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7.5 NOISE

This section describes the existing noise environment at the Pittsburg Power Plant (PPP), evaluates the future noise environment in view of the development of the Willow Pass Generating Station (WPGS), and assesses potential noise impacts associated with the WPGS. Noise-sensitive receptors are identified, and laws, ordinances, regulations, and standards (LORS) that regulate noise levels from plant operations at those receptors are described. The following discussion describes the fundamentals of acoustics as they relate to noise assessment in the environs of power plants; the results of a detailed site reconnaissance; sound level measurements; previous noise studies that are applicable to the project; acoustical calculations; assessment of potential noise impacts from construction and plant operations; and applicable LORS. Where appropriate, mitigation measures are proposed to ensure that potential project-related noise impacts are at less-than-significant levels.

7.5.1 Affected Environment

7.5.1.1 Fundamentals of Acoustics

Noise is generally defined as loud, unpleasant, unexpected, or undesired sound that is typically associated with human activity and interferes with or disrupts normal activities. Although exposure to high noise levels has been demonstrated to cause hearing loss, the principal human response to typical environmental noise exposure levels is annoyance. The responses of individuals to similar noise events are diverse and influenced by many factors including the type of noise, the perceived importance of the noise, its appropriateness to the setting, the time of day and the type of activity during which the noise occurs, and noise sensitivity of the individual.

Sound is a physical phenomenon consisting of minute vibrations that travel through a medium, such as air, and are sensed by the human ear. Sound is generally characterized by several variables, including frequency and amplitude. Frequency describes the sound's pitch (tone) and is measured in cycles per second (Hertz [Hz]), while amplitude describes the sound's pressure (loudness). Because the range of sound pressures that occur in the environment is extremely large, it is convenient to express these pressures on a logarithmic scale that compresses the wide range of pressures into a more useful range of numbers. The standard unit of sound measurement is the decibel (dB).

Hz is a measure of how many times each second the crest of a sound pressure wave passes a fixed point. For example, when a drummer beats a drum, the skin of the drum vibrates a number of times per second. When the drum skin vibrates 100 times per second, it generates a sound pressure wave that is oscillating at 100 Hz, and this pressure oscillation is perceived by the ear/brain as a tonal pitch of 100 Hz. Sound frequencies between 20 and 20,000 Hz are within the range of sensitivity of the healthy human ear.

As mentioned above, sound level is expressed by reference to a specified national/international standard. This report refers to two acoustical quantities: (1) Sound Power Level (PWL) is used to express the sound energy radiated from a source; and (2) Sound Pressure Level (SPL) is used to describe sound at a specified distance or specific receptor location. In expressing sound power as a dB level, the standard reference sound power is 1 picowatt. In expressing SPL on a logarithmic scale, sound pressure is compared to a reference value of 20 micropascals. These terms are different and should not be confused. PWL is a measure of the inherent acoustic power radiated by a source, while SPL depends not only on the power of the source, but also on the distance from the source and on the acoustical characteristics of the space surrounding the source (absorption, reflection, etc.).

Outdoor sound levels decrease logarithmically as the distance from the source increases. This is due to wave divergence, atmospheric absorption, and ground attenuation. Sound radiating from a source in a

homogeneous and undisturbed manner travels in spherical waves. As the sound waves travel away from the source, the sound energy is dispersed over a greater area, decreasing the sound pressure of the wave. Spherical spreading of the sound wave reduces the noise level at a rate of 6 dB per doubling of distance.

Atmospheric absorption also influences the sound levels received by an observer. The greater the distance traveled, the greater the influence of the atmosphere and the resultant fluctuations. Atmospheric absorption becomes important at distances greater than 1,000 feet. The degree of absorption varies depending on the frequency of the sound as well as the humidity and temperature of the air. For example, atmospheric absorption is lowest (i.e., sound carries further) at high humidity, and high temperatures and lower frequencies are less readily absorbed (i.e., sound carries further) than higher frequencies. Over long distances, lower frequencies become dominant as the higher frequencies are more rapidly attenuated. Turbulence, gradients of wind, and other atmospheric phenomena also play a significant role in determining the degree of attenuation. For example, certain conditions (such as temperature inversions) can channel or focus the sound waves, resulting in higher noise levels than would result from simple spherical spreading.

Sound from a tuning fork contains a single frequency (a pure tone), but most sounds one hears in the environment consist not of a single frequency but rather a broad band of many frequencies differing in sound level. Because of the broad range of audible frequencies, methods have been developed to quantify these values into a single number. The most common method used to quantify environmental sounds consists of evaluating all frequencies of a sound according to a weighting system that is reflective of human hearing. Human hearing is less sensitive at low frequencies and extremely high frequencies than at the mid-range frequencies. This process is termed “A weighting,” and the resulting dB level is termed the “A weighted” decibel (dBA). “A weighting" is widely used in local noise ordinances and state and federal guidelines. In practice, the level of a noise source is conveniently measured using a sound level meter (SLM) that includes a filter corresponding to the dBA curve. Unless specifically noted, the use of A weighting is always assumed with respect to environmental sound and community noise, even if the notation does not show the “A.”

In terms of human perception, a sound level of 0 dBA is approximately the threshold of human hearing and is barely audible under extremely quiet listening conditions. This threshold is the reference level against which the amplitude of other sounds is compared. Normal speech has a sound level of approximately 60 dBA. Sound levels above about 120 dBA begin to be felt inside the human ear as discomfort, progressing to pain at still higher levels. Humans are much better at discerning relative sound levels than absolute sound levels. The minimum change in the sound level of individual events that an average human ear can detect is about 1 to 2 dBA. A 3 to 5 dBA change is readily perceived. An increase (or decrease) in sound level of about 10 dBA is usually perceived by the average person as a doubling (or halving) of the sound’s loudness.

Because of the logarithmic nature of the dB unit, sound levels cannot be added or subtracted directly, and are somewhat cumbersome to handle mathematically. However, some simple rules are useful in dealing with sound levels. First, if a sound’s intensity is doubled, the sound level increases by 3 dB, regardless of the initial sound level. Thus, for example: 60 dB + 60 dB = 63 dB, and 80 dB + 80 dB = 83 dB. Remember however, that it requires about a 10-dB increase to double the perceived intensity of a sound, and it is interesting to note that a doubling of the acoustical energy (a 3-dB increase) is at the lower limit of readily perceived change.

Although dBA may adequately indicate the level of environmental noise at any instant in time, community noise levels vary continuously. Most ambient environmental noise includes a mixture of noise from nearby and distant sources that creates an ebb and flow of sound, including some identifiable sources plus a relatively steady background noise in which no particular source is identifiable. A single

descriptor called the equivalent sound level (L_{eq}) is used to describe sound that is constant or changing in level. L_{eq} is the energy-mean dBA during a measured time interval. It is the "equivalent" constant sound level that would have to be produced by a given constant source to equal the acoustic energy contained in the fluctuating sound level measured during the interval. In addition to the energy-average level, it is often desirable to know the acoustic range of the noise source being measured. This is accomplished through the maximum L_{eq} (L_{max}) and minimum L_{eq} (L_{min}) indicators that represent the root-mean-square maximum and minimum noise levels measured during the monitoring interval. The L_{min} value obtained for a particular monitoring location is often called the acoustic floor for that location.

