, an air receiver, instrument air headers, and distribution piping.

2.9.2.4 Power Plant Maturation

The anticipated maturation period of the WPGS units will range between 6 and 12 months following commercial operation. Each of the FP10 units' first year EAF is estimated to be 85 to 89 percent. Functional testing, performance testing, punchlist resolution, reliability runs, and warranty claims will accelerate the maturation process, as well as extensive quality assurance and control during the commission and start-up of the facility.

2.9.2.5 Commercially Proven Technology

The WPGS design incorporates commercially proven technologies from major equipment suppliers, including Siemens Power Generation, Inc. These frame turbine designs are used throughout the world in this application. Steam-turbine design has been proven for several decades and is well known for excellent reliability.

2.9.2.6 Special Design Features

One special design feature of the WPGS is the ACHE, which will greatly reduce source water requirements. The FP10 units also have quick-start capability, reducing startup emissions.

The project will integrate Leadership in Energy and Environmental Design (LEED) concepts. The LEED certification program is nationally accepted as a benchmark for high performance green buildings. The program has been developed by the U.S. Green Building Council, a coalition of public and private organizations and individuals working together to promote environmentally responsible buildings. LEED-NC, now in version 2.2, would be the most appropriate type of system for assessing the buildings and structures supporting a new power plant, as it can be applied to commercial and institutional projects, manufacturing plants, and laboratories.

LEED promotes a whole-building approach to sustainability by focusing on a number of credits organized under six categories of building performance. The LEED credits can be used as both a building rating system, simply evaluating a building's level of sustainability, and as a design tool, setting out the buildings aspirations and offering guidance on how to achieve a high level of efficiency and sustainable performance.

The six main categories from the LEED-NC version 2.2 are:

1. Sustainable sites;
2. Water efficiency;
3. Energy and atmosphere;
4. Materials and resources;
5. Indoor environmental quality; and
6. Innovation and design process.

Table 2.9-2 summarizes potential LEED concepts that could be integrated into the WPGS. Additional information is provided in Appendix T, including a preliminary LEED score sheet. Based on the preliminary concepts identified, the project could receive a Certified or Silver rating.

2.9.2.7 Fuel Availability

The WPGS will be fueled with pipeline-quality natural gas delivered by PG&E. Chapter 5, Natural Gas Supply, contains more detailed information on the natural gas supplied to the WPGS.

2.9.2.8 Water Availability

Raw water makeup (i.e., recycled water) will be supplied to the WPGS from the DDSD WTP. A new offsite water pipeline will be constructed to supply the needs of the facility. Recycled water will be treated to remove ammonia and then stored on site in a 1.6 million-gallon Nitrified Water Storage Tank that has sufficient capacity for 24 hours of operation at full-load peak demand.

2.9.2.9 Electric Transmission Interconnection

Generation from the WPGS will be delivered to the PG&E switchyard, immediately adjacent to the PPP site, by one single-circuit 230-kV transmission connection. All structures will be inspected on a routine basis. Chapter 4, Transmission Facilities, contains more detailed information on the interconnection and Transmission Line Safety and Nuisance.

2.9.2.10 Project Quality Control Measures

The project will require quality control measures to be implemented by suppliers and contractors providing equipment and services to the project. This requirement will apply to the EPC and start-up phases of the project. It is expected that such measures will be part of quality assurance programs established by the suppliers and contractors. The project will audit the quality assurance programs, and supplement the programs with independent design reviews, shop inspections, and construction site inspections.

2.10 APPLICABLE LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Design, construction, and operation of the WPGS, including transmission lines, pipelines, and ancillary facilities, will be conducted in accordance with all LORS pertinent to facility safety, transmission line safety and nuisance, and reliability and availability. LORS applicable to the project are shown in Table 2.10-1. LORS applicable to transmission line safety and nuisance are discussed in Chapter 4. Note that the design of all structures and facilities will be based on building codes, specifications, industry standards, and regulations. All building permits will be reviewed during the building permit approval process by the City of Pittsburg.

2.10.1.1 Power Plant Reliability

The following LORS are applicable to the WPGS in the context of power plant reliability and availability.

Industry Codes and Standards

Currently, there are no industry codes or standards that govern power plant reliability; however, there are trade organizations and associations that are generally recognized as authorities and leaders in the field of power plant availability and reliability. Definitions used by these organizations have become generally accepted as a common means of communicating, and the data published have been found to be useful. The organizations are:

- Electric Power Research Institute. Copies of reports can be obtained from the Research Reports Center:

  3412 Hillview Avenue
  Palo Alto, CA 94304-1395
  (650) 855-2000

- North American Electric Reliability Council:

  Princeton Forrestal Village
  116-390 Village Boulevard
  Princeton, NJ 08540
  (609) 452-8060

WPGS Compliance with Power Plant Reliability

The WPGS will be designed for reliable operations for an expected project life of at least 30 years. To create and maintain reliable operations, the WPGS will include a maintenance program, equipment redundancy, dependable fuel source, and water supply.

2.10.1.2 Efficiency

The California Environmental Quality Act (CEQA) requires that a power plant or other new project not waste energy. CEQA also requires that the project be more efficient in energy use than alternatives to the project.

2.10.1.3 Engineering Geology

Applicable codes and industry standards with respect to the project's engineering geology are summarized in sections of Appendix A, Civil Engineering Design Criteria; and Appendix B, Structural Engineering Design Criteria.

2.10.1.4 Civil and Structural Engineering

Applicable codes and industry standards with respect to the project's engineering design criteria, construction, and operation are summarized in Appendix A, Civil Engineering Design Criteria; and Appendix B, Structural Engineering Design Criteria.

2.10.1.5 Mechanical Engineering

Applicable codes and industry standards with respect to the project's mechanical engineering design criteria, construction, and operation are summarized in Appendix C, Mechanical Engineering Design Criteria.

2.10.1.6 Electrical and Control Systems Engineering

Applicable codes and industry standards with respect to the project's electrical engineering design criteria, construction, and operation are summarized in Appendix D, Electrical Engineering Design Criteria.

2.10.1.7 Seismic Design

The project site is in Seismic Design Category D. Structures, their foundations, and equipment will be designed in accordance with the 2007 CBC. Electrical substation equipment will be designed to meet the requirements of IEEE 693-1997, Recommended Practice for Seismic Design Substations.

2.11 INVOLVED AGENCIES AND AGENCY CONTACTS

Agency contacts regarding facility design of the WPGS are provided in Table 2.11-1.

2.12 REFERENCES

CBC (California Building Code), 2007.

IBC (International Building Code), 2007.

Table 2.5-1
Heat and Material Balance Case Descriptions – Flex Plant 10 Power Blocks

Case		Ambient Temperature (°F)	Relative Humidity (percent)	CTG Load (percent)	Evaporative Cooling	Power Augmentation
1	A	94	32	100	Yes	Yes
	B	94	32	85	Yes	No
	C	94	32	60	Yes	No
2	A	75	54	100	Yes	Yes
	B	75	54	85	Yes	No
	C	75	54	60	Yes	No
3	A	20	90	100	No	No
	B	20	90	85	No	No
	C	20	90	60	No	No

Table 2.5-2
Major Mechanical Equipment

Equipment	Quantity	Size/Capacity	Service/Remarks
Natural gas compressor	3	198,000 lbs/hr each	Combustion turbine fuel (3 × 50 percent of total)
Combustion turbine fuel gas filter separators	2	198,000 lbs/hr each	Natural gas fuel
Combustion turbine generators (CTGs)	2	Siemens SGT6-5000F, 190 MW each	ULN combustion control with inlet air evaporative coolers, capacity excludes power augmentation
Steam turbine generator (STG)	2	SST-800 60 MW each	Back pressure STG
Heat Recovery Steam Generators (HRSGs)	2	1,700 psig steam	Single pressure
Aqueous ammonia storage	1	20,000 gallons	NOx control (19 percent by weight ammonia solution)
SCR catalyst	2	n/a	NO_X control
Oxidation catalyst	2	n/a	VOC and CO control
HRSG stacks	2	21 feet, 4 inches in diameter × 150 feet, 6 inches high each	Includes damper
Continuous emissions monitoring system (CEMS)	2	n/a	NO_X, CO, and O_2
HP boiler feedwater pumps	4	n/a	2×100 percent per train
Air compressor and dryer	4	n/a	4 x 50 percent
Air-cooled heat exchanger (ACHE)	2	12 cells	Condenser designed to allow 100 percent steam bypass of STG
Condensate pumps	4	n/a	Horizontal (2 × 100 percent capacity per train)

Notes:

CO = carbon monoxide
gpm = gallons per minute
lbs/hr = pounds per hour
mmBtu/hr = million British Thermal Units per hour
MW = megawatts
n/a = not available
NO_x = nitrogen oxides
O_2 = oxygen
psig = pounds per square inch
ULN = ultra low nitrogen oxides
VOC = volatile organic compound

Table 2.5-3
Projected Water Quality Relative to Pertinent Specifications
(Page 1 of 2)

Constituent		Water		Specifications		
		Source Water (from DDSD)[1]	Nitrified Plant Makeup Water[2]	Nitrified Makeup Water	RO Feedwater	Evap. Cooler Circ. Wtr.
General						
Alkalinity, M (Total)	mg/L $CaCO_3$	220	> 100	> 100		< 500
Alkali Metals	mg/L Na + K	216	251			< 500
Carbon Dioxide	mg/L CO_2	7	6			
Carbon, Total Organic	mg/L C	11	11			
Chlorine, Total Residual	mg/L Cl_2		0.1 – 0.3	0.1 – 0.3		
Conductivity	μmhos	1700	1572			< 5000
Hardness, Total	mg/L $CaCO_3$	271	271			
Oil and Grease	mg/L	< 6	< 6			< 10
Oxygen	mg/L O_2	7.2	7.2			
Oxygen Demand, Biochem.	mg/L O_2	< 5	< 5	< 5		
Oxygen Demand, Chem.	mg/L O_2	< 50	< 50			
pH		7.8	> 7.5	> 7.5		7 – 9
Silica	mg/L SiO_2	24	31	< 100	< 100	
Solids, Total Dissolved	mg/L ions	950	1100			< 3000
Solids, Total Suspended	mg/L					< 30
Turbidity	NTU	1.0	< 1	< 1	< 1	
Trace Constituents						
Aluminum, Total	mg/L Al	0.180	0.180	< 0.05		
Barium, Total	mg/L Ba	0.014	0.014	< 0.05	< 0.05	
Iron, Total	mg/L Fe			< 0.05	< 0.05	< 1
Heavy Metals	mg/L Fe+Mn+Cu= V+Pb	0.125	0.125			< 1
Manganese, Total	mg/L Mn	0.120	0.120	< 0.5	< 0.5	< 0.2
Strontium, Total	mg/L Sr		<0.10	< 0.1	< 0.1	
Cations						
Ammonium	mg/L NH_4	36	< 0.3	< 0.3		
Calcium	mg/L Ca	59	59			< 200
Magnesium	mg/L Mg	30	30			
Potassium	mg/L K	26	26			
Sodium	mg/L Na	190	225			

Table 2.5-3
Projected Water Quality Relative to Pertinent Specifications
(Page 2 of 2)

Constituent		Water		Specifications		
		Source Water (from DDSD)[1]	Nitrified Plant Makeup Water[2]	Nitrified Makeup Water	RO Feedwater	Evap. Cooler Circ. Wtr.
Anions						
Bicarbonate	mg/L HCO_3	267	122			
Carbonate	mg/L CO_3	0.8	0.2			
Chloride	mg/L Cl	200	200			< 300
Fluoride	mg/L F	0.39	0.39			
Nitrate	mg/L NO_3	4.5	127			
Phosphate	mg/L PO_4	0.300	0.30	< 0.5		
Sulfate	mg/L SO_4	260	260			
Corrosion and Scaling Indices						
Larson – Skold		2.5	5.5			
Langelier (LSI)		0.43	-0.21			0.25 – 0.75
Ryznar (RSI)		6.95	7.95			5.5 – 6.5
Diagnostics						
Total Cations	mg/L $CaCO_3$	819	796			
Total Anions	mg/L CaCO3	778	757			
Charge Imbalance	%	5.1	5.0			

Notes:

1. From grab sample taken by DDSD January 17, 2008. Analyzed by Caltest Analytical Laboratory, Sample identification codes 89287 and 89288.
2. Estimated quality based on grab sample results with ammonia converted to nitrate, associated alkalinity reduction and supplemental alkalinity addition while maintaining electroneutrality.

Table 2.5-4
Daily and Annual Average Water Consumption and Wastewater Discharge Requirements

Water Service/Use[1]	Average Daily Use[2] (gpm)	Maximum Daily Use[3] (gpm)	Annual Use[4] (AFY)
Power augmentation steam	534	534	424
Evaporative cooler makeup	88	248	69
HRSG blowdown quench water	20	20	16
HRSG blowdown flash tank vent and miscellaneous losses	16	16	13
HRSG blowdown	8	8	7
Reverse osmosis reject	221	242	176
Service water	4	12	3
Ammonia Reduction Facilities Wastewater	49	59	39
Reverse Osmosis Pre-filter Backwash	43	47	34
Total Plant Makeup Water Usage Requirements	**983**	**1,186**	**781**
Potable water	1	1	2
Process wastewater	389	513	308
Sanitary wastewater	1	1	2

Notes:

1. See Figure 2.5-5 for detailed water balance.
2. Average daily water use is based on both FP10 combined-cycle units at full generating capacity with evaporative cooling and power augmentation on approximately 50 percent of the time.
3. Maximum daily use is based on peak summer conditions (94^{o} F) and 32 percent relative humidity for all FP10 combined-cycle units operating at full generating capacity.
4. Average annual use takes downtime into account. It is therefore based on the average daily use attenuated by an average annual capacity factor of approximately 50 percent for the FP10 combined-cycle units. Values shown on table are based on the annual average normalized values shown on Figure 2.5-5.

AFY = acre-feet per year
gpm = gallons per minute

Table 2.5-5
WPGS Process Wastewater Composition

Constituent		Daily Average	Annual Average	Peak
General				
Alkalinity, M (Total)	mg/L $CaCO_3$	240	240	220
Carbon Dioxide	mg/L CO_2	5	5	4
Conductivity	µmhos	3,771	3,771	3,457
Hardness, Total	mg/L $CaCO_3$	651	651	596
Oil and Grease	mg/L			
pH		8	8	8
Silica	mg/L SiO_2	74	74	68
Solids, Total Dissolved	mg/L ions	2,640	2,640	2,420
Trace Constituents				
Aluminum, Total	mg/L Al	0.43	0.43	0.40
Barium, Total	mg/L Ba	0.20	0.20	0.18
Iron, Total	mg/L Fe			
Manganese, Total	mg/L Mn	0.29	0.29	0.26
Strontium, Total	mg/L Sr			
Cations				
Ammonium	mg/L NH_4	< 0.72	< 0.72	< 0.66
Calcium	mg/L Ca	142	142	130
Magnesium	mg/L Mg	72	72	66
Potassium	mg/L K	62	62	57
Sodium	mg/L Na	541	541	496
Anions				
Bicarbonate	mg/L HCO_3	290	290	266
Carbonate	mg/L CO_3	1.3	1.3	1.2
Chloride	mg/L Cl	480	480	440
Fluoride	mg/L F	0.9	0.9	0.9
Nitrate	mg/L NO_3	306	306	280
Phosphate	mg/L PO_4	< 0.7	< 0.7	< 0.7
Sulfate	mg/L SO_4	624	624	572
Larson – Skold		5.53	5.53	5.53
Langelier (LSI)		1.22	1.22	0.94
Ryznar (RSI)		5.56	5.56	6.12
Diagnostics				
Total Cations	mg/L $CaCO_3$	1,912	1,912	1,753
Total Anions	mg/L CaCO3	1,817	1,817	1,666
Charge Imbalance	%	5.1	5.1	5.1

Table 2.5-6
Summary of Waste Construction Waste Streams and Management Methods
(Page 1 of 3)

Waste Stream	Anticipated Waste Stream Classification	Estimated Quantity	Estimated Frequency of Generation	Waste Management Method	
				Onsite	Potential Offsite Location
Demolition					
Debris	Class 3	6,000 cubic yards	Once	N/A	Recycle and/or Class II/III landfill disposal
Concrete	Recyclable	25,150 cubic yards	Once	N/A	Recycle at a local offsite concrete crushing plants
Asphalt Pavement	Recyclable	750 cubic yards	Once	N/A	Recycle at a local asphalt production plant
Boiler Brick	Cal Haz	10,000 tons	Once	N/A	Disposal at Class I landfill
Stack Gunite Lining	Cal Haz	1,000 tons	Once	N/A	Disposal at Class I landfill
Metals	Scrap	15,000 tons	Once	N/A	Recycle at off site metal reclamation plants
Asbestos Waste	Cal Haz	7,651 cubic yards	Once	N/A	Disposal at Class I landfill
Light ballast	Cal-Haz	1,825 ea.	Once	N/A	Disposal at Class I landfill
Fluorescent Tubes	Cal-Haz	5,475 ea.	Once	N/A	Disposal at Class I landfill
Mercury Switches	Cal-Haz	275 pounds	Once	N/A	Disposal at Class I landfill
HDPE Plastic	Recyclable	275 cubic yards	Once	N/A	Recycle at local recycler

Table 2.5-6
Summary of Waste Construction Waste Streams and Management Methods
(Page 2 of 3)

Waste Stream	Anticipated Waste Stream Classification	Estimated Quantity	Estimated Frequency of Generation	Waste Management Method	
				Onsite	Potential Offsite Location
Residual Pipe Fuel Oil	Non-Hazardous	TBD	Once	N/A	Local Recyclers
Transformer PCB Oils	Cal Haz	TBD	Once	N/A	Based on Analytical Testing Results
Construction					
Scrap wood, steel, glass, plastic, paper, calcium silicate insulation, mineral wool insulation, cardboard and corrugated packaging	Nonhazardous solids	120 cubic yards	Weekly	Containerize, housekeeping	Recycle and/or Class II/III landfill disposal
Empty hazardous material containers	Hazardous solids	1 cubic yard	Weekly	Store for less than 90 days	Recycle and/or Class I/II landfill disposal
Spent welding materials	Hazardous solid	Less than 1 cubic yard	Monthly	Containerize	Dispose at Class I landfill
Drained waste oil filters	Hazardous solid	100 pounds	Monthly	Containerize	Dispose at Class II landfill
Used and waste lube oil during CTG and STG lube oil flushes	Hazardous or non-hazardous liquids	20,000 gallons	360 drums over life of construction	Store for less than 90 days	Oil will be used for first fill after CTG and STG flushes are complete.
Oil rags, oil absorbent generated during normal construction activities excluding lube oil flushes	Hazardous solids	Less than 2 cubic yards	Monthly	Store for less than 90 days	Oily rags would be recycled. Class I landfill disposal for other solids.