To describe the time-varying character of environmental noise, the statistical or percentile noise descriptors L_{10}, L_{50}, and L_{90} may be used. These are the noise levels equaled or exceeded during 10 percent, 50 percent, and 90 percent of the measured time interval. Sound levels associated with L_{10} typically describe transient or short-term events; L_{50} represents the median sound level during the measurement interval; and L_{90} levels are typically used to describe ambient noise conditions.

The Day-Night Average Sound Level (L_{dn}) represents the average sound level for a 24-hour day and is calculated by adding a 10 dB penalty only to sound levels during the night period (10:00 p.m. to 7:00 a.m.). The L_{dn} is the descriptor of choice used by nearly all federal, state, and local agencies throughout the United States to define acceptable land use compatibility with respect to noise. Within the State of California, the Community Noise Equivalent Level (CNEL) is sometimes used. CNEL is very similar to L_{dn}, except that an additional 5 dB penalty is applied to the evening hours (7:00 p.m. to 10:00 p.m.). Because of the time-of-day penalties associated with the L_{dn} and CNEL descriptors, the L_{dn} or CNEL dBA value for a continuously operating sound source during a 24-hour period will be numerically greater than the dBA value of the 24-hour L_{eq}. Thus, for a continuously operating noise source producing a constant noise level operating for periods of 24 hours or more, the L_{dn} will be 6 dB higher than the L_{eq} value. To provide a frame of reference, common sound levels are presented in Table 7.5-1.

7.5.1.2 Use of Near Field Versus Far Field Noise Emission Specifications

Measured and predicted noise levels may be used to objectively describe a selected noise environment. Several different types of sound descriptors, and secondary parameters where necessary, are used to convey specific information. Selection of the scientifically correct description set is typically dictated by the purpose for measuring and/or predicting (modeling) the noise levels. The two most common reasons for quantifying levels are related to occupational noise exposure and to community noise exposure. While a single noise source (such as a fan motor or an entire power plant) may be of interest in both cases, the purpose for obtaining the noise level is different for each concern. Thus, the description set used to describe the noise must include purpose-specific characteristics of the noise (e.g., its absolute and relative level, duration, temporal pattern, spectrum uniformity, and shape of radiation pattern), and, in some cases, the local or more distant characteristics of the propagation path and the physical environment.

In the case of occupational noise, the most important parameters are the absolute level of sound at the employee's ears during typical work tasks, the cumulative amount of sound energy to which a worker is exposed during a work shift, and the type of noise (relatively constant or "impulsive"). Because of the potential complexity of describing noise that might affect a worker, a short-cut criterion was developed to generally reduce the risk of adverse occupational noise exposure. This short-cut method is to describe and/or limit potential noise levels near a machine (sometimes called the "operator's position") or in a defined acoustic environment (e.g., shop floor, vehicle cab, or control room). "Near" is assumed to be 3 feet distant from the noise source in the vicinity of the worker's head (usually about 5 feet above local floor or ground). A location this close to a large noisy object is also in the object's acoustic near field and its sound pressure is subject to large fluctuations over small distances. The specification of a machine's

sound level as less than, no more than, or equal to "85 dBA at 3 feet" is useful (when combined with quite a bit of other information) for the limited purpose of addressing occupational noise exposure. However, it is not useful for describing or modeling the community noise exposure caused by the machine.

With respect to community noise, much more acoustic information is required to accurately describe (measure and model) the noise exposure that may result from the identical noise source causing a worker exposure (plus the sum of all additional different sources). For example, assume the noise source is very large (typical of machinery at power generating plants) and produces noise at a level of 85 dBA when measured at a nearby worker. What about the noise energy radiated by the other parts of the device into an adjacent community? If the machine radiates noise uniformly per unit area (which is not likely), it is the overall surface area of the machine that determines the total amount of noise that will ultimately reach the community. Two machines with the same 85 dBA at 3 feet specification may be grossly different in size. If the machine does not radiate noise uniformly from its entire surface (which is almost always the case), then "85 dBA at 3 feet" is a meaningless piece of acoustical information at other than one or a few points around the machine.

Thus, for example, the far-field SPL specification (e.g., "x" dBA at 400 feet) from one, a few, or a large group of machines may be used to more accurately predict the SPL of overall machine noise in the community for a range of distances from the machines. This is because measurements and prediction of noise level (in any given direction) in the noise source's acoustic far field (typically several hundred feet away for a very large source such as a power plant) are much more stable than near-field (very close to the source) measurements or specifications.

The best acoustic data to use for accurate community sound level modeling is the intrinsic PWL of each major noise source in specific octave bands. This information describes the overall sound energy emission of the source irrespective of its size, shape, or directivity, and takes into account the magnitude (level) and frequency (spectrum) of the noise emitted. The temporal component (which often, but not always, is continuous for power plants) and the distance attenuation component may then be calculated separately to determine the far field noise level from each major source (and energy summed to provide the overall power plant noise level) at various points of interest (e.g., plant boundary, rest home, residences, school) within the surrounding area. This method was used to model community noise exposure in the vicinity of the WPGS site.

7.5.1.3 WPGS Project Site and Vicinity

The WPGS site is situated within the existing PPP, at 696 West 10th Street, Pittsburg, CA, 94565. The PPP facility stretches from Suisun Bay to the north and Willow Pass Road/West 10th Street to the south. The PPP site is approximately 2 miles from the center of the City of Pittsburg.

The PPP site consists of approximately 1,000 acres, of which approximately 260 acres are currently used for power plant operations (not including the adjacent 36-acre Pacific Gas and Electric Company [PG&E] switchyard property). The site has a long history of industrial use and has been used for power generation since 1954. The facility consists of seven units, three of which are currently operational. These operational units are Units 5, 6, and 7. Units 5 and 6 were first operational in 1960 and 1961, respectively. Unit 7 was first operational in 1972. Each of the units is natural gas fired. The facility has a total generating capacity of approximately 1,311 megawatts. Energy from the PPP is available on a year-round basis, but has been predominantly operated in the summer months in recent years.

There are also 16 aboveground fuel oil storage tanks located on the PPP site. The tanks are arranged into two tank farm areas in the northeast and southeast portions of the property. Tanks 1 through 6 are located along the eastern boundary of the PPP site. These tanks are 160 feet in diameter and 48 feet high. Each

tank is surrounded by a 300-foot-diameter secondary containment structure that is 27.5 feet high. A 15-foot-tall earthen berm is also present along the PPP eastern boundary. The tanks and associated retaining basins as well as the berm serve as a boundary between the facility and offsite residential areas directly east of the PPP site. Additional tanks are located at the southeastern corner of the site adjacent to the main gate.

The WPGS site is bounded by Suisun Bay to the north, PPP Tanks 1 through 6 to the east, the PG&E switchyard to the south, and Units 5 and 6 and undeveloped areas to the west. Land surrounding the PPP site includes Riverview Park and a marina to the northeast, residential land uses to the east, Mariner Walk development and park to the southeast, commercial and industrial uses to the south, and open space to the west. The most significant noise-sensitive land use near the WPGS site is the residential area located 500 feet east of the WPGS site boundary, and immediately east of the PPP site. This area is separated from the WPGS site facility by existing Tanks 1 through 6 and a 15-foot-tall earthen berm along the PPP eastern boundary.

Ambient Noise Surveys

Environmental noise was measured at the WPGS site and at selected offsite locations on April 29 and 30, 2008. Noise level measurements were made at the northern and southern extents of the residential community nearest to the WPGS site. These locations were specifically selected to enable the assessment of noise exposure and potential impacts resulting from the project, and are representative of the diverse noise environments within the community. The offsite locations represent receptor locations within the community nearest to the WPGS site. The ambient noise surveys were comprehensive long-term (LT) (25-hour) automated measurements of existing ambient noise.

Figure 7.5-1 shows the locations where the measurements were conducted. During the survey, two LT measurements were conducted to acoustically describe the project site and its environs, and to determine the existing sound levels at potential noise-sensitive receptors.

The SLM at LT-1 was located east of the WPGS site, at the property line of the nearest residential receptor. This location is representative of the northern extent of the nearest residential community and, due to its close proximity to the plant, represents the most potentially impacted noise receptor. The SLM was located along the top of the earthen berm separating the PPP facility from the residential area. Noise sources during the measurement included existing plant operational noise, typical community activity such as vehicular pass-bys and pedestrians, distant aircraft, and wildlife. The SLMs measured noise levels for contiguous 15-minute intervals during a 25-hour period (4:00 a.m., April 29, 2008, to 5:00 a.m., April 30, 2008).

The SLM at LT-2 was located southeast of the WPGS site at Mariner Walk Park. The park contains a baseball field, open areas, and a children's playground, and is a prominent location within the community. With regard to potential project noise exposure, the location is representative of the southern extent of the nearest residential community. Noise sources during the measurement survey included traffic noise, noise associated with park activities such as softball games and playground activities, barking dogs, distant aircraft, and wildlife, in addition to existing plant operational noise. The SLM measured noise levels for contiguous 15-minute intervals during a 25-hour period (7:00 a.m., April 29, 2008, to 8:00 a.m., April 30, 2008).

In addition to the noise measurement survey, the City of Pittsburg provided information regarding noise complaint data. A review of noise complaints recorded within the previous 5 years was conducted. The review encompassed both city environmental planning staff and the Pittsburg Police Department. Complaint data were correlated with location, and special emphasis was placed on the properties east of

the existing facility. This research did not identify any noise complaints associated with facility operations within the past 5 years (Vahl, 2008). A review of Mirant noise complaint data revealed one noise complaint from this area within this period.

7.5.1.4 Methods

As indicated above, the automated SLMs measured average noise levels in contiguous 15-minute intervals during a 25-hour period. The measurements were made with two Larson Davis Model 820 (LT-1 Serial Number 1528, LT-2 Serial Number 1597) SLMs.

The sound measurement instruments meet the requirements of the American National Standards Institute (ANSI) Standard S1.4-1983 and the International Electrotechnical Commission Publications 804 and 651, and are the best instrumentation available outside of a specialized laboratory setting. The instruments used for the survey were set on Slow time response using the dBA scale. A-weighting is used so that the instrument's response is similar to human hearing, which is less sensitive to low and very high-pitched sounds. In all cases, the microphone height was 5 feet above the ground and the microphone was equipped with a windscreen. Each sound measuring instrument was programmed to record L_{eq}, L_{max}, L_{min}, and statistical distributions of sound level (L_{10}, L_{50}, and L_{90}) for each measurement period.

Atmospheric conditions during the survey period were suitable for conducting noise measurements. Temperatures and humidity conditions ranged from 57 degrees Fahrenheit (°F) and 75 percent relative humidity during nighttime hours to 77°F and 30 percent relative humidity during the daytime hours. Winds varied from calm conditions to occasional gusty conditions. Gusts were typically 10 to 12 miles per hour, although occasional stronger gusts were recorded. Sky conditions were clear throughout the survey period.

To ensure accuracy and to verify laboratory calibration, the instruments were also checked in the field before and after each measurement period. The calibration of the SLMs was verified with a Larson Davis Model CAL200 acoustic calibrator (Serial Number 2794). The accuracy of the acoustical calibrator is maintained through a program established through the manufacturer and traceable to the National Institute of Standards and Technology. All field procedures were consistent with professional practice and ANSI Standards for measuring environmental noise.

The stored data from the instruments were downloaded to a personal computer for subsequent analysis. The overall noise environment in L_{dn} was calculated for the long-term locations from the hourly L_{eq} dBA values. The 10-dB nighttime penalty integral to the L_{dn} noise descriptor was added to the hourly data for the hours between 10:00 p.m. and 7:00 a.m.

7.5.1.5 Results

Listings of the hourly noise data at the two long-term measurement locations are provided in Tables 7.5-2 and 7.5-3. LT-1 is located east of the WPGS site and is the nearest noise-sensitive receptor location. The receptor is a relatively isolated residential location that backs to the PPP property line. The SLM was located along the top of the earthen berm separating the PPP facility from the residential area east of the facility. The nearest residential structure to this location is approximately 30 feet east of LT-1 and below the berm. The berm provides noise attenuation from facility noise, and noise levels at the structure are less than the noise levels recorded at LT-1. The quietest four consecutive hours, in terms of the L_{90} metric, is commonly used by the California Energy Commission (CEC) for determining potential noise impacts. Based on the data obtained from the noise measurement survey, the quietest four consecutive hours occurs during the period from 4:00 a.m. to 7:00 a.m. on April 29, 2008. The average L_{90} for this period is 50.3 dBA. The existing 25-hour measured CNEL at LT-1 is 69.5.

LT-2 is located southeast of the WPGS site at the northwest corner of Mariner Walk Park. While LT-1 can be considered the "worst case" scenario in terms of noise exposure, LT-2 is representative of the "typical scenario" in terms of noise exposure from the facility. This characterization is made based on the human activity in the vicinity of the location and the distance to the WPGS site. Based on the data obtained from the noise measurement survey, the quietest four consecutive hours occurs during the period from 2:00 a.m. to 6:00 a.m. The average L_{90} for this period at LT-2 is 48.1 dBA. The existing 25-hour measured CNEL at LT-2 is 64.7.