Table 2.5-6
Summary of Waste Construction Waste Streams and Management Methods
(Page 3 of 3)

Waste Stream	Anticipated Waste Stream Classification	Estimated Quantity	Estimated Frequency of Generation	Waste Management Method	
				Onsite	Potential Offsite Location
Solvents, paint, adhesives and aerosols	Hazardous liquids	2 drums	Monthly	Store for less than 90 days	Recycle or disposal at TSDF
Spent lead acid batteries	Hazardous solids	2 batteries	Yearly	Store for less than 1 year	Recycle
Spent alkaline batteries	Hazardous solids	60 batteries	Monthly	Store for less than 1 year	Recycle
Waste oil from oil waste holding tank (construction equipment lube oil)	Hazardous liquids	20 gallons	Monthly	Store for less than 90 days	Recycle
Sanitary waste from potable chemical toilets and construction office holding tanks	Nonhazardous liquids	1,500 gallons	Daily	Periodically pumped to tanker truck by licensed contractors	Removed from site by sanitary toilet contractor
Stormwater from construction area	Nonhazardous liquids	1,774,000 gallons (2-year, 24-hour storm event)	As needed during rainy season	Route through oil-water separator	Discharge per NPDES requirements
Fluorescent, mercury vapor lamps	Hazardous solids	30	Yearly	Store for 1 year	Recycle
HRSG cleaning and flushing	Hazardous liquids	300,000 gallons	Once before initial startup	Store for less than 90 days if hazardous	Solution will be removed and treated off site.
Hydrotest water	Hazardous or non-hazardous liquids	150,000 gallons	As needed	Sample/test. Reuse or dis-charge if suitable.	If hazardous, dispose to TSDF

Table 2.5-7
Summary of Anticipated Operating Waste Streams and Management Methods
(Page 1 of 3)

Waste Stream	Waste Stream Classification	Estimated Amount	Estimated Frequency of Generation	Waste Management Method	
				Onsite	Offsite Treatment
Used lubricating oil/oil solvents from small leaks and spills from turbine lubricating oil system	Hazardous liquid	800 pounds	Yearly	Store for less than 90 days	Recycle
Used lubricating oil filters from turbine lubricating oil system	Hazardous solids	1,100 pounds	Yearly	Store for less than 90 days	Disposal of drained filters to a Class II landfill
Used lubricating oil from maintenance of turbine equipment	Hazardous liquid	4,400 pounds	Yearly	Store for less than 90 days	Recycle
Solvents, paint and adhesives	Hazardous liquid	60 pounds	Monthly	Store for less than 90 days	Disposal to a licensed Treatment, Storage, and Disposal Facility
Laboratory analysis waste from water treatment	Hazardous solids	60 gallons	Yearly	Store for less than 90 days	Disposal to a licensed Treatment, Storage, and Disposal Facility
Spent SCR catalyst (heavy metals, including vanadium)	Hazardous solids	56 to 66 tons	Every 7 to 10 years	Removed to truck by licensed contractors	Recycled by an SCR manufacturer or disposed in Class I landfill
Spend CO catalyst (heavy metals)	Hazardous solids	6 to 7 tons	Every 7 to 10 years	Store for less than 90 days	Recycled by manufacturer
Spent lead acid batteries	Hazardous solids	4 batteries	Lead Acid – Yearly	Store for less than 1 year	Recycle

Table 2.5-7
Summary of Anticipated Operating Waste Streams and Management Methods
(Page 2 of 3)

Waste Stream	Waste Stream Classification	Estimated Amount	Estimated Frequency of Generation	Waste Management Method	
				Onsite	Offsite Treatment
Spent alkaline batteries	Hazardous solids	60 pounds	Alkaline - Monthly	Store for less than 1 year	Disposal to a licensed Treatment, Storage, and Disposal Facility
Unbroken fluorescent bulbs, mercury vapor lamps	Hazardous solids	60 pounds	Yearly	Store for 1 year	Reclaim mercury; disposal to a licensed Treatment, Storage, and Disposal Facility
Broken fluorescent bulbs	Hazardous solids	Less than 10 pounds	Monthly	Store for less than 90 days	Disposal to a licensed Treatment, Storage, and Disposal Facility
Waste oil from oil-water separator	Hazardous liquid	Less than 4 US gallons	Daily	Store for less than 90 days	Recycle
Oily rags, oil absorbent from CTG and other users of hydraulic actuators and lubricants	Hazardous solids	300 pounds (approximately 800 rags)	Weekly	Store for less than 90 days	Oily rags would be recycled Class I landfill disposal for other solids

Table 2.5-7
Summary of Anticipated Operating Waste Streams and Management Methods
(Page 3 of 3)

Waste Stream	Waste Stream Classification	Estimated Amount	Estimated Frequency of Generation	Waste Management Method	
				Onsite	Offsite Treatment
Chemical feed area drainage (spillage, tank overflow, or area washdown water)	May be hazardous if high or low pH	Minimal	Yearly	If contamination is suspect, immediately contain. Store onsite for less than 90 days or trucked offsite.	Test prior to discharge. If nonhazardous, discharge to DDSD. If hazardous, drummed or tanker trucked to a licensed Treatment, Storage, and Disposal Facility
CTG used air filters	Nonhazardous solids	Several hundred filters	Every 5 years	Store for less than 90 days	Recycle/Class II/III landfill disposal
CTG water wash	Hazardous or nonhazardous liquids	5,000 US gallons	Quarterly	Sample. Store hazardous portion for less than 90 days	Test prior to discharge. Dispose to a TSDF if hazardous
Hydraulic Fluid	Hazardous	<50 gallons	Yearly	Store for less than 90 days	Recycle
Sanitary wastewater	Nonhazardous liquids	1,440 US gallons	Daily	Per discharge guidelines	Discharge to DDSD
Stormwater	Nonhazardous liquids	876,000 US gallons	For a once in 2 years, 24-hour storm event	Stormwater program	Discharge to Suisun Bay, except stormwater from curbed areas discharge to DDSD

Table 2.5-8
Fire Protection Systems Design Conditions

Location	Type of System
Buildings	Automatic Clean Agent System per NFPA for control room. Wet/dry/pre-action sprinkler system or FM-200® waterless fire protection system for administrative areas and offices. Firewater supply is from an onsite water system.
Turbines	A Carbon Dioxide (CO_2) System per Turbine Manufacturer standards is provided for each CTG.
Throughout Plant	An automatic wet pipe sprinkler system, portable ABC-rated fire extinguishers in all areas, and hose reel stations with 100-foot hose.
Outside Areas	Dry barrel-type fire hydrants are designed, installed, and located as per NFPA 24 and as required per local jurisdiction. The location of the hydrants is not more than 300 feet apart in all outside areas as required by code.

Note:
NFPA = National Fire Protection Association

Table 2.5-9
Average Calculated Illumination Levels

Location	Maintained Average Foot-Candles	Illumination Lux
Air conditioning equipment room	10	100
Outdoor platforms and stairways (HRSG, tanks etc.)	5	50
Control room and administrative rooms (adjustable)	50	500
Control room emergency lighting	15	150
Electrical rooms	30	300
Toilet rooms	20	200
Combustion turbine/steam turbine areas	5	50
Water treatment area	2	20
Chemical injection skids	2	20
Parking lot	1	10
Pipe rack	2	20
Main step-up transformers	2	20
Building perimeter	2	20

Table 2.6-1
Major Structures
(Page 1 of 2)

Structure	Quantity	Size, L×W×H (feet)	Service/Remarks	Visual
Common Structures				
Natural gas compressor enclosure	1	50 × 75 × 12		Corrugated steel, painted tan
Water treatment building	1	68 × 110 × 15		Corrugated steel, painted tan
Demineralized water storage tank	1	52 feet DIA × 52 feet	800,000-gallon tank HRSG makeup	Steel tank, painted tan
Waste water storage tank	1	46 feet DIA × 46 feet	600,000-gallon capacity	Steel tank, painted tan
Reverse osmosis permeate tank	1	54 feet DIA × 54 feet	0.9-million-gallon capacity	Steel tank, painted tan
Settling Basin	1	32 feet by 64 feet by 10 feet deep	150,000-gallon capacity	
Transmission structure (A frame)	5	85 to 115 feet tall A-Frame		Weathered or galvanized steel structure
Transmission structure (lattice)	1	150 feet high		weathered or galvanized steel structure
Admin/control building	1	220 feet × 324 feet (warehouse section is 15 feet tall; and office section is three floors, 30 feet tall)	75,000 square feet	Corrugated steel, painted tan
Combustion turbine generators	2	75 × 47 × 76 (top of inlet air filter)	ULN combustion control with evaporative inlet air coolers	Industrial equipment, primarily steel painted tan
Steam turbine generator	2	60 × 22 × 28 including support structures	Back pressure STG	Industrial equipment located inside metal panel enclosure, painted tan
Heat recovery steam generators	2	123 × 25 × 88	Single pressure	Industrial equipment Casing and ducting steel painted tan Steam drums on top, silver metal insulation

Table 2.6-1
Major Structures
(Page 2 of 2)

Structure	Quantity	Size, L×W×H (feet)	Service/Remarks	Visual
Aqueous ammonia storage tank	1	35 feet 6 inches × 10 feet DIA	NO_X control (19 wt percent ammonia solution)	Steel horizontal tank, painted white
HRSG stacks	2	21 feet 4-inch DIA 150 feet, 6 inches tall	Self-supported	Steel vertical cylinder, painted desert tan
Air-cooled Heat Exchanger	2	127 × 90.5 × 46	12 Cells	Industrial equipment, coil and fan assembly with painted gray steel side (wind) walls on 22 feet tall steel support structure, painted tan.
Screening Wall	5	150 to 172 feet long (each wall) × 48		Painted tan similar to existing Tanks 1 through 6

Notes:
HRSG = heat recovery steam generator
NO_x = oxides of nitrogen
STG = steam turbine generator
ULN = ultra low NO_x

Table 2.7-1a
Construction Staff by Trade

	2009			2010												2011												2012						
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	July
Month	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**
Craft/Trade																																		
Laborer	4	18	28	36	28	20	21	22	24	25	18	17	10	7	4	2	3	4	4	3	2	1	–	–	–	–	–	–	–	–	–	–	–	–
Operating Engineer	3	11	19	23	17	7	1	1	2	4	5	3	1	0	0	0	1	1	1	1	0	0	–	–	–	–	–	–	–	–	–	–	–	–
Teamster	1	2	4	6	4	1	5	5	5	5	–	–	–	0	0	0	1	1	1	1	0	0	–	–	–	–	–	–	–	–	–	–	–	–
Cement Finisher	–	–	–	2	23	8	11	13	21	23	21	19	12	7	4	1	1	1	1	1	1	0	–	–	–	–	–	–	–	–	–	–	–	–
Carpenter	–	–	–	15	17	18	20	7	12	13	11	11	6	4	3	2	3	4	4	3	2	1	–	–	–	–	–	–	–	–	–	–	–	–
Ironworkers	–	9	9	1	3	5	8	13	25	35	40	30	14	5	3	1	1	1	1	1	1	0	–	–	–	–	–	–	–	–	–	–	–	–
Millwrights	–	–	–	–	–	–	–	–	–	–	3	8	11	16	19	25	29	36	46	45	50	43	45	32	21	16	13	6	–	–	–	–	–	–
Boilermakers	–	–	–	–	–	–	–	–	–	–	4	10	14	21	25	33	38	47	60	58	65	56	59	42	28	21	17	8	–	–	–	–	–	–
Pipefitters	–	–	–	–	–	9	13	4	4	4	10	27	37	55	67	89	101	127	162	156	175	150	157	112	74	56	45	21	–	–	–	–	–	–
Electricians	–	–	–	–	–	–	5	5	–	–	–	–	–	0	0	0	7	18	24	35	42	56	63	80	102	98	110	95	99	71	47	35	29	13
Painter	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	2	2	4	2	1	1	0	0	–	–
Insulator	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	2	3	4	3	4	4	5	3	2	1
Total Craft	8	40	60	83	92	68	84	70	93	109	112	125	105	115	125	153	185	240	304	304	338	307	324	268	229	196	193	135	104	76	52	38	31	14
Contractor Staff (see Table 2.7-1b for trade breakdown.	19	19	20	21	21	21	25	28	28	28	29	29	23	26	31	34	34	38	48	51	52	52	50	50	48	49	46	42	41	39	37	29	26	23
Total Site Staff	27	59	80	104	113	89	109	98	121	137	141	154	128	141	156	187	219	278	352	355	390	359	374	586	506	441	432	312	249	191	141	105	59	37

Table 2.7-1b
Construction Contractor Staff by Trade

	2009			2010												2011												2012						
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	July
Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
Construction Staff																																		
Construction Project Manager	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Construction Coordinator (Project Engr.)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
CSA Coordinator (inc survey)	3	3	3	3	3	3	3	3	3	3	3	3		4	4	4	4	5	5	5	5	4	4	4										-
Mech. Coordinator														1	1	1	1	1	1	1	1	1	1											-
Elec. Coordinator				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Const. Coordinator – Cablematic Tech																				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Subcontracts Administrator														1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-
Equipment Administrator														1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-
Document Control Clerk	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	1	1	1	1
Project Superintendent	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Civil/Structural/Buildings Superintendent	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1										-
HRSG Superintendent																		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
CTG/STG Turbine Superintendent								1	1	1	1	1	1						1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-
Piping Superintendent	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1
Electrical Superintendent	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	
Night Shift Superintendent																									1	1	1							-
Construction Equipment Superintendent																			1	1	1	1	1	1	1	1	1	1	1					-
Project Scheduler	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Cost Engineer	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Procurement Manager	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Warehouse Superintendent	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		-
Warehouse Clerk	1	1	2	2	2	2	2	3	3	3	3	3	3		1	2	2	2	3	3	3	3	3	3	3	3	1	1	1	1	1			-
Start-Up Manager							1	1	1	1	1	1	1					1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Start Up Tech – Mech.							1	1	1	1	1							1	3	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1
Start up Tech – Electrical												1	1											1	1	1	1	1	1	1	1	1	1	1
Start Up tech – I&C																									1	1	1	1	1	1	1	1	1	1
Controls/DCS Engineer																										1	1	1	1	1	1	1	1	1
Turnover Package Coordinator								1	1	1	1	1	1						1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Start-Up Clerk											1	1	1										1	1	1	1	1	1	1	1	1	1	1	1
Safety/security Manager	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Safety Supervisor							1	1	1	1	1	1								1	1	1	1	1	1	1	1	1	1	1	1			-
Safety Supervisor Nightshift																									1	1	1							-
Safety EMT																1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			-
QA/QC Manager	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		-
QA/QC Technician (Welding)							1	1	1	1	1	1								1	1	1	1	1	1	1	1	1	1					-
QA/QC Technician (Civil)														1	1	1	1	1	1											1				-
QA/QC Technician (Piping/Mech)																				1	1	1	1	1	1	1	1	1	1					-
QA/QC Nightshift																									1	1	1							
Office Manager/Accountant	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Accounting Clerk															1	1	1	1	1	1	1	1	1	1	1	1	1							
Clerks/Timekeepers	1	1	1	1	1	1	1	1	1	1	1	1	1		1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1
IT Specialist														1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			-
Planners														1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			-
HR and Community relations															1	1	1	1	1	1	1	1	1	1	1	1	1	**1**	**1**	**1**	**1**			-
Environmental Compliance Manager														1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			-
C/S/A Engineer														1	1	1	1	1	1	1	1	1												-
Electrical Engineer																			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-
I&C Engineer																					1	1	1	1										-
Mechanical/Pipe Engineer																			1	1	1	1	1	1	1	1	1	1	1	1	1	1		-
Total Contractor Staff	**19**	**19**	**20**	**21**	**21**	**21**	**25**	**28**	**28**	**28**	**29**	**29**	**23**	**26**	**31**	**34**	**34**	**38**	**48**	**51**	**52**	**52**	**50**	**50**	**48**	**49**	**46**	**42**	**41**	**39**	**37**	**29**	**26**	**22**

Table 2.7-2
Expected Construction Deliveries

Equipment	Units	Loads Per Unit	Total Loads (rounded up)	Delivery Duration Months
Combustion turbines	2	191	382	4
Steam turbines	2	19	38	2
Heat recovery steam generators	2	110	220	4
Piles	2	70	140	6
Generator step-up transformers	4	1	4	4
Auxiliary power transformers	2	1	2	2
Electrical switchgear and cabinets	15	1	15	2
Switchyard steel	5	1	5	1
Switchyard Equipment (breakers, switches, meters, bus, Insulators)	0	0	0	0
Bus duct 13.8-kV	4	1	4	2
Switchyard breakers	0	0	0	0
Black start generator	0	0	0	0
Electrical conduit and wire	20	1	20	6
Electrical lighting equipment	3	1	3	2
General electrical materials	70	1	70	6
Electrical transmission tower and hardware	0	0	0	0
Natural gas compressors and coolers	2	4	8	1
Fuel gas conditioning	2	1	2	2
SCR module delivery	2	10	20	4
Exhaust transition and stack	2	30	60	4
Mechanical equipment (balance of plant pumps, equipment, FCC)	17	1	17	6
Balance of plant equipment	22	1	11	6
Piping, supports, and valves	309	1	309	6
Fire pump skid	1	1	1	1
Structural steel, platforms	20	1	20	4
Administrative and warehouse buildings	1	100	100	3
Cooling towers	2	50	100	4
Water treatment equipment and filters	5	1	5	2
Water storage tanks	3	3	9	2
Earthwork (sand, gravel)	1	490	490	6
Structural fill (foundations)	1	942	942	6
Concrete (foundations)	1,601	1	1,601	8
Construction consumables	578	1	578	35
Office equipment and supplies	578	1	578	38
Site contractor mobilization and demobilization	20	1	20	2
General contractor mobilization and demobilization	10	1	10	2
Construction equipment delivery and pickup	60	1	60	18
Total[1]			**5,826**	**201**

Notes:
Construction Duration for Project is 34 months.
Loads Per Month Average = 29
[1] Total may not tally with sum of column due to rounding.