7.5.2 Environmental Consequences

This section summarizes the noise impact analysis conducted for the WPGS. Expected noise levels from the project were modeled (predicted) for noise-sensitive receptors in the study area including the future facility boundaries. The predicted noise levels were compared with existing ambient noise conditions and typical residential noise criteria to determine the potential for environmental noise impact as a consequence of construction and operation of the project.

7.5.2.1 Significance Criteria

Noise would be produced at the site during both the construction and operational phases of the project. Potential noise impacts from both activities are assessed in this section. For the purposes of this analysis, the following significance criteria were used to determine the magnitude of potential noise impacts:

- Noise impacts would be considered significant if project operation activities would conflict with the Noise Element of the Pittsburg General Plan by failing to minimize noise at the source for new development deemed to be a noise generator, or by failing to protect public health or welfare, or by failing to limit generation of loud noises during construction to normal business hours between 8:00 a.m. and 5:00 p.m.

- Noise impacts would be considered significant if project operation activities would conflict with the Pittsburg Municipal Code by allowing noise levels that are considered unreasonable or potentially dangerous to the public health and welfare.

- Noise impacts would be considered significant if project operation activities would conflict with the Noise Element of the Contra Costa General Plan for areas west of the PPP site by allowing annoying or inappropriate noise conditions.

- Noise impacts would be considered significant if project operation activities would conflict with the Contra Costa County Code by not controlling operations to prevent noise nuisances to public and private ownerships.

- Noise impacts would be considered significant if project-generated operation noise would result in a noise level increase at noise-sensitive locations of more than 5 dBA above existing ambient noise levels.

7.5.2.2 Modeled Construction Noise

Construction is expected to take place for several months, with varying degrees of activity occurring during different phases of construction. Construction phases are expected to include:

- Excavation;
- Concrete pouring;
- Steel erection;

- Mechanical/electrical installation; and
- Cleanup.

Construction noise for WPGS would be typical of noise associated with industrial facility construction activities. Noise sources that are associated with most large industrial construction sites (including power plants) include air compressors, track hoes, backhoes, graders, bulldozers, scrapers, front-end loaders, cranes, hoists, generators, boom trucks, portable welders, and various heavy trucks and smaller vehicles. The exact noise levels are a complex function of such factors as the actual noise levels emitted from each major noise-emitting equipment, their location and orientation within the construction area, and their operation and load.

To realistically estimate the plant construction noise impacts, the composite noise levels listed in Table 3.1 of the *Power Plant Construction Noise Guide* (the Guide) were used (Barnes, Miller, and Wood, 1977). The composite noise levels are based on intensive noise monitoring during the construction of 15 actual power plants. The noise monitoring for the composite levels was done at locations selected to avoid undue excess attenuation from atmospheric conditions and terrain. The construction equipment was characterized as typical; it was neither unusually noisy nor quiet. The noise measurement data from the 15 power plants were normalized to consistent propagation conditions as follows: 59° F, 70 percent relative humidity, no wind or temperature gradients, flat terrain, and no soft ground (vegetation) losses. One important consideration in using these data is that the measurements are over 20 years old. Thus, actual construction noise was probably overestimated (there has been a trend towards quieter equipment in the intervening years). This same observation would be made if the U.S. Environmental Protection Agency (U.S. EPA) construction equipment or phases of construction noise level data were used, because the U.S. EPA data were compiled in 1971. In spite of this consideration, these data are comprehensive and have the advantage of integrating significant variability to arrive at average impacts from construction. The estimated variability of the composite levels is ±3 dB for transient noise events, but is conservative overall.

For each phase of construction, the composite noise levels (defined in the *Guide*) provide long-term average L_{eq} at multiple distances from a hypothetical power plant construction site. These levels were then used to predict noise levels at the nearest residential use (LT-1), located east of the WPGS site, using simple spherical divergence of the sound wave energy from the site to LT-1, 1,500 feet distant. No additional excess attenuation due to vegetation, wind, atmospheric absorption, or temperature gradients was assumed. The results of the modeling are presented in Table 7.5-4. These results indicate that worst-case construction noise would be at or below existing noise levels at this location. Noise from WPGS construction will be lower at more distant noise-sensitive locations.

Periodically, some noises will be higher or lower than the levels presented here, but the overall sound levels should be lower because of excess attenuation and the trend toward quieter construction equipment in the decade since the data were developed. These noise levels are based on data from normal workday construction only. Where nighttime or weekend construction must occur, shifts are usually smaller and noise levels correspondingly lower. In the *Guide*, only one of 15 sites had evening construction activity. In that instance, the crew was about one-third the size of the daytime force and noise levels were about 4 dB lower.

A reference distance of 100 feet was used to evaluate onsite construction noise levels and their potential impact on workers. These noise levels are also presented in Table 7.5-4. These noise levels will vary significantly depending on whether a worker is close to or conducting a noisy activity, but the L_{eq} are projected to average between 70 and 80 dBA during construction. Some workers will be occasionally exposed to noise levels above 85 dBA during construction.

Linear Facilities

New offsite linear facilities will include 5-mile-long water supply and water discharge pipelines interconnecting the WPGS with the Delta Diablo Sanitation District Wastewater Treatment Plant (DDSD WTP).

The linear pipelines primarily follow along existing roadways and the Union Pacific Railroad to the DDSD WTP. Construction noise impacts from installation of the pipelines will be temporary in nature and will not contribute to the long-term ambient noise environment in these areas. Limiting noisy construction to daytime hours should provide adequate mitigation of impacts.

Pile Driving

Pile driving will be necessary for construction of the WPGS. Noise from these operations could be expected to reach 104 dBA at a distance of 50 feet. Based on simple geometric dispersion, pile driving noise would thus be projected to reach levels of 81 dBA at LT-1, the nearest residential receptor. Added to the existing daytime ambient level of 64.5 dBA Leq, this would combine to produce 81.1 dBA, an increase of 16.5 dBA over the ambient level.

The actual impact at the receptor locations will be greatly reduced from this value due to localized attenuation (approximately 10 dBA, variable by specific location). While this would produce a noticeable impact, limiting pile driving to daytime hours, localized attenuation, and the temporary nature of the pile driving would result in impacts that are tolerable to residents.

Steam Blows

Typically, the loudest noise encountered during construction, inherent in building any project incorporating a steam turbine, is created by the steam blows. After erection and assembly of the feed water and steam systems, the piping and tubing that comprise the steam path have accumulated dirt, rust, scale, and construction debris such as weld spatter, dropped welding rods, and the like. If the plant were started up without thoroughly cleaning out these systems, all this debris would find its way into the steam turbine, quickly destroying the machine.