Table 2.7-3
Average Construction Equipment On Site Per Month

Construction Equipment	Percent Usage	HP	Fuel (Diesel/ Gas)	2009			2010												2011												2012						
				Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
Demolition																																					
Hydraulic excavator	100%	250	Diesel	2	3	3	3	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1-ton flatbed truck	100%	150	Gas	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Forklift	100%	40	Gas	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fuel/lube truck	50%	150	Gas	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Water truck	100%	300	Diesel	2	2	2	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Articulating boom manlift (120, 80, 60, and 40 foot).	100%	75	Gas	2	2	2	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Air compressor	100%	50	Gas	2	2	2	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydraulic crane (75 ton)	50%	350	Diesel	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Service truck	50%	150	Gas	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Construction																																					
Pickup truck	75%	150	Gas	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2
1-ton flatbed truck	50%	150	Gas																																		
Tractor	50%	195	Diesel	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Forklift	75%	40	Gas	1	1	1	1	2	2	2	3	2	2	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	3	3	3	3	2	2
Fuel/lube truck	25%	150	Gas	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
M2250 ringer crane/M2250 crawler crane	25%	500	Diesel						1	1	1																			1	1	1	1	1	1		
150 ton crawler crane	50%	300	Diesel	1	1	1		1	1	1	1	1	1	1	1	1														1	1	1	1	1	1	1	1
Hydraulic crane (55 ton)	65%	300	Diesel	1	1	1	1	1	2	2	1	1	1	1	1	1	1	1				1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2
Hydraulic crane (45 ton)	65%	250	Diesel	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1									1	1	1	1	1	1	1	1
Articulating boom manlift (120, 80, 60 and 40 foot).	70%	75	Gas				2	2	4	4	6	6	6	6	6	8	12	12	10	10	10	12	12	12	12	12	12	8	8	8	8	6	6	6	4	2	2
Air compressor	80%	50	Gas	1	1	1	1	1	2	2	2	1	1	1	1	1	1	1	1			1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2
Backhoe loader	40%	80	Diesel			2	2	2	2	2	1	1	1	1	1							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Front end loader	70%	130	Diesel		1	1	1	1	1	2	2	2	2	1	1	1						1	2	2	2	2	2	2	2	2	2	2	2				
Dump truck (30 ton)	100%	300	Diesel							10	1	1	1																								
Hydraulic excavator	85%	250	Diesel			2	2	2	2	4	2	2	2	1	1							1	1	2	2	2	2	2	2	2	2	1	1				
Bull dozer	80%	300	Diesel																				1	1	1	1	1	1									
Bull dozer w/ ripper	80%	300	Diesel							1																											
Vibratory roller	80%	125	Gas			1	1	1	1														1	1	1	1	1	1	1	1	1	1	1				
Walk behind vibratory roller	60%	25	Gas			1	1	1	1		1	1	1										1	1	2	2	2	2	2	1	1	1	1				
Dump truck	35%	300	Diesel			1	1	1	1													1	2	2	2	2	2	2	2	1	1	1	1				
Motor grader	80%	200	Diesel																																		
Jumping jack compactors	60%	7.5	Gas								1	1	1										1	1	2	2	2	2	2	2	2	2	2				
Vibratory plate compactor	60%	7.5	Gas								1	1	1																								
Water truck	50%	300	Diesel	1	1	1	1	1	1													1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Concrete pumper truck	15%	350	Diesel			1	1	1	1													1	1	1	1	1	1	1	1	1	1						
Welder (diesel)	70%	25	Diesel	2	2	2	1	1	1	2	2	3	3	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2
Light plant	30%	25	Gas		1	1	1	1									1	1	1	1																	
			Total	**26**	**30**	**39**	**40**	**43**	**47**	**45**	**38**	**37**	**38**	**31**	**32**	**33**	**37**	**38**	**35**	**34**	**34**	**27**	**33**	**34**	**36**	**37**	**37**	**33**	**32**	**33**	**33**	**31**	**33**	**25**	**23**	**18**	**18**

Table 2.7-4
Construction Water Requirements

Construction Month		Gallons
October 2009	1	100,000
November 2009	2	110,000
December 2009	3	115,000
January 2010	4	120,000
February 2010	5	125,000
March 2010	6	120.000
April 2010	7	120,000
May 2010	8	120,000
June 2010	9	125,000
July 2010	10	125,000
August 2010	11	125,000
September 2010	12	125,000
October 2010	13	120,000
November 2010	14	120,000
December 2010	15	125,000
January 2011	16	135,000
February 2011	17	190,000
March 2011	18	205,000
April 2011	19	220,000
May 2011	20	315,000
June 2011	21	175,000
July 2011	22	165,000
August 2011	23	320,000
September 2011	24	1,250,000
October 2011	25	150,000
November 2011	26	1,250,000
December 2011	27	140,000
January 2012	28	125,000
February 2012	29	120,000
March 2012	30	115,000
April 2012	31	110,000
May 2012	32	15,000
June 2012	33	15,000
July 2012	34	10,000
Total[1] (gallons)		6,820,000
Total (acre-feet)		21
Average Monthly (gallons)		200,000
Average Daily (gallons)		10,000

Notes:
Months 17–26 include water for hydrotesting, flushing and steam blow purposes.
[1] Total may not tally with sum of column due to rounding.

Table 2.8-1
Plant Operation Workforce

Department	Personnel	Shift	Workdays
Operations	8 Plant Operators	Rotating 12-hour shift, 2 employees per shift	7 days a week.
Production	2 Operations Specialist 1 Operations Supervisor	Standard 8-hour days	5 days a week with additional coverage as required.
Administration	1 Plant Manager 1 Administrative Assistant 1 Plant Engineer 1 Planner/Scheduler	Standard 8-hour days	5 days a week with additional coverage as required.
Maintenance	1 Maintenance Supervisor 2 I&C Technicians 1 Electrician 1 Mechanic	Standard 8-hour days	5 days a week with additional coverage as required.
Total	20 Personnel		

Note:
I&C = instrumentation and control

Table 2.9-1
Major Equipment Redundancy for One Flex Plant 10 Combined-Cycle Unit

Description	Number	Notes
CTG, HRSG, and CTG Main Transformer	One train	A bypass system is provided around the STG to allow the CTG/HRSG train to operate at full load.
STG	One	Refer to note related to CTG/HRSG trains.
STG Main Transformer	One	Refer to note related to CTG/HRSG trains.
Boiler Feedwater Pump	Two at 100 percent	One boiler feedwater pump can be down and the plant will be able to operate at full load.
Condensate Pump	Two at 100 percent	One condensate pump can be down and the plant will be able to operate at full load.
Auxiliary Transformer	One	One tied to the output of each CTG.
Air Compressors	Two at 100 percent	One air compressor can be down and the plant will be able to operate at full load.
Gas Compressors	Three at 50 percent	Total for two units

Notes:
CTG = combustion turbine generator
HRSG = heat recovery steam generator
STG = steam turbine generator

Table 2.9-2
List of Potential LEED-NC Credits Applicable to the WPGS
(Page 1 of 4)

LEED Credit	LEED Credit Name	LEED Credit Description
Sustainable Sites		
Prereq 1	Construction Activity Pollution Prevention	Create and implement an Erosion and Sedimentation Control Plan
Credit 3	Brownfield Redevelopment	Develop on a site defined as a brownfield by a local, state or federal government agency
Credit 4.2	Alternative Transportation: Bicycle Storage and Changing Rooms	Provide secure bicycle racks and/or storage (within 200 yards of a building entrance) for 5% or more of all building users (measured at peak periods), and, provide shower and changing facilities in the building for 0.5% of occupants.
Credit 4.3	Alternative Transportation: Low Emitting and Fuel Efficient Vehicles	Provide preferred parking for low-emitting and fuel-efficient vehicles for 5% of the total vehicle parking capacity of the site.
Credit 4.4	Alternative Transportation: Parking Capacity	Size parking capacity to not exceed minimum local zoning requirements and provide preferred parking for carpools or vanpools for 5% of the total provided parking spaces
Credit 6.1	Stormwater Management: Quantity Control	Implement a stormwater management plan that results in a 25% decrease in the volume of stormwater runoff from the two-year, 24-hour design storm.
Credit 7.2	Heat Island Effect: Roof	Use roofing materials having a Solar Reflectance Index (SRI) equal to or greater than the values in the table below for a minimum of 75% of the roof surface.
Credit 8	Light Pollution Reduction	Minimize light trespass from the building and site, reduce sky-glow to increase night sky access, improve nighttime visibility through glare reduction, and reduce development impact on nocturnal environments
Water Efficiency		
Credit 1.2	Water Efficient Landscaping: No Potable Use or No Irrigation	Achieve credit 1.1 and install landscaping that does not require permanent irrigation systems.
Credit 3.1	Water Use Reduction: 20%	Employ strategies that in aggregate use 20% less water than the water use baseline calculated for the building (not including irrigation) after meeting the Energy Policy Act of 1992 fixture performance requirements.
Energy and Atmosphere		
Prereq 1	Fundamental Commissioning of the Building Energy System	Verify that the building's energy related systems are installed, calibrated and perform according to the owner's project requirements, basis of design, and construction documents.

Table 2.9-2
List of Potential LEED-NC Credits Applicable to the WPGS
(Page 2 of 4)

LEED Credit	LEED Credit Name	LEED Credit Description
Prereq 2	Minimum Energy Performance	Establish the minimum level of energy efficiency for the building and systems.
Prereq 3	Fundamental Refrigerant Management	Zero use of CFC-based refrigerants in new base building HVAC&R systems.
Credit 1.1b	Optimize Energy Performance: Option 1 – Whole Bldg Sim. 21% New/14% Existing	Demonstrated a percentage improvement in the proposed building performance rating compared to the baseline building performance rating per ASHRAE/IESNA Standard 90.1-2004 by a whole building project simulation.
Credit 3	Enhanced Commissioning	Begin the commissioning process early during the design process and execute additional activities after systems performance verification is completed.
Credit 5	Measurement and Verification	Provide for the ongoing accountability of building energy consumption over time.
Materials and Resources		
Prereq 1	Storage and Collection of Recyclables	Provide an easily accessible area that serves the entire building and is dedicated to the collection and storage of non-hazardous materials for recycling, including (at a minimum) paper, corrugated cardboard, glass, plastics and metals.
Credit 2.2	Construction Waste Management: Divert 75% from Disposal	Recycle and/or salvage 75% of non-hazardous construction and demolition debris.
Credit 4.2	Recycled Content: 20% (post-consumer + ½ pre-consumer)	Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 20% of the total value of the materials in the project.
Credit 5.1	Regional Materials: 10% Extracted, Processed and Manufactured Regionally	Use building materials or products that have been extracted, harvested or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10% (based on cost) of the total materials values.
Credit 7	Certified Wood	Use a minimum of 50% of wood-based materials and products which are certified in accordance with the Forest Stewardship Council's Principles and Criteria, for wood building components.
Prereq 1	Minimum Indoor Air Quality (IAQ) Performance	Establish minimum IAQ performance to enhance indoor air quality in buildings, thus contributing to the comfort and well-being of the occupants.

Table 2.9-2
List of Potential LEED-NC Credits Applicable to the WPGS
(Page 3 of 4)

LEED Credit	LEED Credit Name	LEED Credit Description
Indoor Environmental Quality		
Prereq 2	Environmental Tobacco Smoke Control	Minimize exposure of building occupants, indoor surfaces, and ventilation air distribution systems to Environmental Tobacco Smoke.
Credit 1	Outdoor Air Delivery Monitoring	Install permanent monitoring systems that provide feedback on ventilation system performance to ensure that ventilation systems maintain design minimum ventilation requirements.
Credit 2	Increase Ventilation	Provide additional outdoor air ventilation to improve indoor air quality for improved occupant comfort, well-being and productivity.
Credit 3.1	Construction IAQ Management Plan: During Construction	Reduce indoor air quality problems resulting from the construction/renovation process in order to help sustain the comfort and well-being of construction workers and building occupants.
Credit 3.2	Construction IAQ Management Plan: Before Occupancy	Reduce indoor air quality problems resulting from the construction/renovation process in order to help sustain the comfort and well-being of construction workers and building occupants.
Credit 4.1	Low-Emitting Materials: Adhesives and Sealants	Reduce the quantity of indoor air contaminants that are odorous, irritating and/or harmful to the comfort and well-being of installers and occupants
Credit 4.2	Low-Emitting Materials: Paints and Coatings	Reduce the quantity of indoor air contaminants that are odorous, irritating and/or harmful to the comfort and well-being of installers and occupants
Credit 4.3	Low-Emitting Materials: Carpet Systems	Reduce the quantity of indoor air contaminants that are odorous, irritating and/or harmful to the comfort and well-being of installers and occupants
Credit 5	Indoor Chemical and Pollutant Source Control	Minimize exposure of building occupants to potentially hazardous particulates and chemical pollutants.
Credit 6.1	Controllability of Systems: Lighting	Provide individual lighting controls for 90% (minimum) of the building occupants to enable adjustments to suit individual task needs and preferences and provide lighting system controllability for all shared multi-occupant spaces.

Table 2.9-2
List of Potential LEED-NC Credits Applicable to the WPGS
(Page 4 of 4)

LEED Credit	LEED Credit Name	LEED Credit Description
Credit 6.2	Controllability of Systems: Thermal Comfort	Provide individual comfort controls for 50% (minimum) of the building occupants to enable adjustments to suite individual task needs and preferences and provide comfort system controls for all shared multi-occupant spaces.
Credit 7.1	Thermal Comfort: Design	Provide a comfortable thermal environment that supports the productivity and well-being of building occupants.
Credit 7.2	Thermal Comfort: Verification	Provide for the assessment of building thermal comfort over time.
Credit 8.1	Daylight and Views: Daylight: 75% of Spaces	Provide for the building occupants a connection between indoor spaces and the outdoors through the introduction of daylight and views into the regularly occupied areas of the building.
Credit 8.2	Daylight and Views: Views: 90% of Spaces	Provide for the building occupants a connection between indoor spaces and the outdoors through the introduction of daylight and views into the regularly occupied areas of the building.
Innovation and Design Process		
Credit 1.1	Innovation in Design: Green Education	Provide the building occupants with an understanding of the green features in the building and how to use them correctly.
Credit 2	LEED Accredited Professional	At least one principal participant of the project team shall be a LEED Accredited Professional.