To prevent this, before the steam system is connected to the turbine, the steam line is temporarily routed to the atmosphere. Traditionally, high-pressure steam is then raised in the heat recovery steam generator or a temporary boiler and allowed to escape to the atmosphere through the steam piping. This flushing action, referred to as a "high pressure steam blow," is quite effective at cleaning out the steam system. A series of short steam blows, lasting 2 or 3 minutes each, is performed several times daily over a period of 2 or 3 weeks. At the end of this procedure, the steam lines are connected to the steam turbine, which is then ready for operation.

High-pressure steam blows, if unsilenced, can typically produce noise levels as high as 129 dBA at a distance of 50 feet; this would amount to roughly 103 dBA at LT-1, the nearest sensitive receptor. With a silencer installed on the steam blow piping, noise levels are commonly attenuated to 89 dBA at 50 feet; this would yield approximately 66 dBA at LT-1 without consideration of path attenuation.

A quieter steam blow process, referred to as low pressure steam blow and marketed under names such as QuietBlow™ or Silentsteam™, has become popular. This method uses lower pressure steam over a continuous period of approximately 36 hours. Resulting noise levels reach about 80 dBA at 100 feet; such a process would yield noise levels at LT-1 of approximately 63 dBA.

The Siemens Flex Plant 10 (FP10) units are a new design. The FP10 design incorporates single pressure heat recovery steam generators (HRSGs) rather than traditional triple pressure HRSGs and requires less steam piping than previous designs. The result of these innovations is that a fewer number of steam blows of shorter duration will be required during the construction process, compared to previous designs. Steam blows from the construction of WPGS will incorporate silencers in the steam piping, will be conducted during daytime hours only, and will not result in significant noise effects.

7.5.2.3 Modeled Construction Traffic Noise

Construction traffic will be primarily from Bailey Road or Railroad Avenue to Willow Pass Road/West 10th Street. The peak construction vehicle daily trips is predicted to be in June 2011.

The existing traffic volume on Willow Pass Road/West 10th Street is approximately 7,400 vehicles per day in the area adjacent to the WPGS site access road. Existing traffic volumes along Bailey Road and Railroad Avenue are 11,550 and 18,100 in the area of the WPGS site, respectively. Project construction traffic would add approximately 500 daily trips due to construction vehicles, which would not measurably or perceptually increase noise along these streets.

7.5.2.4 Modeled Operational Noise

The new power plant will have two FP10 units operating in combined cycle, two HRSGs, two steam generator turbines, air-cooled heat exchangers, and associated auxiliary systems and equipment. Major noise-generating components would include combustion turbine generators, steam turbine generators, compressors, air-cooled heat exchangers, HRSGs, and transformers. The overall noise level generated by these components at offsite locations depends on the physical layout of the facility and the noise control measures incorporated into the facility design. Noise from the units is directional and the directivity of noise emissions was considered in the facility design. The FP10 units are positioned to minimize offsite noise exposure at sensitive locations consistent with operational design requirements. Onsite near-field sound levels may be as high as 100 dBA.

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

- Inlet air silencer (with acoustically-lined elbow);
- Gas turbine – sound attenuated enclosure;
- Exhaust diffuser and duct – acoustical barrier;
- Gas compressors – sound attenuated enclosure; and
- ACHE – acoustic design for the fans.

The noise emissions from these newer units are less than the noise emissions from the existing units currently operating at the facility (Units 5 through 7). The incorporation of these noise control devices has been included in the formulation of equipment noise generation values and modeling of overall noise emissions. Additional attenuating features are provided by the existing aboveground storage tanks and the proposed series of screening walls between Tanks 1 through 6, along the eastern portion of the PPP site. The screening walls will be situated between the existing aboveground storage tanks and is designed to supplement the attenuation provided by the aboveground storage tanks and 15-foot-tall earthen berm least of the WPGS facility.

Cadna/A® was used to model the generation and propagation of noise from the plant. Cadna/A® is a three dimensional software program for prediction and assessment of noise levels in the vicinity of industrial facilities and other noise sources. Cadna/A® uses internationally recognized algorithms (ISO 9613-2) for the propagation of sound outdoors to calculate noise levels, and presents the resultant noise levels in an

easy to understand, graphically-oriented format. The program allows for input of all pertinent features (such as terrain or structures) that affect noise, resulting in a highly accurate estimate of existing and future noise levels.

Cadna/A® was used to create a virtual model of the planned facility and other existing nearby structures. Digital Terrain Modeling was used to account for elevation and terrain features, and aerial photographs were used to model the existing structures. Noise emission levels were input using octave band levels, to accurately estimate noise propagation and attenuation effects. To ensure the validity of the results, the model was tested using previously measured and modeled noise data, and found to be consistent with both practice and theory.

All pieces of equipment that were deemed to be significant future noise sources at the WPGS facility were included in the baseline noise model. It was assumed the facility would operate 24 hours per day as a worst case scenario. The set of modeled sources included turbines, generators, pumps, motors, main transformers, air-cooled heat exchangers, and HRSGs. Small equipment items, such as pumps less than 25 horsepower, were excluded because they were considered insignificant sources. Nominal noise emissions levels from various sources were used for the modeling inputs. The source level data included data provided by the client; limited vendor data; databases of previously modeled similar projects; and industry-standard estimated sound power values. Major buildings, tanks, and large equipment trains were included as barriers where appropriate. The Cadna/A® model output predicted noise levels at several discrete locations and areas of equal noisiness around the WPGS site.

Attenuation due to spherical wave divergence, topographic features, barriers, and standard atmospheric absorption (70 percent relative humidity, 60°F) was included in the calculation of predicted noise levels. Attenuation due to wind or temperature gradients was not subtracted from the predicted levels, to provide a conservative estimate of project sound levels.

Based on the above assumptions, the estimated sound levels (at the closest noise-sensitive receptors to the proposed equipment) are summarized in terms of L_{eq}, CNEL, and quietest 4 hours L_{90} in Tables 7.5-5 through 7.5-7. The nearest noise-sensitive receptor is LT-1, approximately 500 feet east of the WPGS. As shown in these tables, the plant's operational sound levels will not significantly increase the sound levels above the existing sound levels at this location. All residences are located far enough away from the WPGS site that the WPGS will increase existing ambient noise levels at critical noise-sensitive receptor locations by less than 5 dBA. Figure 7.5-2 shows the area of potential 5 dBA L_{90} increase including WPGS operations. There are no affected residential land uses in this area. The only potentially affected sensitive receptor is a small portion of the extreme western section of Riverview Park. This area is located immediately northeast of the PPP site. Noise measurement data is not available for this location; however, the location of the site suggests that noise from the PPP site is a significant component of the existing ambient environment, and an increase in noise exposure from the WPGS site would not significantly alter the acoustical environment of the area.

7.5.2.5 Tonal Noise

The CTGs, transformers, and combustion turbine inlet compressors produce tonal sounds. Because of care in specifying the plant's engineering design features, no prominent tonal noise emissions will be propagated to the noise-sensitive receptors. For example, the generator enclosure and combustion turbine enclosure and inlet silencers will be designed to reduce the tonal emissions from these sources to levels below the general plant noise. In addition, the transformer tonal noise emission level will be below the broadband plant noise. Therefore, no equipment tonal emissions will be distinctly audible at any offsite locations. During normal operations, the nature of noise from the facility would be essentially continuous and broadband with no audible tonal emissions.

7.5.2.6 Occupational Noise Exposure

A review of major equipment near-field noise emission data and general knowledge of machinery associated with power generation indicate that noise levels within the WPGS project site could reach 85 to 100 dBA within 3 feet of the equipment envelope. Because of these predicted site noise levels, the requirement for a hearing conservation program will be evaluated, and employees working at the WPGS facility with potential exposure to noise sources will be identified. All areas within the WPGS facility where noise levels could be 85 dBA or greater will be delineated and posted "Noise Hazard Area – Hearing Protection Required."

7.5.2.7 Power Transmission

Noise sources associated with power transmission include occasional breaker operation in the switchyard, corona noise, and very low magnetostriction hum from the conductors. Breaker noise is considered impulsive in nature, lasting a very short duration and possibly occurring only a very few times per year. Corona noise is characterized as a buzz or hum, and is usually worse when the conductors are wet, such as in rain or fog.

The Electric Power Research Institute (EPRI) has conducted noise tests and studies and has published reference material on transmission line noise. Consistent with all acoustic textbooks' discussion of propagation of noise from a line source, EPRI states that noise produced by a conductor decreases at a rate of 3 dB per doubling of distance from the source. The EPRI Transmission Line Reference Book indicates that the audible noise from a typical 230-kilovolt line with two conductors per phase would likely be less than 40 dBA at a distance of 40 feet from the outside conductor at ground level. If only one conductor per phase is used, the noise level will be less. This level of noise is very likely to be inaudible with respect to existing levels of community noise.

7.5.2.8 Conclusion

Based on the above analysis, project noise levels during operation of the facility are not predicted to exceed recommended noise compatibility guidelines at any sensitive receptors.

7.5.3 Cumulative Impacts and Indirect Effects

As discussed in Section 7.4, Land Use, there are ten other recently approved or proposed development projects within the project vicinity. The projects primarily involve industrial developments between downtown and the DDSD WTP; commercial developments downtown and along the New York Slough waterfront and south of State Route 4; and residential uses in the downtown area and along the waterfront to the northeast. These projects would not be expected to impact noise levels near the WPGS site, considering the nature of the projects and their location, which is primarily in downtown or further to the east. Therefore, no cumulative impacts from increased noise near the WPGS site are expected.

7.5.4 Noise Control Measures

7.5.4.1 Construction Noise

Construction of the WPGS will temporarily elevate the noise levels in the surrounding community. Most often the sound levels will be moderate, with a few processes causing short-term, substantially elevated noise levels to occur. Because construction is of a limited duration, will be conducted during daylight hours, and best practices for construction noise control will be implemented, no adverse construction noise effects are expected to occur in the surrounding community.

NOISE-1 Construction Noise Restrictions

- Construction noise emission shall comply with all local LORS regarding hours of construction activity and permitted noise levels affecting adjacent uses.

- All construction equipment should be operated and maintained to minimize noise generation. Equipment and vehicles using internal combustion engines shall be equipped with mufflers, air-inlet silencers where appropriate, and other shrouds or noise reducing features, in good operating condition and meeting or exceeding original factory specifications. Mobile or fixed "package equipment" shall be equipped with shrouds and noise control features that are readily available for that type of equipment.

- The use of noise-producing signals, including horns, whistles, electronic alarms, and sirens and bells, will be for safety warning purposes only.

- No construction-related public address, loudspeaker, or music system shall be audible at any adjacent noise-sensitive land use.

NOISE-2 Noise Hotline

The construction contractor shall implement a noise complaint process and hotline number for the surrounding community. Mirant Willow Pass will have the responsibility and authority to receive and resolve legitimate noise complaints.

7.5.4.2 Offsite Operational Noise

The WPGS as designed will not cause significant adverse noise impacts; thus, no additional mitigation of operational noise is required. However, to ensure that acoustical design goals are met by the facility while in operation, the following mitigation measures are recommended:

NOISE-3 Noise Attenuation

The project design and implementation shall include appropriate noise attenuation measures adequate to ensure that the noise level produced by operation of the WPGS will not exceed an hourly average exterior noise level of more than 53.6 dBA L_{90} at any residence. No new pure tone components may be introduced. No single piece of equipment shall be allowed to stand out as a source of noise that draws legitimate complaints, as determined by the compliance project manager (CPM).

Verification. Within 30 days of the project first achieving a sustained output of 80 percent or greater of rated capacity, Mirant Willow Pass shall conduct a 25-hour noise survey. The noise survey shall also include short-term measurement of one-third octave-band SPL to ensure that no noise tones have been introduced. If the results from the operational noise survey indicate that pure tones are present, then additional noise control measures shall be implemented to eliminate the pure tones. Irrespective of the specific method used for determining the project's noise level, the character of the project's noise shall be evaluated at the nearest residence to determine the presence of tones or other dominant sources of project noise.

The measurement of project noise for the purposes of demonstrating compliance with this Condition of Certification may be made at a location, acceptable to the CPM, closer to the WPGS than the nearest residence (e.g., 400 feet from the project's acoustic center in the direction of residences), and this measured level then mathematically extrapolated to determine the project's

noise contribution at the nearest residence. If the results from the operational noise survey indicate that the project-only noise level exceeds 53.6 dBA, L_{90} for any given hour at any residence, additional noise control measures shall be implemented to reduce noise to a level of compliance with this limit.

Within 30 days after completing the post-construction operational noise survey, Mirant Willow Pass shall submit a summary report of the survey to the CPM. Included in the survey report will be a description of any additional noise control measures necessary to achieve compliance with the above listed noise limits, and a schedule, subject to CPM approval, for implementing these measures.

Within 30 days of completion of installation of these measures, Mirant Willow Pass shall submit to the CPM a summary report of a new noise survey, performed as described above and showing compliance with this condition.

7.5.4.3 Onsite Occupational Noise Exposure

Noise levels within the WPGS site were modeled to be above 85 dBA within 50 feet of major noise producing equipment. Employees working near the noise sources will participate in a facility-specific hearing conservation program if a program is necessary for compliance with Occupational Safety and Health Administration (OSHA) regulations. In addition, specific plant areas will have noise surveys conducted after commissioning to determine where noise hazard warnings and personal hearing protection is necessary. With these project features in-place, no special mitigation measures will be required.