Table 2.10-1
Applicable Laws, Ordinances, Regulations, and Standards
(Page 1 of 7)

Engineering Activity	Laws, Ordinances, Regulations, and Standards	Administering Agency	Applicability/Compliance	AFC Section
Federal				
Engineering Geology	Occupational Safety and Health Act, 29 United States Code (USC) §651 et seq.; 29 Code of Federal Regulations (CFR) §§1901.1-1910, 1500, 29 CFR, Part 1926	Federal Occupational Safety and Health Administration (OSHA); Cal OSHA (per 29 CFR §1952.70-1952.175)	Specific occupational safety and health standards. Mirant will meet all standards.	Appendix A, Civil Engineering Design Criteria; Appendix B, Structural Engineering Design Criteria; Section 7.7, Worker Safety and Health
Engineering Geology	Clean Water Act (CWA), 33 USC §1342 et seq.	Regional Water Quality Control Board (RWQCB)	Requires permits for specified discharges into waters of the United States. Mirant will provide notice of intent to RWQCB to operate under and will comply with all General Industrial Activity Storm Water Permit requirements.	Appendices A and B; Section 7.14, Water Resources
State				
Engineering Geology	Business and Professions Code §6700 et seq.; 6730, 6736	Board of Professional Engineers and Land Surveyors	Requires state registration to practice as a civil or structural engineer in California and that all plans, specifications, reports, or documents be prepared by or under the direction of a registered engineer. Mirant will comply with all requirements.	Appendices A and B; Section 7.15, Geologic Hazards and Resources
Engineering Geology	California Occupational Safety and Health Act, Labor Code §6500 et seq.	California Occupational Safety and Health Administration (Cal OSHA)	Requires a permit for construction of trenches or excavation 5 feet or deeper into which personnel have to descend.	Appendices A and B; Section 7.7, Worker Safety and Health

Sample Table 2.10-1
Applicable Laws, Ordinances, Regulations, and Standards
(Page 2 of 7)

Engineering Activity	Laws, Ordinances, Regulations, and Standards	Administering Agency	Applicability/Compliance	AFC Section
Engineering Geology	California Building Code (CBC) (latest edition available)	CEC	Sets building standards and requirements. Mirant will comply with all CBC requirements.	Appendices A and B; Section 7.15, Geologic Hazards and Resources
Engineering Geology	Labor Code §6300 et seq.; 8 CCR 1500 et seq.; 2300 et seq., §3200 et seq.	Cal OSHA	Prescribes construction safety orders, industrial safety orders, and work safety requirements. Mirant will comply with all safety requirements.	Appendices A and B; Section 7.7, Worker Safety and Health
Engineering Geology	Vehicle Code §35780 et seq.	California Department of Transportation (Caltrans)	Requires a permit for transportation of oversize or overweight vehicles over state highways. Mirant will obtain all necessary permits.	Section 7.10, Traffic and Transportation
Local				
Engineering Geology	Code of Building Regulations	City of Pittsburg	Sets building standards and requirements.	Appendices A and B; Section 7.15, Geologic Hazards and Resources
Federal				
Civil and Structural Engineering	29 USC §651 et seq.; 29 CFR §§1901.1-1910, 1500; 29 CFR, Part 1926.	OSHA; Cal OSHA (per 29 CFR §§1952.70-1952.175)	Specific occupational safety and health standards. Mirant will meet all standards.	Appendices A and B; Section 7.7, Worker Safety and Health
Civil and Structural Engineering	33 USC §1342 et seq.	RWQCB	Requires permits for specified discharges into waters of the United States. Mirant will provide notice of intent to RWQCB to operate under and will comply with all General Industrial Activity Storm Water Permit requirements.	Section 7.14, Water Resources

Table 2.10-1
Applicable Laws, Ordinances, Regulations, and Standards
(Page 3 of 7)

Engineering Activity	Laws, Ordinances, Regulations, and Standards	Administering Agency	Applicability/Compliance	AFC Section
State				
Civil and Structural Engineering	Business and Professions Code §6700 et seq.; §§6730, 6736	Board for Professional Engineers and Land Surveyors	Requires state registration to practice as a civil or structural engineer in California and that all plans, specifications, reports, or documents be prepared by or under the direction of a registered engineer. Mirant will comply with all requirements.	Appendices A and B
Civil and Structural Engineering	Labor Code §6500 et seq.	Cal OSHA	Requires a permit for construction of trenches or excavation 5 feet or deeper into which personnel have to descend.	Appendices A and B; Section 7.7, Worker Safety and Health
Civil and Structural Engineering	California Building Code (CBC)	CEC	Sets building standards and requirements. Mirant will comply with all CBC requirements.	Appendices A and B; Section 7.7, Worker Safety and Health
Civil and Structural Engineering	Labor Code §6300 et seq.; 8 CCR 1500 et seq.; 2300 et seq.; §3200 et seq.	Cal OSHA	Prescribes construction safety orders, industrial safety orders, and work safety requirements. Mirant will comply with all safety requirements.	Appendices A and B; Section 7.7, Worker Safety and Health
Civil and Structural Engineering	Vehicle Code §35780 et seq.	Caltrans	Requires a permit for transportation of oversize or overweight vehicles over state highways. Mirant will obtain all necessary permits.	Section 7.10, Traffic and Transportation

Table 2.10-1
Applicable Laws, Ordinances, Regulations, and Standards
(Page 4 of 7)

Engineering Activity	Laws, Ordinances, Regulations, and Standards	Administering Agency	Applicability/Compliance	AFC Section
Local				
Civil and Structural Engineering	Code of Building Regulations	City of Pittsburg	Sets building standards and requirements for City.	Appendices A and B; Section 7.15, Geologic Hazards and Resources
Civil and Structural Engineering	Hydrology Manual	County Flood Control District	Specifies drainage requirements. Mirant will comply with all drainage requirements.	Appendices A and B; Section 7.14, Water Resources
Federal				
Mechanical Engineering	29 USC §651 et seq.; 29 CFR §§1901.1-1910, 1500; 29 CFR, Part 1926.	Federal OSHA; Cal OSHA (per 29 CFR §§1952.70-1952.175)	Specific occupational safety and health standards. Mirant will meet all standards.	Appendix C; Section 7.7, Worker Safety and Health
State				
Mechanical Engineering	CBC, California Plumbing Code	CEC	Sets building standards and requirements. Mirant will comply with all CBC requirements.	Appendix C; Section 7.15, Geologic Hazards and Resources
Mechanical Engineering	Labor Code §6500 et seq.; 8 CCR 1500 et seq.; 2300 et seq.; §3200 et seq.	Cal OSHA	Prescribes construction safety orders, industrial safety orders, and work safety requirements. Mirant will comply with all safety requirements.	Appendix C; Section 7.7, Worker Safety and Health
Mechanical Engineering	8 CCR Chapters 4-7	CEC	Prescribes requirements for flammable liquids, gases, and vapors. Mirant will comply with all requirements.	Appendix C; Section 7.12, Hazardous Materials Handling

Table 2.10-1
Applicable Laws, Ordinances, Regulations, and Standards
(Page 5 of 7)

Engineering Activity	Laws, Ordinances, Regulations, and Standards	Administering Agency	Applicability/Compliance	AFC Section
Mechanical Engineering	Business and Professions Code §6700 et seq., 6730, 6735 and 6736	Board of Professional Engineers and Land Surveyors	Requires state registration to practice as a mechanical engineer and that all plans, specifications, reports, or documents be prepared by a registered engineer. Mirant will use registered engineers.	Appendix C
Federal				
Electrical Engineering	29 USC §651 et seq.; 29 CFR §§1901.1-1910, 1500, 29 CFR, Part 1926	Federal OSHA; Cal OSHA (per 29 CFR §§1952.70-1952.175)	Specific occupational safety and health standards. Mirant will meet all standards.	Appendix D; Section 7.7, Worker Safety and Health
State				
Electrical Engineering	CBC, California Electrical Code	CEC	Sets building standards and requirements. Mirant will comply with all CBC requirements.	Appendix D; Section 7.15, Geologic Hazards and Resources
Electrical Engineering	Labor Code §6500 et seq.; 8 CCR 1500 et seq.; 2300 et seq.; §3200 et seq.	Cal OSHA	Prescribes construction safety orders, industrial safety orders, and work safety requirements. Mirant will comply with all safety requirements.	Appendix D; Section 7.7, Worker Safety and Health
Electrical Engineering	8 CCR Chapters 4-7	CEC	Prescribes requirements for flammable liquids, gases, and vapors. Mirant will comply with all requirements.	Appendix D; Section 7.12, Hazardous Materials Handling
Electrical Engineering	Business and Professions Code §6700 et seq., 6730, 6735 and 6736	Board of Professional Engineers and Land Surveyors	Requires state registration to practice as an electrical engineer and also requires all plans, specifications, reports, or documents be prepared by a registered engineer. Mirant will use registered engineers.	Appendix D

Table 2.10-1
Applicable Laws, Ordinances, Regulations, and Standards
(Page 6 of 7)

Engineering Activity	Laws, Ordinances, Regulations, and Standards	Administering Agency	Applicability/Compliance	AFC Section
Local				
Electrical Engineering	Code of Building Regulations	City of Pittsburg Department of Building	Sets building standards and requirements for City.	Appendix D; Section 7.15, Geologic Hazards and Resources
Industry				
Power Plant Reliability	EPRI, NERC		EPRI and NERC trade association standards will be followed	Appendix D; Section 2.9, Safety and Reliability
Federal				
Public Health/Worker Safety Protection	OSHA, 29 USC §651 et seq.; 29 CFR 1910 et seq.; and 29 CFR 1926 et seq.	Federal OSHA and Cal OSHA	Project will meet employee health and safety standards for employer-employee communications, electrical operations, and chemical exposures.	Section 7.7.7, Worker Safety
Public Health/Worker Safety Protection	Department of Labor, Safety and Health Regulations for Construction promulgated under Section 333 of the Contract Work Hours and Safety Standards Act, 40 USC 327 et seq.	Federal OSHA and Cal OSHA	Project will meet employee health and safety standards for construction activities. Requirements addressed by CCR Title 8, General Construction Safety Orders.	Section 7.7.7, Worker Safety
Federal				
Transmission Engineering	47 USC §15.25	Federal Aviation Administration	The project will not to cause communication interference	Section 2.9.2, Section 2.9.4.4 and Section 4.3
State				
Transmission System Engineering	General Order 52 (GO-52)	CPUC	The project will not cause inductive interference	Section 2.9.2, Section 2.9.4.4 and Section 4.3

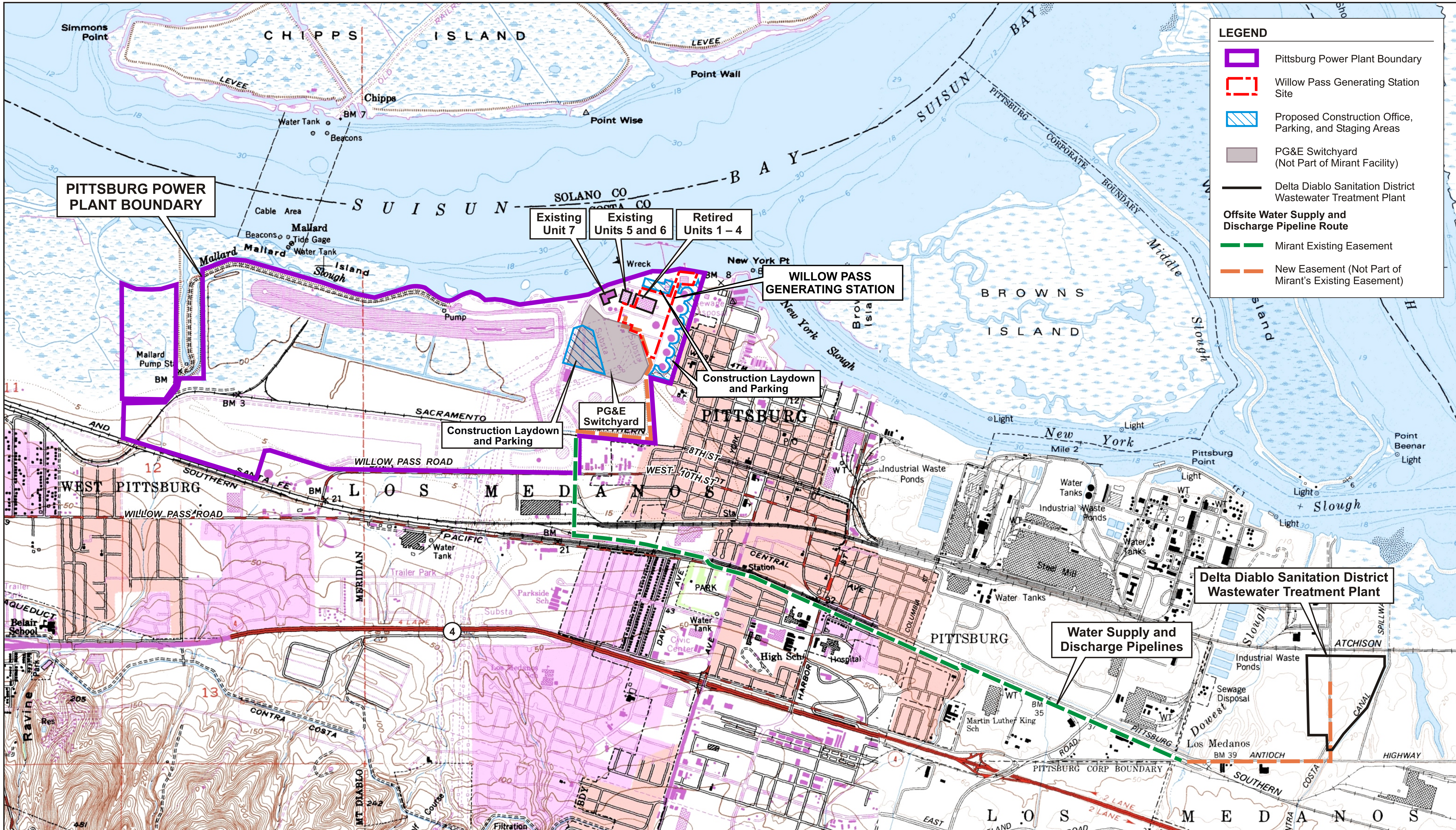
Table 2.10-1
Applicable Laws, Ordinances, Regulations, and Standards
(Page 7 of 7)

Engineering Activity	Laws, Ordinances, Regulations, and Standards	Administering Agency	Applicability/Compliance	AFC Section
Transmission System Engineering	General Order 95 (GO-95)	CPUC	Establishes rules and guidelines for transmission line construction. The WPGS transmission line clearances, grounding techniques, maintenance and inspection requirements will be provided in accordance with the GO-95 requirements.	Section 2.9.2 and Section 2.9.4.4
Transmission System Engineering	California Code of Regulations Section 2700	CEC	Establishes essential requirement and minimum standards for installation, operation and maintenance of electrical equipment to provide practical safety and freedom from danger. The project will be constructed in conformance with these regulations.	Section 2.9.2.4

Notes:
CEC = California Energy Commission
CalOSHA = California Occupational Safety and Health Administration

Table 2.11-1
Involved Agencies and Agency Contacts

Issue	Agency	Contact/Title	Telephone
Air Emissions	Bay Area Air Pollution Control District 939 Ellis Street San Francisco, CA 94109	Brian Bateman Director of Engineering Division	(415) 749-4653
Recycled Water Supply and Process Wastewater Discharge	Delta Diablo Sanitation District 2500 Pittsburg-Antioch Highway Antioch, CA 94509-1373	Gary Darling General Manager	(925) 756-1920
Potable Water Supply and Sanitary Wastewater Conveyance	City of Pittsburg, Engineering and Development Services Division 65 Civic Avenue Pittsburg, CA 94565	Joe Sbranti City Engineer, Engineering Department	(925) 252-4930
Building Permits	City of Pittsburg, Building Division 65 Civic Avenue Pittsburg, CA 94565	Larry Smith Chief Building Official, Building Division	(925) 252-4910
Land Use Planning	City of Pittsburg, Planning Department 65 Civic Avenue Pittsburg, CA 94565	Marc Grisham, Director of Planning, Planning Department	(925) 252-6920



Source:
USGS Topographic Maps, 7.5 Minute Series:
Honker Bay, CA (Rev. 1980) and
Antioch North, CA (1978)

0 2000 4000 Feet

0 0.5 1 Miles

Scale 1:24,000

N

PROJECT LOCATION MAP

Willow Pass Generating Station
Mirant Willow Pass, LLC
Pittsburg, California

June 2008
28067343

URS

FIGURE 2.1-1

6/24/08 vsa ..T:\Mirant Pittsburg-Willow Pass\Graphics\2.0 Facility Description\2.1-1_proj loc_6-24-08.cdr

LEGEND

Pittsburg Power Plant Boundary	Proposed Gas Line
Willow Pass Generating Station Site	Proposed Water Supply and Discharge Lines
Construction Laydown and Parking	Proposed Transmission Line
Proposed Screening Walls	

Photo Source:
DigitalGlobe; Airphoto USA 2007

N

0 400
Scale in Feet

SITE PLAN

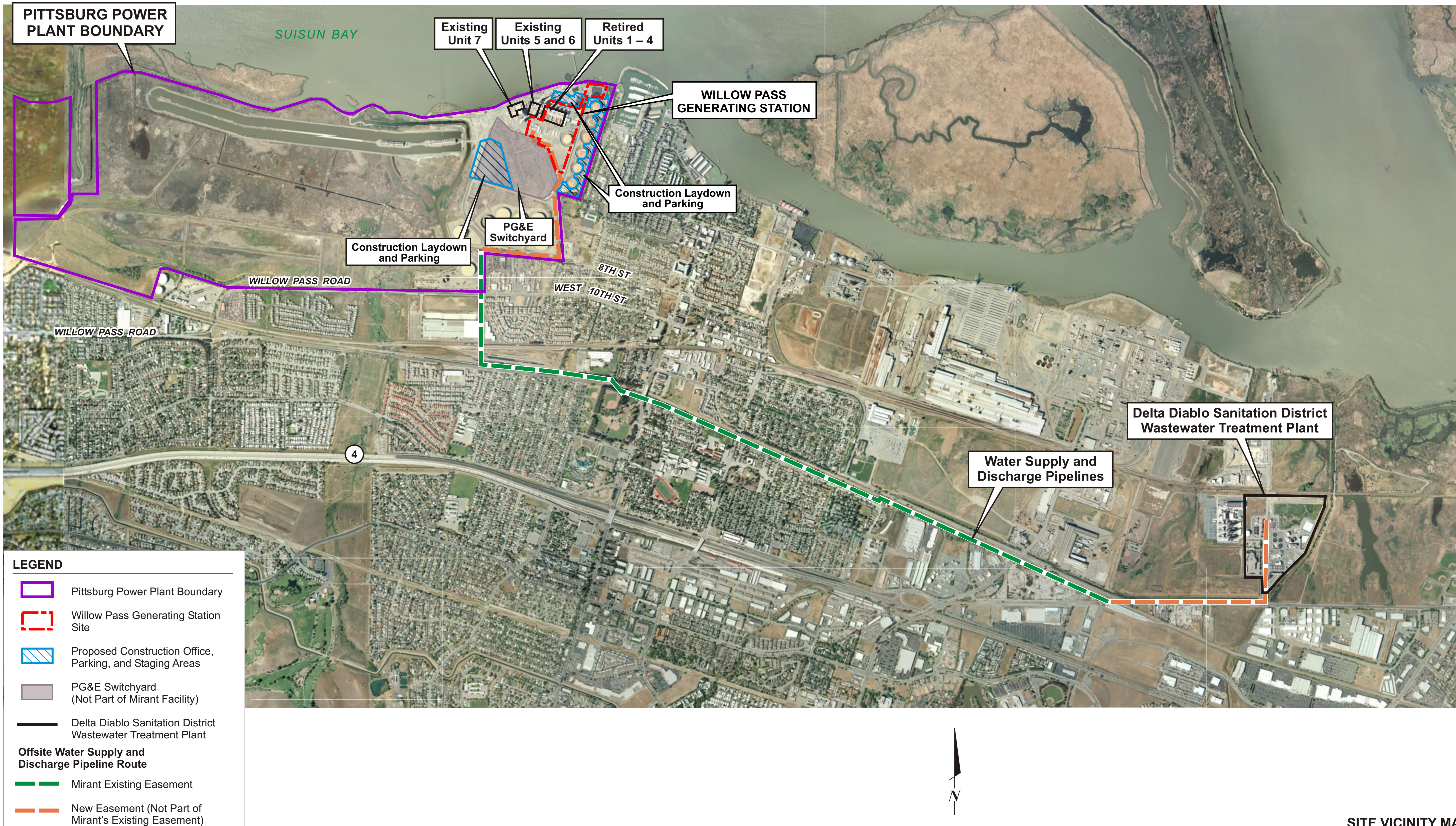
Willow Pass Generating Station
Mirant Willow Pass, LLC
Pittsburg, California

June 2008
28067343

URS

FIGURE 2.1-2

6/24/08 vsa ..\T:\Mirant Pittsburg-Willow Pass\Graphics\2.0 Facility Description\2.1-2_siteplan_6-24-08.ai



LEGEND

- Pittsburg Power Plant Boundary
- Willow Pass Generating Station Site
- Proposed Construction Office, Parking, and Staging Areas
- PG&E Switchyard (Not Part of Mirant Facility)
- Delta Diablo Sanitation District Wastewater Treatment Plant

Offsite Water Supply and Discharge Pipeline Route

- Mirant Existing Easement
- New Easement (Not Part of Mirant's Existing Easement)

Photo Source:
DigitalGlobe; Airphoto USA 2007

SITE VICINITY MAP

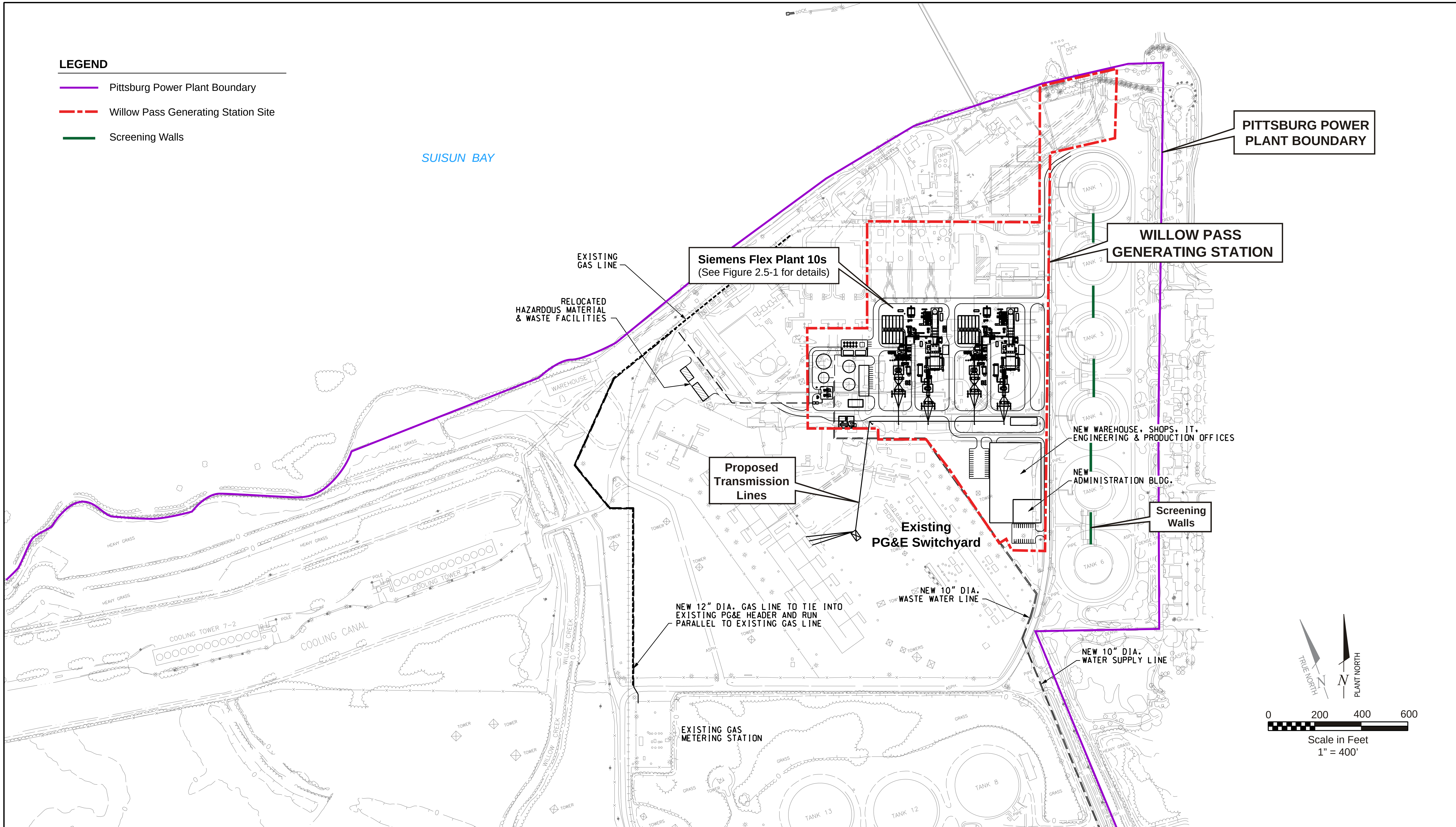
Willow Pass Generating Station
Mirant Willow Pass, LLC
Pittsburg, California

June 2008
28067343

URS

FIGURE 2.2-1

6/20/08 vsa ..T:\Mirant Pittsburg-Willow Pass\Graphics\2.0 Facility Description\2.2-1_sitevicinity_6-20-08.cdr



Source:
CH2MHill Lockwood Greene; General Arrangement Willow Pass Plot Plan
Combined-Cycle Siemens Flex 10s;
Drawing No: MR-GA-PT-01-12 (Rev. E, 06/20/08)

FLEX PLANT 10 SITE LAYOUT

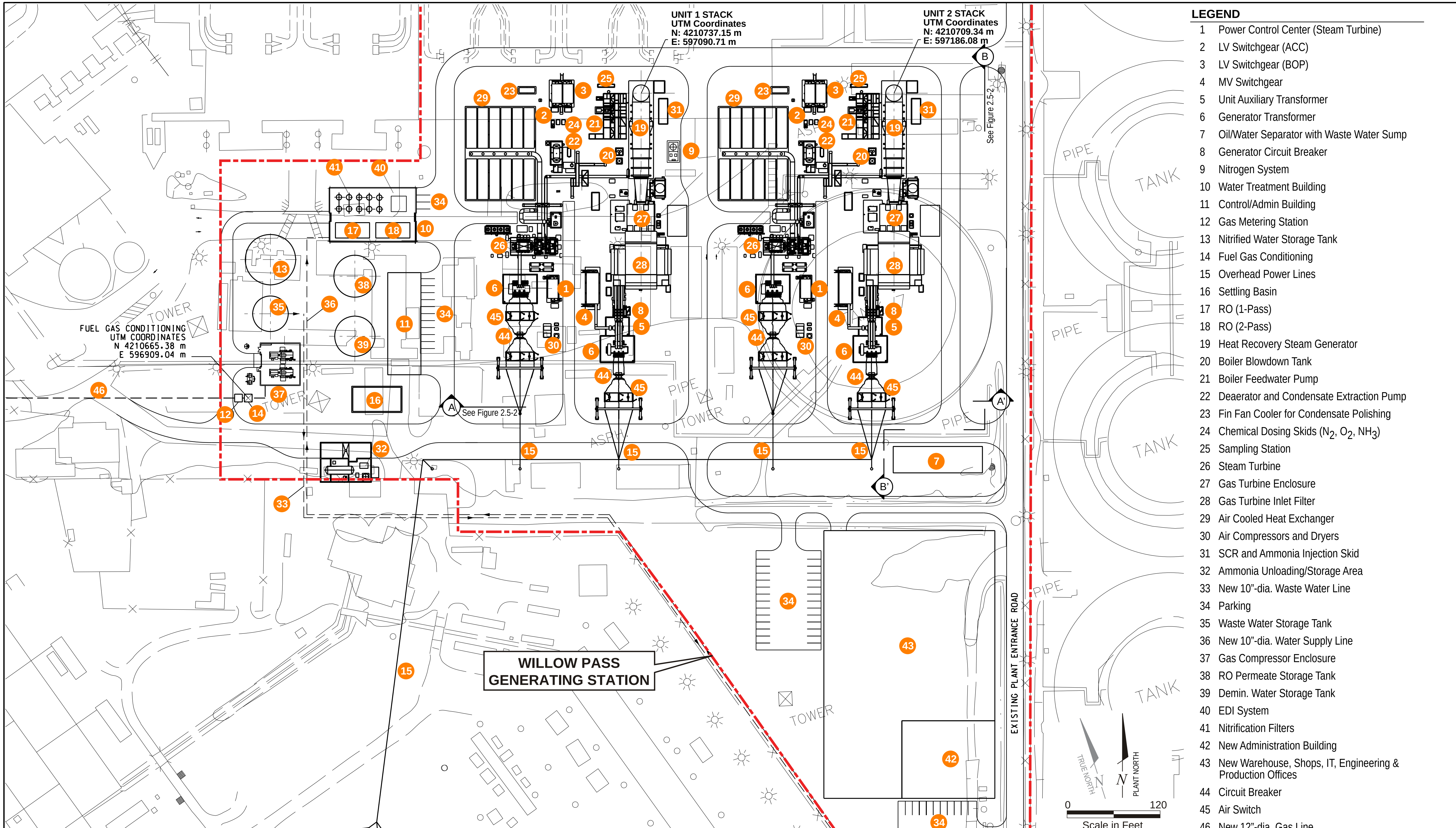
June 2008
28067343

Willow Pass Generating Station
Mirant Willow Pass, LLC
Pittsburg, California

URS

FIGURE 2.3-1

6/20/08 vsa ..\T:\Mirant Pittsburg-Willow Pass\Graphics\2.0 Facility Description\2.3-1_FP10 layout_6-20-08.ai



Source:
CH2MHill Lockwood Greene; General Arrangement Willow Pass Generating Station
Combined Cycle Siemens Flex 10s Equipment Layout;
Drawing No: MR-GA-PT-01-13 (Rev. E, 06/20/08)

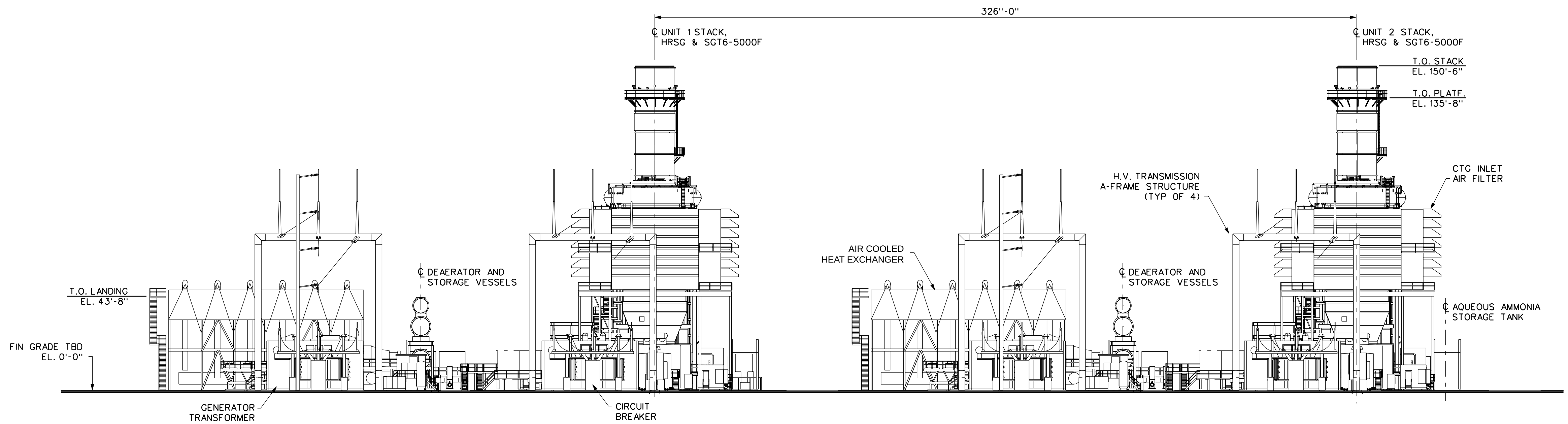
June 2008
28067343

PLOT PLAN
Willow Pass Generating Station
Mirant Willow Pass, LLC
Pittsburg, California

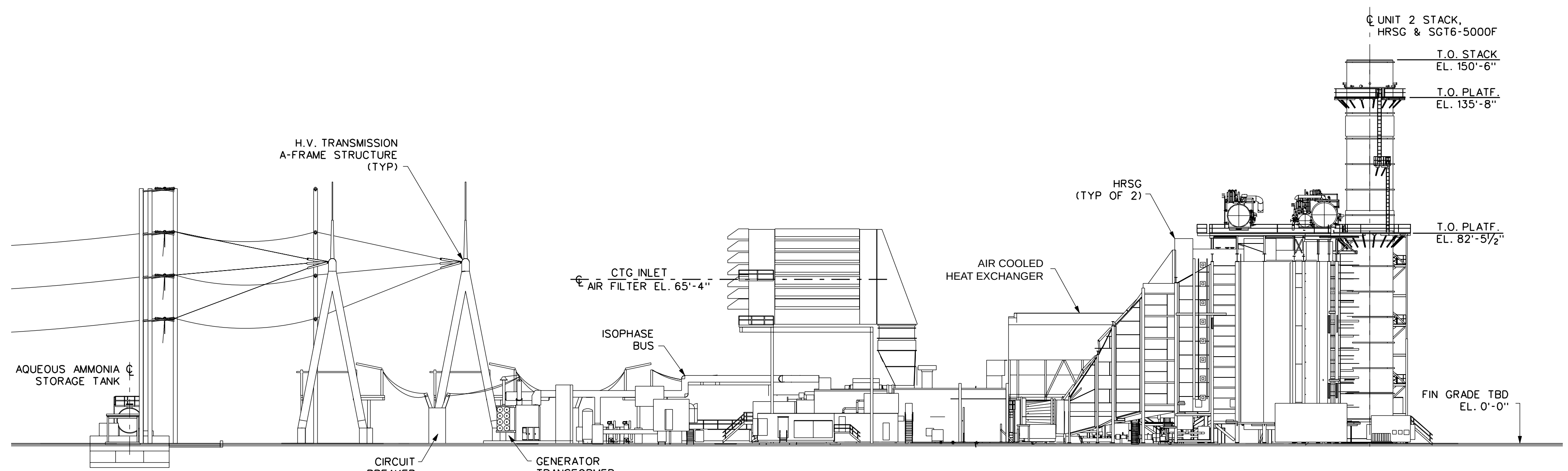
URS

FIGURE 2.5-1

6/24/08 vsa ..\T:\Mirant Pittsburg-Willow Pass\Graphics\2.0 Facility Description\2.5-1_plotplan_06-24-08.ai



SECTION A-A'
LOOKING NORTH



SECTION B-B'
LOOKING WEST

0 60
Approximate Scale in Feet

See Figure 2.5-1 for Section Locations

Source:
CH2MHill Lockwood Greene; General Arrangement, Willow Pass Generating Station
Combined Cycle Siemens Flex 10s Elevation Views
Drawing No: MR-GA-PT-01-14 (Rev. B, 5/1/08)

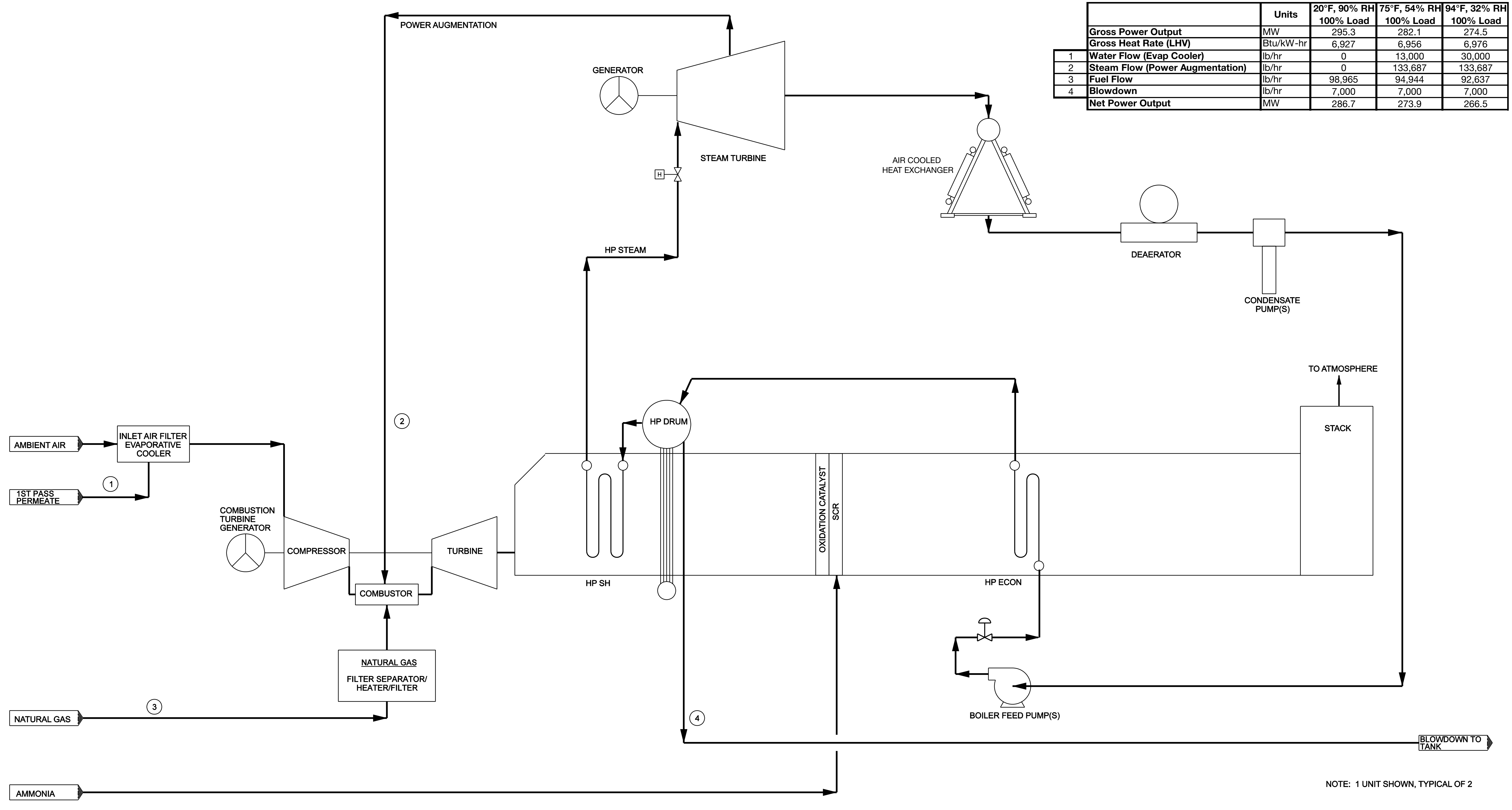
ELEVATION VIEWS

Willow Pass Generating Station
Mirant Willow Pass, LLC
Pittsburg, California

June 2008
28067343

URS

FIGURE 2.5-2



		Units	20°F, 90% RH 100% Load	75°F, 54% RH 100% Load	94°F, 32% RH 100% Load
	Gross Power Output	MW	295.3	282.1	274.5
	Gross Heat Rate (LHV)	Btu/kW-hr	6,927	6,956	6,976
1	**Water Flow (Evap Cooler)**	lb/hr	0	13,000	30,000
2	**Steam Flow (Power Augmentation)**	lb/hr	0	133,687	133,687
3	**Fuel Flow**	lb/hr	98,965	94,944	92,637
4	**Blowdown**	lb/hr	7,000	7,000	7,000
	Net Power Output	MW	286.7	273.9	266.5