NOISE-4 Occupational Noise Survey

Within 30 days of the WPGS first achieving a sustained output of 80 percent or greater of rated capacity, Mirant Willow Pass shall conduct an occupational noise survey to verify modeled noise levels and to identify any additional noise hazard areas in the facility. The survey shall be conducted by a qualified person in accordance with the provisions of Title 8 California Code of Regulations, Sections 5095-5099 (Article 105) and Title 29, Code of Federal Regulations (CFR), Section 1910.95. The survey results shall be used to determine the magnitude of employee noise exposure. Areas above 85 dBA that may be accessed by any personnel shall be posted as high noise level areas. Hearing protectors shall be furnished and their use required in the posted areas.

Mirant Willow Pass shall prepare a report of the survey results and, if necessary, identify proposed measures that will be employed to comply with the applicable California and federal regulations.

Verification. Within 30 days after completing the survey, Mirant Willow Pass shall submit the noise survey report to the CPM. Mirant Willow Pass shall make the report available to OSHA and the California Occupational Safety and Health Administration (Cal/OSHA) upon request.

7.5.5 Applicable Laws, Ordinances, Regulations, and Standards

The following discussion addresses relevant LORS regarding noise emissions and exposure. Some of these LORS are not legally applicable to the WPGS because of the preemptive jurisdiction of the CEC in the certification process of power plants. The purpose of this section is to provide the reader with a greater understanding of the regulatory environment relating to environmental noise. A summary of these LORS and their applicability to the project is provided in Table 7.5-8.

7.5.5.1 Federal

There are a number of laws and guidelines at the federal level that direct the consideration of a broad range of noise and vibration issues. Because the project does not fall within the purview of the Federal Energy Regulatory Commission (FERC) or require action by federal agencies, the project is not directly subject to federal noise regulations other than the OSHA. For perspective, several of the more significant noise-related federal regulations and guidelines are provided below:

- National Environmental Policy Act (42 United States Code [USC] 4321, et seq.) (PL-91-190) (40 CFR § 1506.5)

  The National Environmental Policy Act is the basic national charter for protection of the environment, including the noise environment. It establishes policy, sets goals, and provides means for carrying out the policy. It also contains "action-forcing" provisions to ensure that federal agencies act according to the letter and spirit of the Act. The regulations that follow provide guidance to federal agencies regarding what they must do to comply with the procedures and achieve the goals of the Act.

- Noise Control Act of 1972 (42 USC 4910)

  This Act establishes a national policy to promote an environment for all Americans free from noise that jeopardizes their health and welfare. To accomplish this, the Act establishes a means for the coordination of federal research and activities in noise control, authorizes the establishment of federal noise emissions standards for products distributed in commerce, and provides information to the public respecting the noise emission and noise reduction characteristics of such products.

- U.S. EPA recommendations in "Information on Levels of Environmental Noise Requisite to Protect Health and Welfare with an Adequate Margin of Safety," National Technical Information Service 550\9-74-004, U.S. EPA, Washington, D.C., March 1974.

  In response to a federal mandate, the U.S. EPA provided guidance in this document, commonly referenced as the, "Levels Document," that establishes an L_{dn} of 55 dBA as the requisite level, with an adequate margin of safety, for areas of outdoor uses, including residences and recreation areas. This document does not constitute U.S. EPA regulations or standards, but identifies safe levels of environmental noise exposure without consideration for achieving these levels or other potentially relevant considerations. It is intended to "provide state and local governments as well as the federal government and the private sector with an informational point of departure for the purpose of decision making." The agency is careful to stress that the recommendations contain a factor of safety and do not consider technical or economic feasibility issues, and therefore should not be construed as standards or regulations.

- FERC Guidelines on Noise Emissions from Compressor Stations, Substations, and Transmission Lines (18 CFR 157.206(d)5)

  These guidelines require that:

  > "the noise attributable to any new compressor stations, compression added to an existing station, or any modification, upgrade, or update of an existing station, must not exceed a day-night level (L_{dn}) of 55 dBA at any pre-existing noise-sensitive area (such as schools, hospitals, or residences)."

This policy was adopted based on the U.S. EPA-identified level of significance of 55 L_{dn} dBA.

- Federal Highway Administration Noise Abatement Procedures (23 CFR Part 772)

  The purpose of 23 CFR Part 772 is to provide procedures for noise studies and noise abatement measures to help protect the public health and welfare, to supply noise abatement criteria, and to establish requirements for information to be given to local officials for use in the planning and design of highways. It establishes five categories of noise-sensitive receptors and prescribes the use of the Hourly L_{eq} as the criterion metric for evaluating traffic noise impacts.

- Department of Housing and Urban Development (HUD) Environmental Standards (24 CFR Part 51)

  HUD Regulations set forth the following exterior noise standards for new home construction assisted of supported by the Department:

  65 L_{dn} or less – Acceptable

  > 65 L_{dn} and < 75 L_{dn} – Normally unacceptable, appropriate sound attenuation measures must be provided

  > 75 L_{dn} – Unacceptable

  HUD's regulations do not contain standards for interior noise levels. Rather, a goal of 45 dB is set forth and attenuation requirements are geared to achieve that goal.

- OSHA Occupational Noise Exposure; Hearing Conservation Amendment (Federal Register 48 [46], 9738 – 9785 [1983]).

  The standard stipulates that protection against the effects of noise exposure shall be provided for employees when sound levels exceed 90 dBA over an 8-hour exposure period. Protection shall consist of feasible administrative or engineering controls. If such controls fail to reduce sound levels to within acceptable levels, personal protective equipment shall be provided and used to reduce exposure of the employee. Additionally, a Hearing Conservation Program must be instituted by the employers whenever employee noise exposure equals or exceeds the Action Level of an 8-hour time-weighted average (TWA) sound level of 85 dBA. The Hearing Conservation Program requirements consist of periodic monitoring of area and personal noise, performance and evaluation of audiograms, provision of hearing protection, annual employee training, and record keeping.

The most relevant federal guidelines applicable to community noise exposure are those provided by the U.S. EPA in "Information of Levels on Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety" (U.S. EPA 550/9-74-004). It should be noted that this document does not constitute U.S. EPA regulations or standards, but rather identifies safe levels of environmental noise exposure without consideration for achieving these levels or other potentially relevant considerations. It is intended to "provide state and local governments as well as the federal government and the private sector with an informational point of departure for the purpose of decision making." These guidelines are not adopted or recommended by the State of California or any local

jurisdiction. The agency is careful to stress that the recommendations contain a factor of safety and do not consider technical or economic feasibility issues needed to implement these guidelines.