Source:
CH2MHill Lockwood Greene; Process Flow Diagram, Willow Pass Heat Balance FP 10s
Drawing No: MC-PR-10-#-#-01 (Rev. P2, 06/19/08)

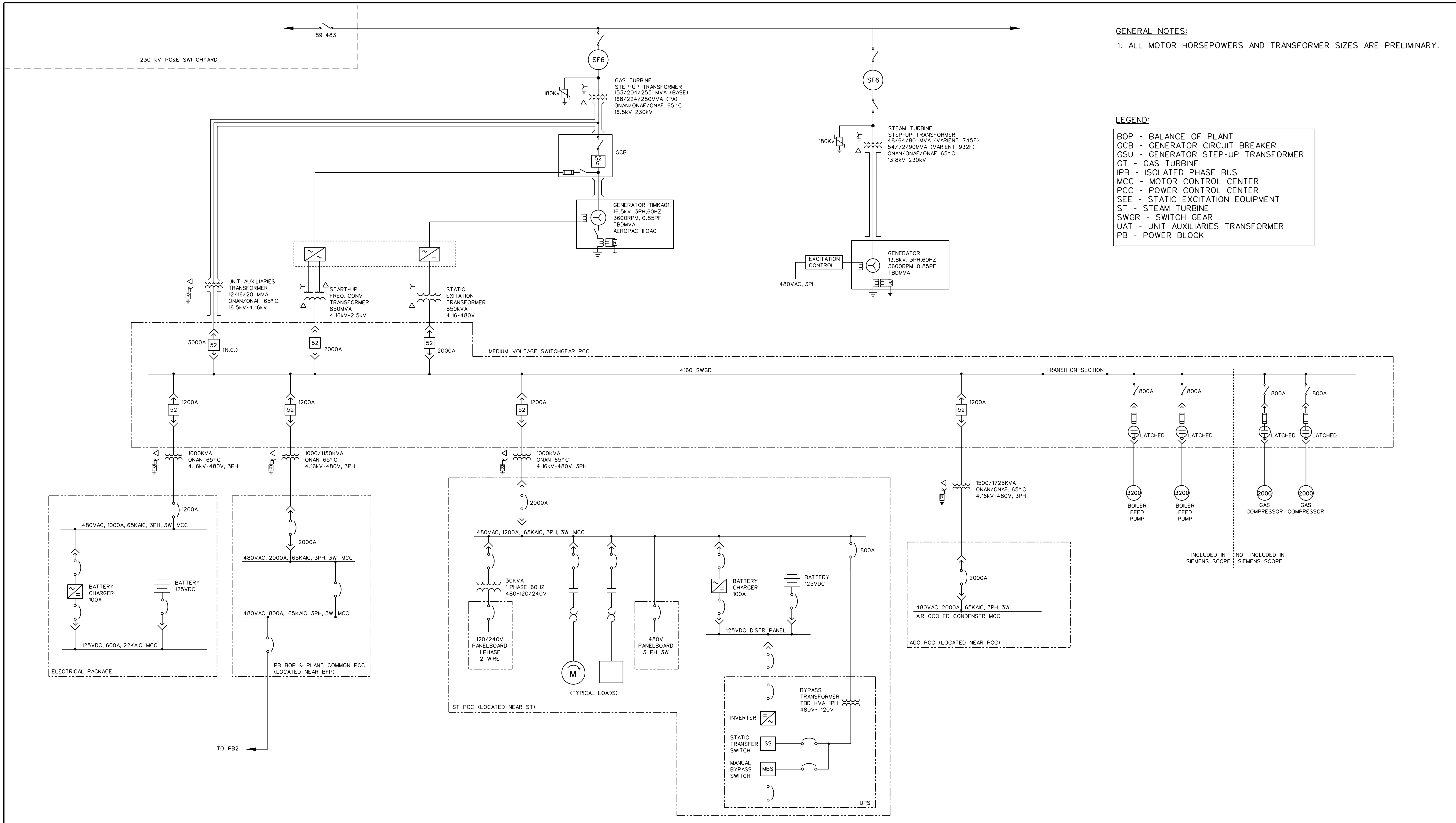
FLEX PLANT 10 HEAT AND MATERIAL BALANCE

Willow Pass Generating Station
Mirant Willow Pass, LLC
Pittsburg, California

June 2008
28067343

URS

FIGURE 2.5-3



Source:
CH2MHill Lockwood Greene; Electrical Willow Pass Generating Station,
Combined Cycle PB1, Overall Single-Line Diagram;
Drawing No: MR-EE-WP-00-02 (Rev. P2, 05/07/08)

FLEX PLANT 10
OVERALL SINGLE LINE DIAGRAM

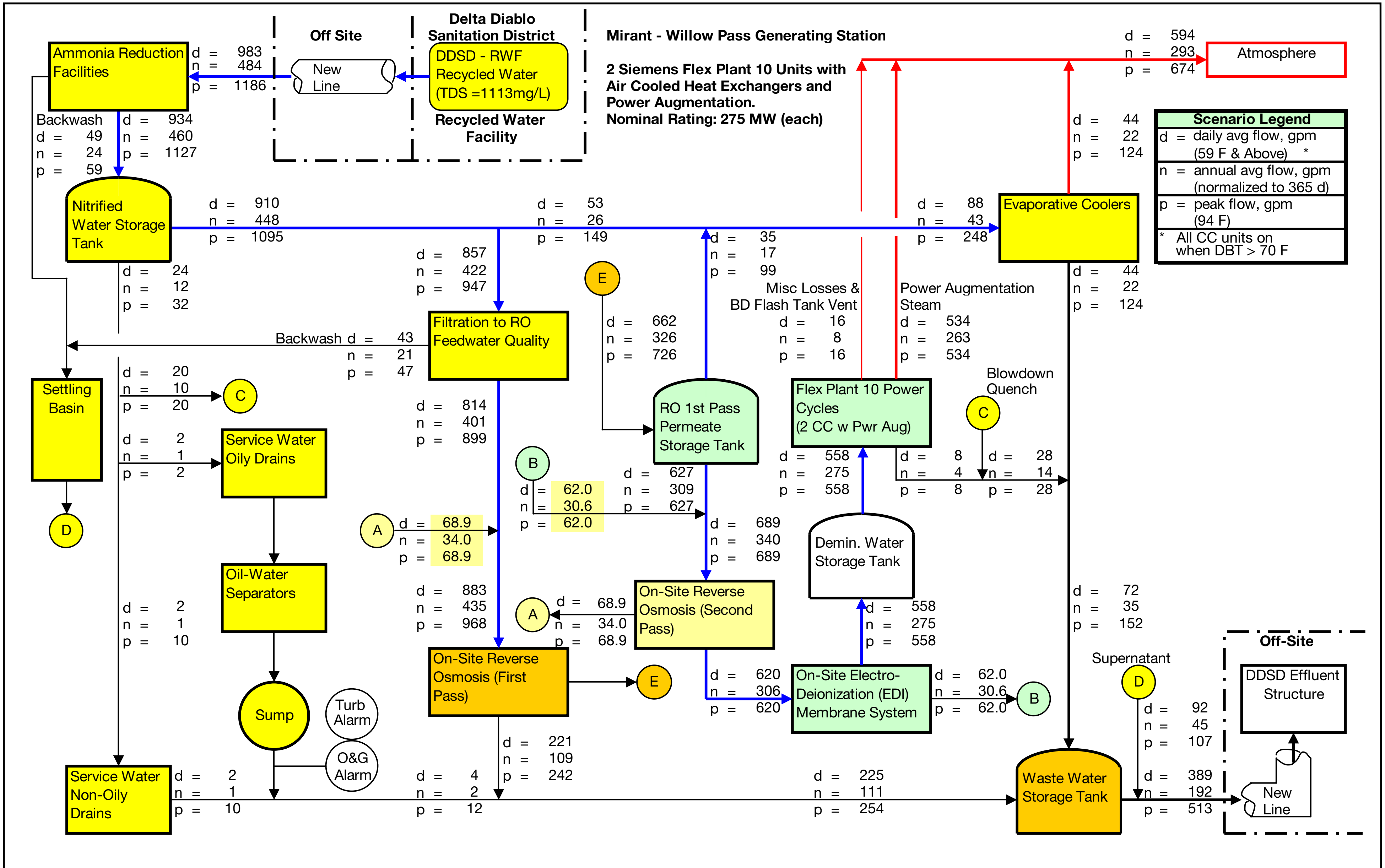
Willow Pass Generating Station
Mirant Willow Pass, LLC
Pittsburg, California

June 2008
28067344

URS

FIGURE 2.5-4

6/16/08 vsa ..\T:\Mirant Pittburg-Willow Pass\Graphics\2.0 Facility Description\2.5-4_FP10 Unit1.ai



Source:
CH2MHil, Water Balance - High Level Overview, Rev. 3 (June 12, 2008)

WATER BALANCE DIAGRAM

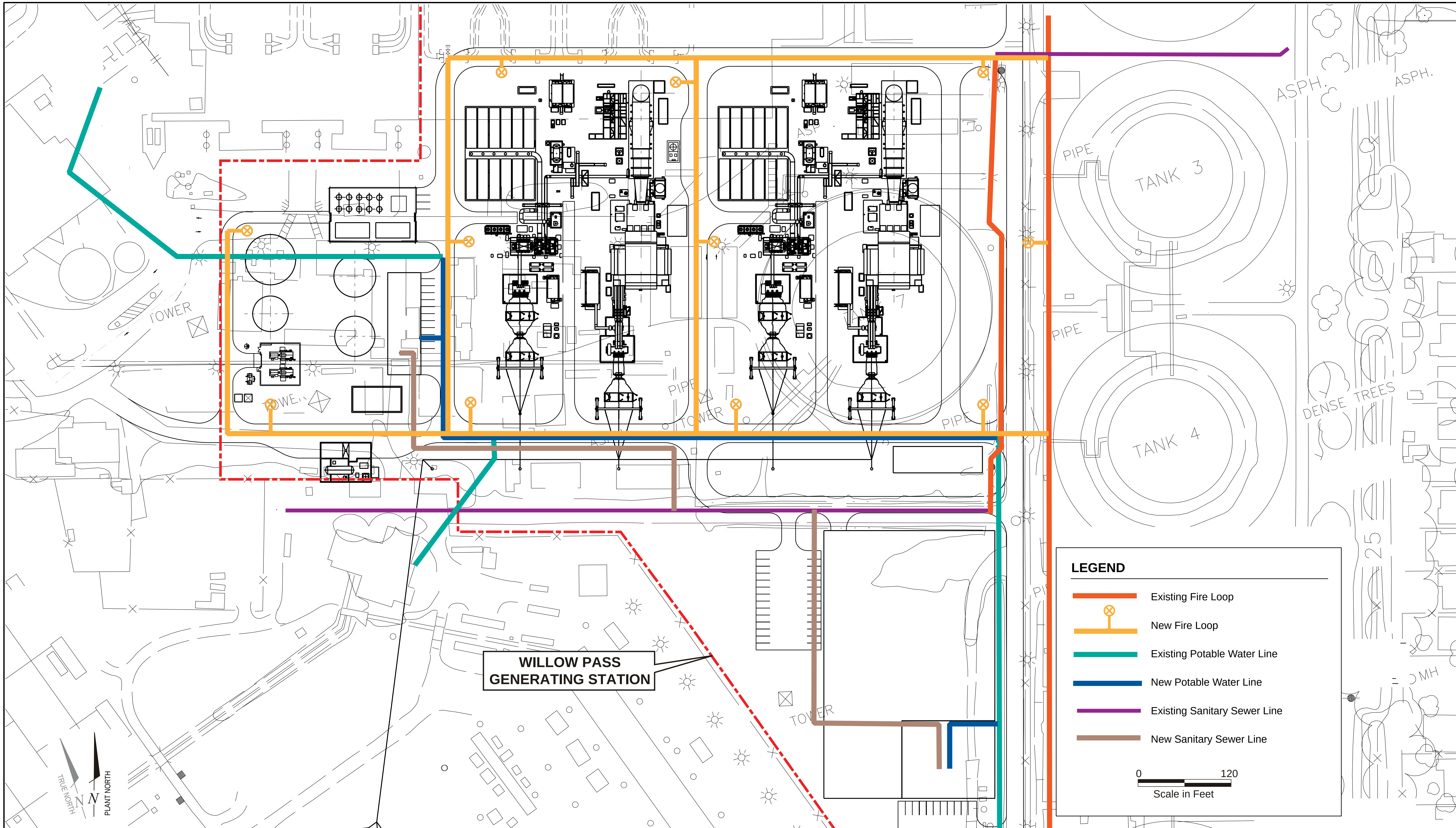
Willow Pass Generating Station
Mirant Willow Pass, LLC
Pittsburg, California

June 2008
28067343

URS

FIGURE 2.5-5

6/16/08 vsa ..\T:\Mirant Pittburg-Willow Pass\Graphics\2.0 Facility Description\2.5-5_WaterBalance.ai



Source:
CH2MHill Lockwood Greene; General Arrangement Willow Pass Generating Station
Firewater Loop Water Main;
Drawing No: MR-GA-PT-01-17 (Rev. C, 06/20/08)

FIREWATER LOOP AND POTABLE WATER MAIN

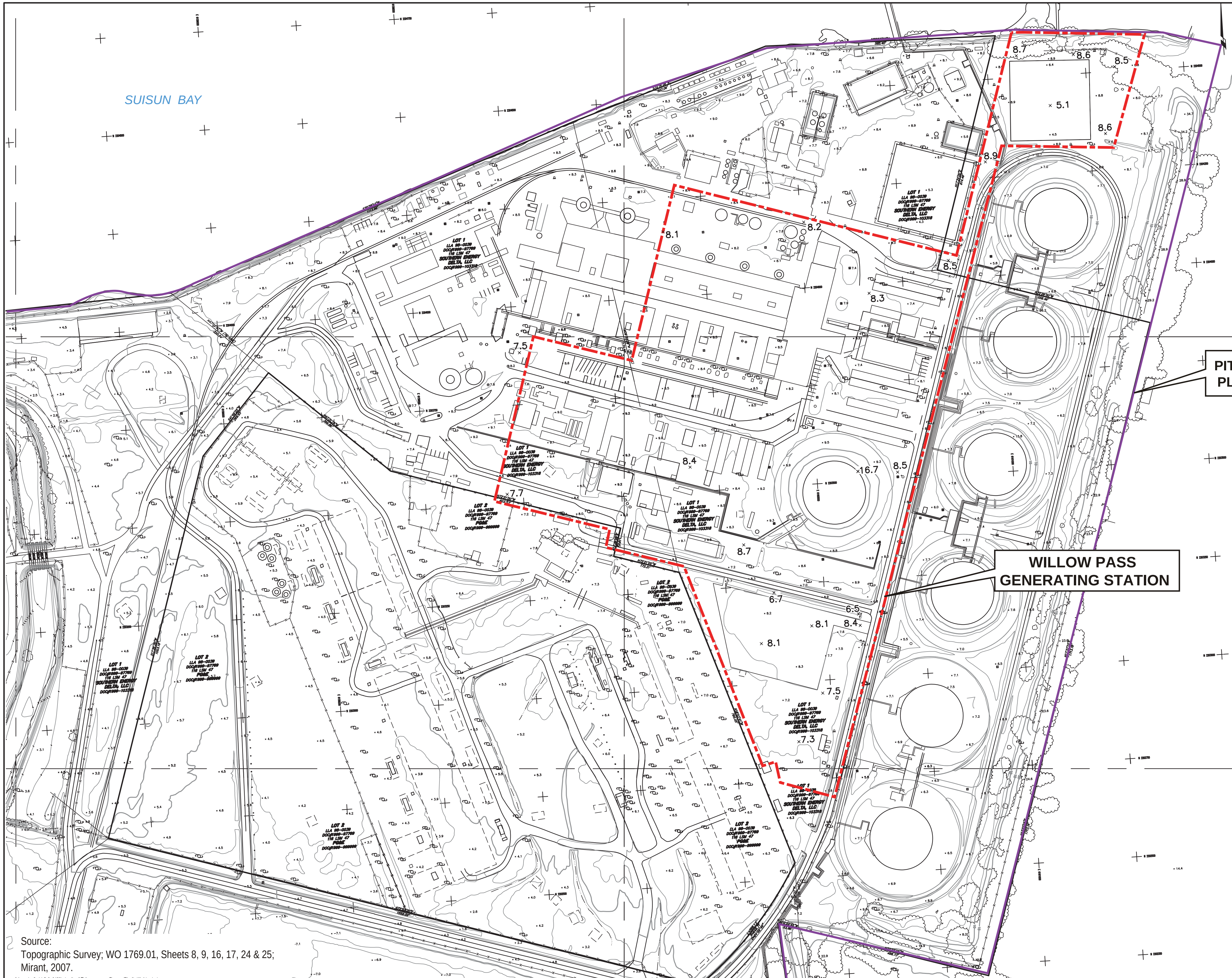
Willow Pass Generating Station
Mirant Willow Pass, LLC
Pittsburg, California

June 2008
28067343

URS

FIGURE 2.5-6

6/20/08 vsa ..\T:\Mirant Pittsburg-Willow Pass\Graphics\2.0 Facility Description\2.5-6_firewater loop.ai



ELEVATION STATEMENT

ELEVATIONS SHOWN HEREON ARE BASED UPON THE NATIONAL GEODETIC VERTICAL DATUM OF 1929 (NGVD29) HOLDING CCCo BM #633. CCCo BM #633 IS A 3" BRONZE DISK SET IN THE TOP OF THE WEST CONCRETE HEADWALL OF THE WILLOW PASS ROAD UNDERPASS AT THE S.P. RAILROAD CROSSING.
ELEVATION = 21.608.

HORIZONTAL DATUM & BASIS OF BEARINGS

HORIZONTAL DATUM AND COORDINATES ARE BASED UPON THE CALIFORNIA STATE PLANE COORDINATE SYSTEM 1983, ZONE 3, 2000.86 EPOCH. COORDINATE SYSTEM WAS ESTABLISHED BY GPS STATIC TIES TO NGS MONUMENTS PID#AH7472, PID#JS1883 AND PID#JS4835.

NOTE:

1.) THIS SURVEY DOES NOT REPRESENT A CURRENT BOUNDARY SURVEY. NO PROPERTY BOUNDARIES WERE LOCATED OR DETERMINED AS PART OF THIS SURVEY. BOUNDARY LINES SHOWN WERE COMPILED FROM FOLLOWING RECORD DOCUMENTS AND HAVE NOT BEEN LOCATED ON THE GROUND. REFERENCE: 63 LSM 15, 116 LSM 47 & DOC#1999-97770

Source:
Topographic Survey; WO 1769.01, Sheets 8, 9, 16, 17, 24 & 25; Mirant, 2007.

EXISTING SITE TOPOGRAPHIC SURVEY

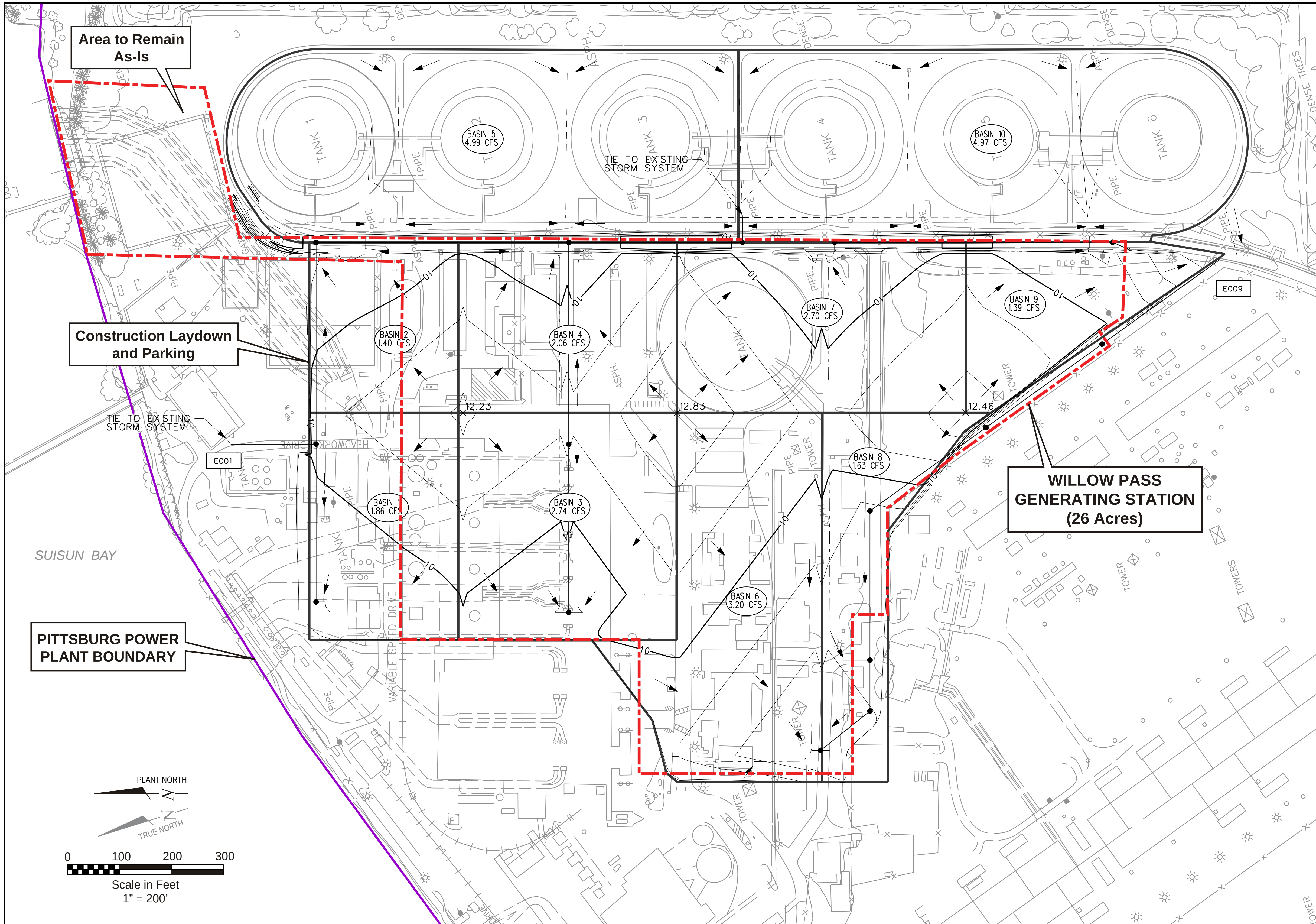
Willow Pass Generating Station
Mirant Willow Pass, LLC
Pittsburg, California

June 2008
28067343

URS

FIGURE 2.6-1

6/19/08 vsa ..\T:\Mirant Pittsburg-Willow Pass\Graphics\2.0 Facility\2.6-1_topo survey.ai



NOTES:

1. CONTOUR INTERVAL IS 1.0 FT.
2. DRAINAGE FLOWS SHOWN ARE BASED ON 25 YEAR - 24 HOUR STORM EVENT (See Appendix F)
3. TOTAL DISTURBED AREA: 26 ACRES (23 IN WPGS, 3 IN PPP)
4. CLEAN STORM WATER RUNOFF WILL BE CONVEYED TO OUTFALLS E001 & E009 THROUGH STORM DRAINS AND EXISTING DITCHES. AREAS OF POTENTIAL OIL/CHEMICAL CONTAMINATION WILL BE CONTAINED WITHIN CONCRETE CURBS AND CONVEYED TO AN ON -SITE OIL/WATER SEPARATOR.
5. EARTHWORK QUANTITIES ARE BANK.

EARTHWORK:

EST. CUT 8,305 C.Y.
EST. FILL 83,828 C.Y.
NET (IMPORT) -75,523 C.Y.

ASPHALT TO BE REMOVED:

208,120 S.Y.
23,124 C.Y. (ASSUMING 4" AVERAGE THICKNESS)

LEGEND

- Existing Storm System
- Flow Arrow
- Flow to Inlet (BASIN 17 0.44 CFS)
- Ultimate Outfall (E00X)
- Drainage Boundary
- Proposed Storm

Source:
CH2MHill Lockwood Greene; Civil Willow Pass Generating Station Drainage Plan Siemens Flex 10s Equipment Layout; Drawing No: MR-CI-PT-00-01 (Rev. C, 05/13/08)

SITE GRADING AND DRAINAGE PLAN

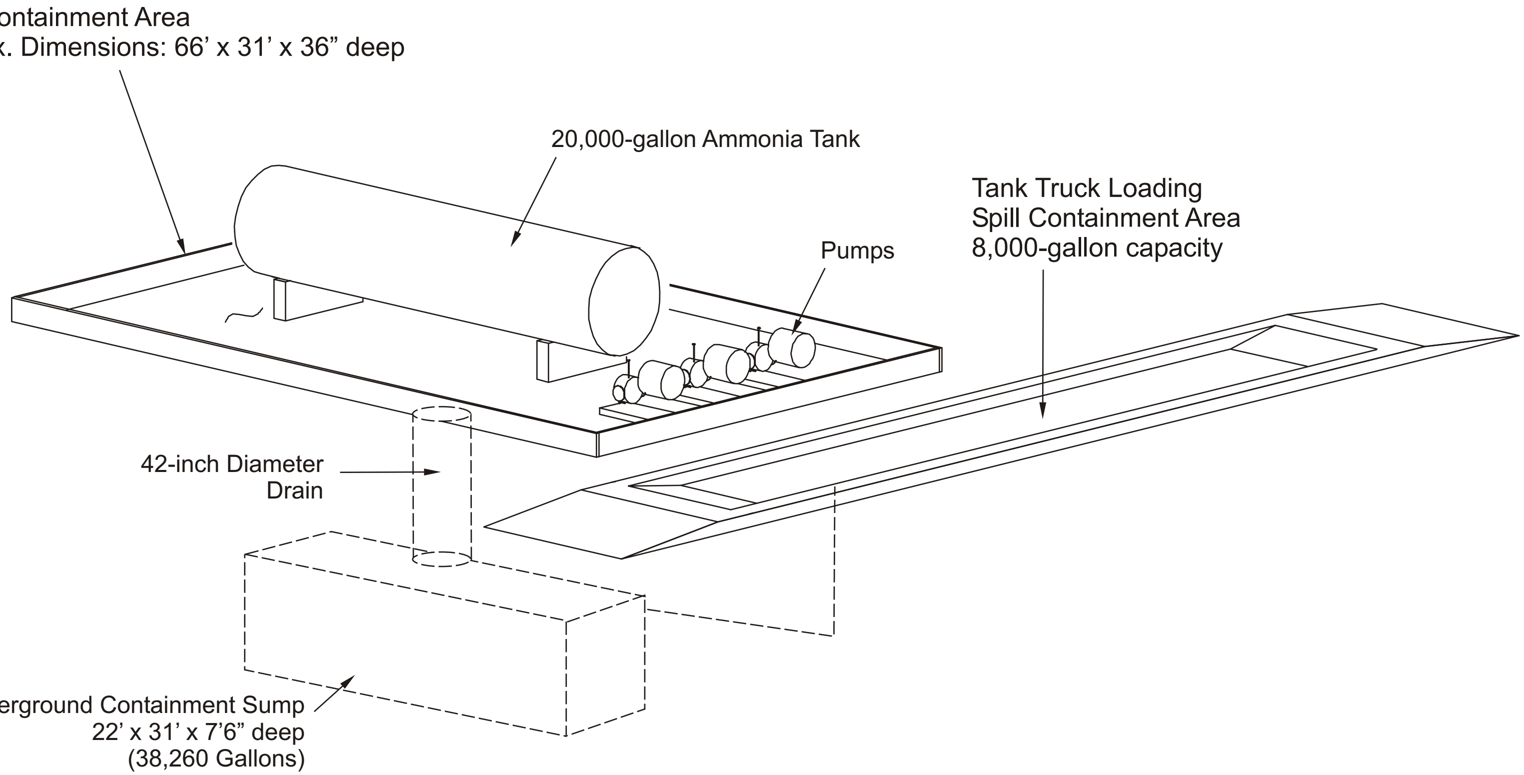
Willow Pass Generating Station
Mirant Willow Pass, LLC
Pittsburg, California

June 2008
28067343

URS

FIGURE 2.6-2

6/19/08 vsa ..\T:\Mirant Pittsburg-Willow Pass\Graphics\2.0 Facility Description\2.6-2_grading-drainage.ai



AQUEOUS AMMONIA STORAGE AND SPILL CONTAINMENT SCHEMATIC

Willow Pass Generating Station
Mirant Willow Pass, LLC
Pittsburg, California

June 2008
28067343

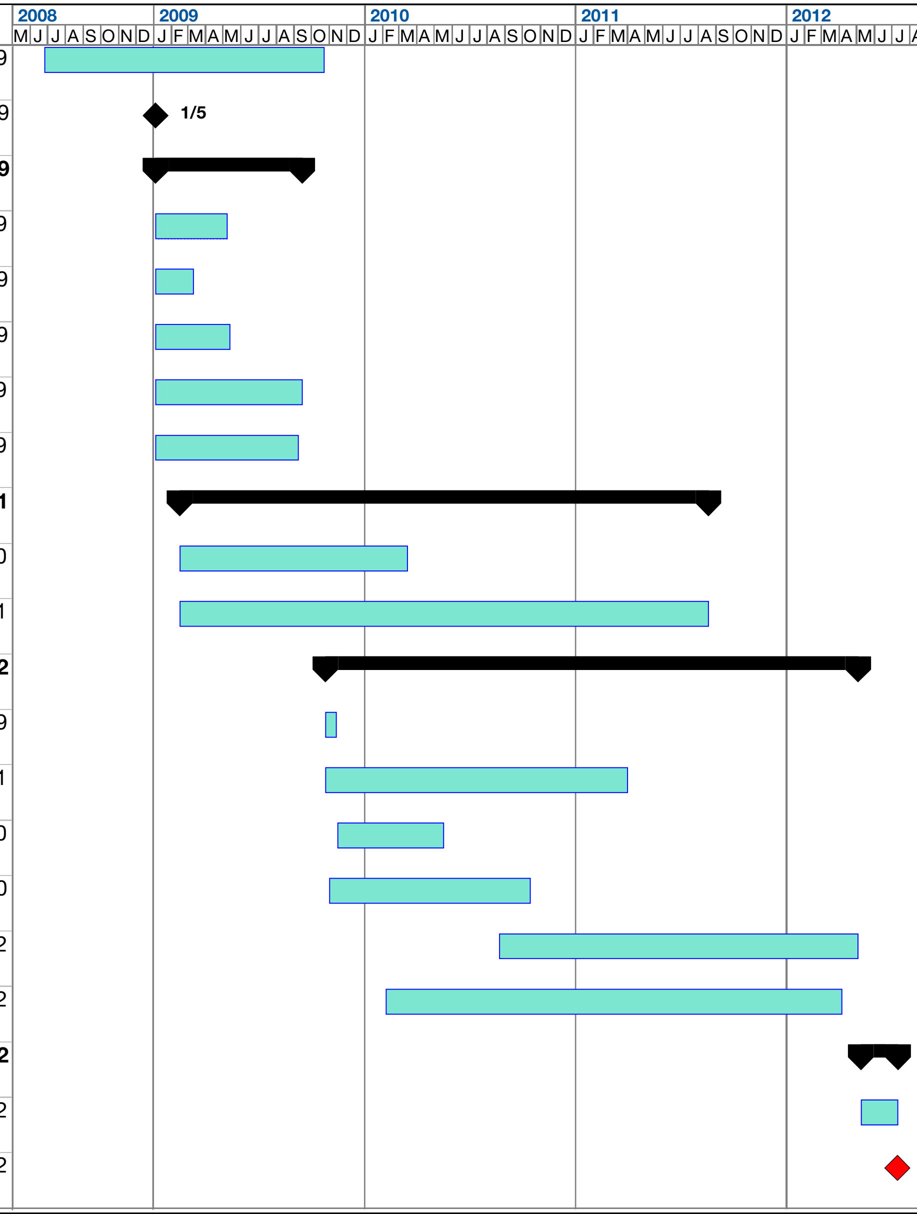
URS

FIGURE 2.6-3

6/15/08 vsa ..T:\Mirant Pittsburg-Willow Pass\Graphics\2.0 Facility Description\2.6-3_aquammonia.cdr

Willow Pass Generating Station

ID	Task Name	Start	Finish
1	**Permitting - Application for Certification**	Fri 6/27/08	Fri 10/23/09
2	**Full Notice to Proceed**	Mon 1/5/09	Mon 1/5/09
3	**Design**	**Mon 1/5/09**	**Tue 9/15/09**
4	Preliminary Engineering	Mon 1/5/09	Fri 5/8/09
5	Building Design	Mon 1/5/09	Wed 3/11/09
6	Civil & Structural Design	Mon 1/5/09	Wed 5/13/09
7	Electrical Design	Mon 1/5/09	Tue 9/15/09
8	Mechanical Design	Mon 1/5/09	Tue 9/8/09
9	**Fabrication/Delivery**	**Mon 2/16/09**	**Fri 8/19/11**
10	GSU Transformers	Mon 2/16/09	Tue 3/16/10
11	FP10 Units (includes HRSGs & ACHEs)	Mon 2/16/09	Fri 8/19/11
12	**Construction**	**Mon 10/26/09**	**Fri 5/4/12**
13	Site Mobilization	Mon 10/26/09	Fri 11/13/09
14	Demolition	Mon 10/26/09	Fri 4/1/11
15	Site Preparation & Grading	Mon 11/16/09	Tue 5/18/10
16	Foundations	Mon 11/2/09	Fri 10/15/10
17	Install FP10 Units (includes HRSGs)	Mon 8/23/10	Fri 5/4/12
18	BOP Equip/Elec/Control/Piping	Mon 2/8/10	Fri 4/6/12
19	**Startup**	**Thu 5/10/12**	**Thu 7/12/12**
20	FP10 Startup & Commissioning	Thu 5/10/12	Thu 7/12/12
21	FP10 Commerical Online Date	Thu 7/12/12	Thu 7/12/12



Date:06/09/08 | Task | Critical Path Item | Summary

PROJECT SCHEDULE

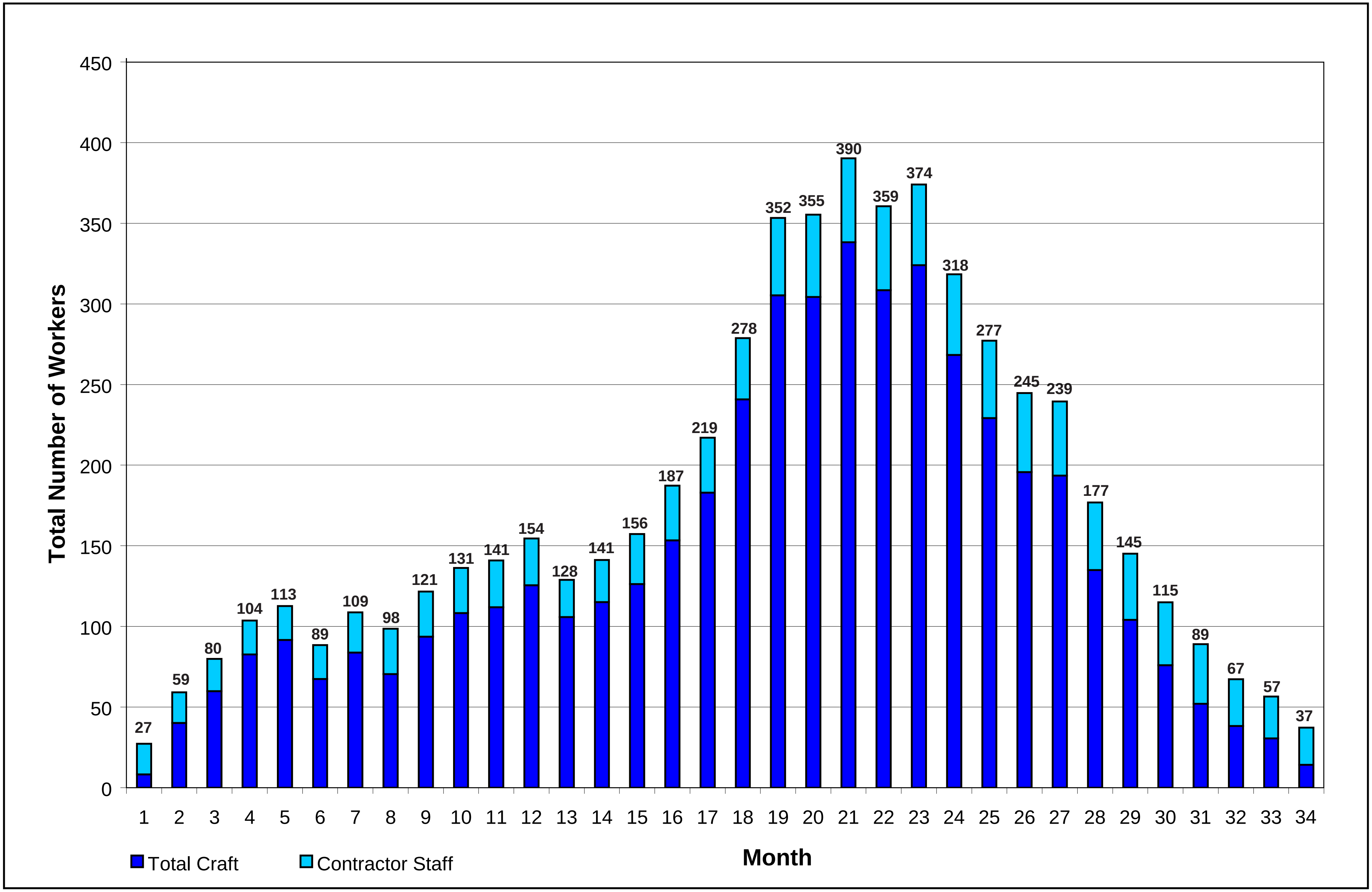
Willow Pass Generating Station
Mirant Willow Pass, LLC
Pittsburg, California

June 2008
28067343

URS

FIGURE 2.7-1

6/13/08 vsa ..\T:\Mirant Pittsburg-Willow Pass\Graphics\2.0 Facility Description\2.7-1_sched_6-09-08.ai



Source:
CH2MHill, May 2008

CONSTRUCTION STAFF BY MONTH

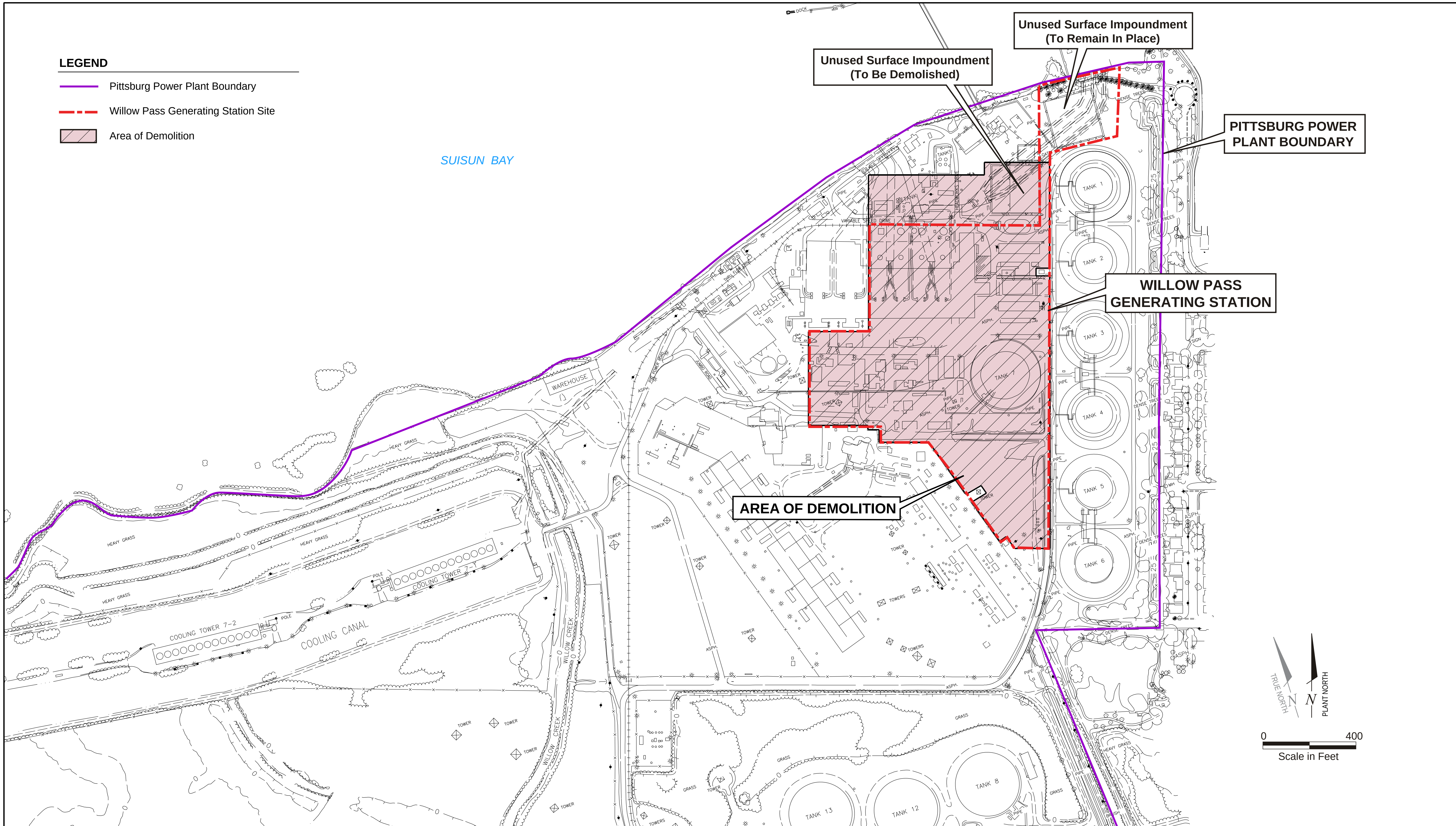
Willow Pass Generating Station
Mirant Willow Pass, LLC
Pittsburg, California

June 2008
28067343

URS

FIGURE 2.7-2

6/24/08 vsa ..\T:\Mirant Pittburg-Willow Pass\Graphics\2.0 Facility Description\2.7-2_const staff-fin.ai



Source:
CH2MHill Lockwood Greene; General Arrangement Willow Pass Generating Station Demolition Drawing, Drawing No: MR-GA-PT-01-15 (Rev. C, 05/01/08)

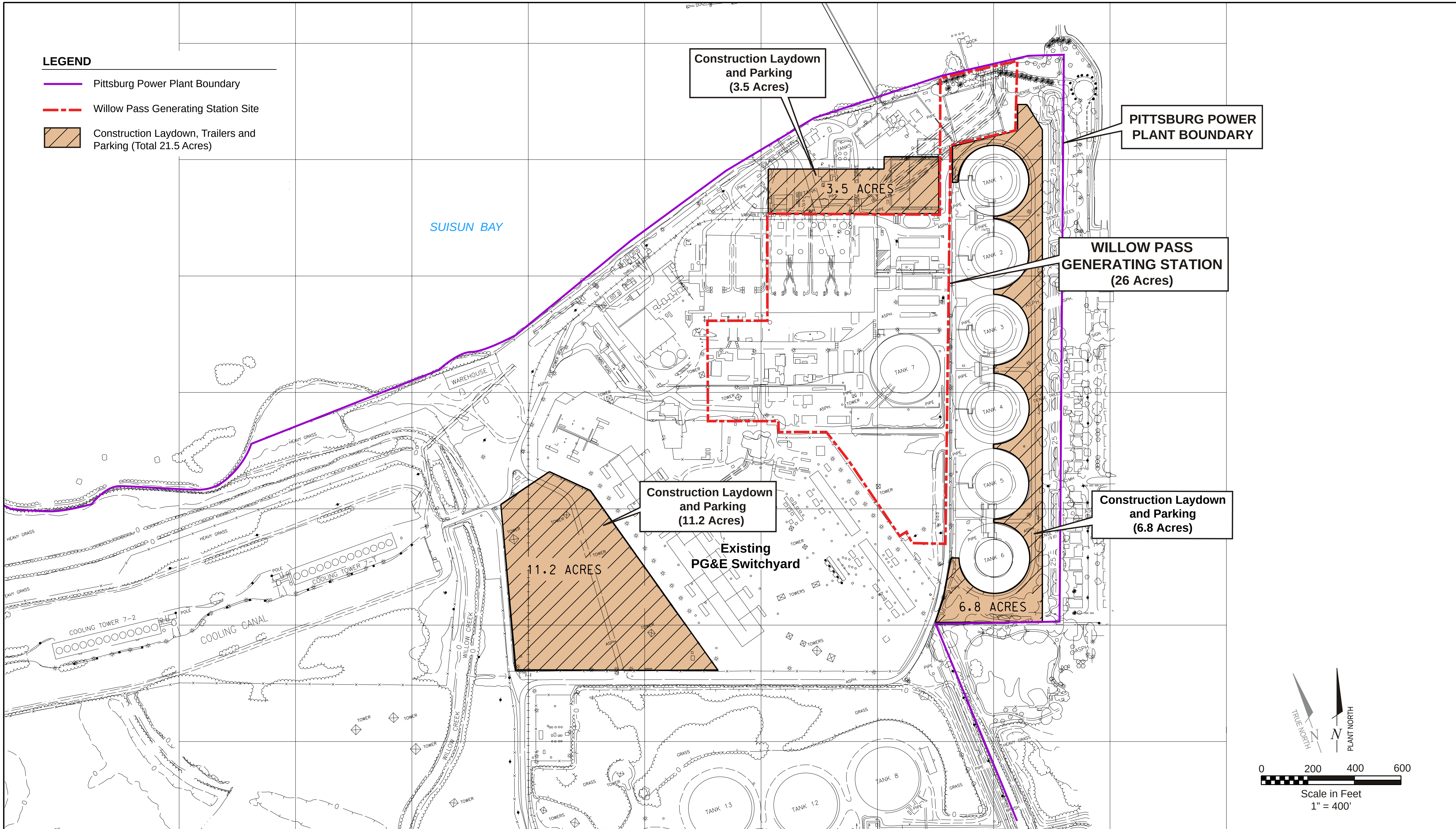
DEMOLITION AREA

Willow Pass Generating Station
Mirant Willow Pass, LLC
Pittsburg, California

June 2008
28067343

URS

FIGURE 2.7-3



Source:
CH2MHill Lockwood Greene; General Arrangement Willow Pass Generating Station Construction Laydown and Parking Layout;
Drawing No: MR-GA-PT-01-16 (Rev. A, 06/04/08)

CONSTRUCTION OFFICE, PARKING, AND LAYDOWN AREAS

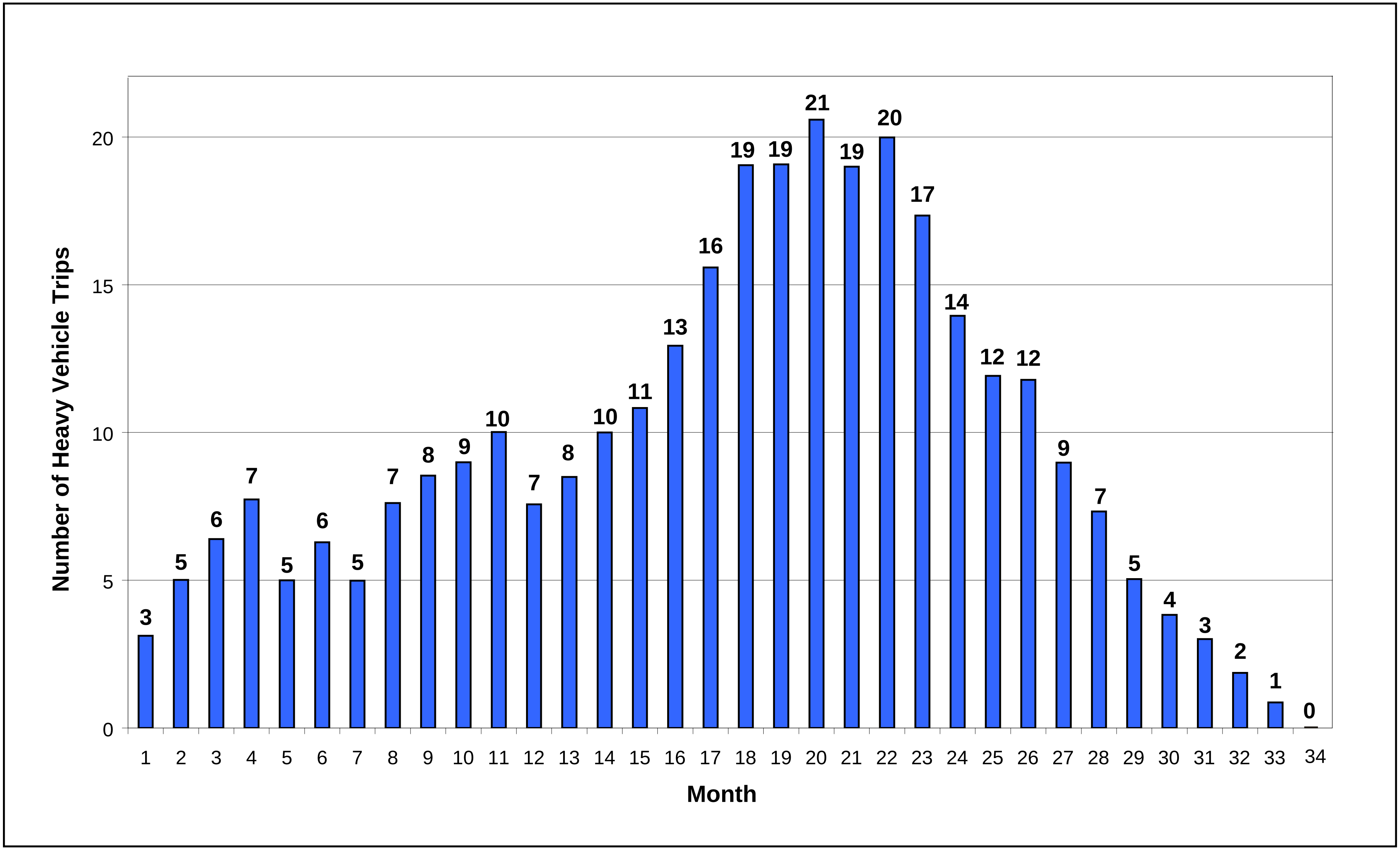
Willow Pass Generating Station
Mirant Willow Pass, LLC
Pittsburg, California

June 2008
28067343

URS

FIGURE 2.7-4

6/24/08 vsa ..\T:\Mirant Pittsburg-Willow Pass\Graphics\2.0 Facility Description\2.7-4_laydownarea.ai



Source:
CH2MHill, May 2008

HEAVY VEHICLE DELIVERY TRIPS

Willow Pass Generating Station
Mirant Willow Pass, LLC
Pittsburg, California

June 2008
28067343

URS

FIGURE 2.7-5

6/24/08 vsa ..\T:\Mirant Pittburg-Willow Pass\Graphics\2.0 Facility Description\2.7-5_vehicle trips_fin.ai