7.5.5.2 State

The California Environmental Quality Act (CEQA) requires that significant environmental impacts be identified, and that such impacts be eliminated or mitigated to the extent feasible. Section XI of Appendix G of the CEQA Guidelines (CCR, Title 14, Appendix G) sets forth some characteristics that may signify a potentially significant impact. Specifically, a significant effect from noise may exist if a project would result in:

1. Exposure of persons to or generation of noise levels in excess of standards established in the local General Plan or noise ordinance, or applicable standards of other agencies;

2. Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels;

3. A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project; or

4. A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

The State of California provides regulation by adopted laws and guidance regarding noise emissions through the jurisdiction of state commissions. Regulation of noise emissions and noise exposure from power plants is provided via the CEC. The CEC provides siting guidelines (CEC-140-2007-003) to assist power plant operators with the evaluation of potential power plant locations. The siting guidelines specify that the potential noise impacts from power plant construction and operation be evaluated by comparing existing ambient noise levels with the noise levels projected to result from the project. This approach requires the determination of noise emissions from the project and evaluation of noise exposure at specific receptor locations. In essence, this methodology ensures that power plants in California are sited with due regard to the local noise environment. In general, the CEC considers that a project-related increase in environmental noise of 5 to 10 dBA or more at noise-sensitive receptors may be significant. An increase of 10 dBA or more is generally considered a significant impact.

Occupational exposure to noise is regulated by Cal/OSHA in Title 8, Group 15, Article 105, Sections 5095-5100. The standard specifies that protection against the effects of noise exposure shall be provided when sound levels exceed 90 dBA over an 8-hour exposure period. Protection shall consist of feasible administrative or engineering controls. If such controls fail to reduce sound levels to within acceptable levels, personal protective equipment shall be provided and used to reduce exposure of the employee. Additionally, a Hearing Conservation Program must be instituted by the employers whenever employee noise exposure equals or exceeds the Action Level of an 8-hour TWA sound level of 85 dBA. The Hearing Conservation Program requirements consist of periodic area and personal noise monitoring, performance and evaluation of audiograms, provision of hearing protection, annual employee training, and record keeping. The CEC incorporates this regulation into its Conditions of Certification.

7.5.5.3 Local

The majority of the PPP site, including the WPGS site, was recently annexed by the City of Pittsburg. The site is bordered on the west by unincorporated Contra Costa County. Noise emissions from the project could potentially impact sensitive uses within each of these jurisdictions.

Contra Costa County

Contra Costa County General Plan. The Noise Element of the Contra Costa County General Plan is designed to limit the exposure of the community to excessive noise levels. A major objective of the noise element is to provide guidelines to achieve noise and land use compatibility. The Land Use and Noise Elements of the General Plan are closely related. By identifying noise-sensitive land uses and establishing guidelines for land use and noise, the Noise Element influences the general distribution, location, and intensity of future land use and helps to alleviate noise conflicts. Figure 7.5-3 provides a listing of acceptable noise levels by land use category. The noise levels considered generally acceptable and conditionally acceptable for single-family residences are 60 dBA CNEL and 70 dBA CNEL, respectively. Several goals and policies in the Contra Costa County General Plan Noise Element are applicable to construction and operation of the project (Contra Costa County, 2005). These are as follows:

- Goal 11-A: To improve the overall environment in the County by reducing annoying and physically harmful levels of noise for existing and future residents and for all land uses.
- Goal 11-B: To maintain appropriate noise conditions in all areas of the County.
- Goal 11-C: To ensure that new developments will be constructed so as to limit the effects of exterior noise on the residents.
- Policy 11-1: New projects shall be required to meet acceptable exterior noise level standards as established in the Noise and Land Use Compatibility Guidelines contained in Figure 4.8-2. These standards, along with the future noise levels shown in the future noise contours maps, should be used by the County as a guide for evaluating the compatibility of "noise-sensitive" projects in potentially noisy areas.
- Policy 11-6: If an area is currently below the maximum "normally acceptable" noise level, an increase in noise up to the maximum should not be allowed necessarily.
- Policy 11-8: Construction activities shall be concentrated during the hours of the day that are not noise-sensitive for adjacent land uses and should be commissioned to occur during normal work hours of the day to provide relative quiet during the more sensitive evening and early morning periods.
- Policy 11-9: Sensitive land uses shall be encouraged to be located away from noise areas, or the impacts of noise on these uses shall be mitigated. If residential areas are planned adjacent to industrial noise sources, than a noise survey shall be performed to determine the extent of any noise impacts and recommend appropriate noise mitigation measures.

Contra Costa County Noise Ordinance. The County of Contra Costa has a noise ordinance restricting the noise from Temporary Events. The Contra Costa County Municipal Code Chapter 82-44 states that temporary events shall not generate or emit any noise or sound that exceeds any of the levels specified in the Allowable Exterior Noise Levels Table (Table 7-5.9) measured at the exterior of any dwelling unit located in a residential property. The noise generated or emitted shall not exceed the levels specified in the table for the duration of the time specified in the table.

Title 7 Building Regulations, Chapter 716-8.1008 of the Contra Costa County Code contains regulations applicable to construction.

Chapter 716-8.1008: Nuisances.

Operations shall be controlled to prevent nuisances to public and private ownerships because of dust, drainage, removal of natural support of land and structures, encroachment, *noise*, and/or vibration. (Ords. 99-46 § 15: 69-59 § 1, 1969).

City of Pittsburg

City of Pittsburg General Plan. The General Plan for the City of Pittsburg contains noise compatibility guidelines for land uses within the city. The project and the nearest potentially noise-sensitive receptors are located within the City of Pittsburg. The General Plan Noise Element and Noise Ordinance of the City of Pittsburg apply to noise at these locations. The following are the goals and policies of the City of Pittsburg General Plan Noise Element (City of Pittsburg, 2004):

- Goal 12-G-1: Protect public health and welfare by eliminating or minimizing the effects of existing noise problems, and by preventing increased noise levels in the future.

- Goal 12-G-3: Continue efforts to incorporate noise considerations into land use planning decisions, and guide the location and design of transportation facilities to minimize the effects of noise on adjacent land uses.

- Policy 12-P-1: As part of development review, use Figure 12-3 (Pittsburg General Plan) to determine acceptable uses and installation requirements in noise-impacted areas.

- Policy 12-P-4: Require noise attenuation programs for new development exposed to noise above normally acceptable levels. Encourage noise attenuation programs that avoid visible sound walls.

- Policy 12-P-5: Require that applicants for new noise-sensitive development, such as schools, residences, and hospitals, in areas subject to noise generators producing noise levels greater than 65 dB CNEL obtain the services of a professional acoustical engineer to provide a technical analysis and design of mitigation measures.

- Policy 12-P-6: Ensure that new noise-sensitive uses, including schools, hospitals, churches, and homes, in areas near roadways identified as impacting sensitive receptors by producing noise levels greater than 65 dB CNEL, incorporate mitigation measures to ensure that interior noise levels do not exceed 45 dB CNEL.

- Policy 12-P-7: Require the control of noise at the source through site design, building design, landscaping, hours of operation, and other techniques, for new development deemed to be noise generators.

- Policy 12-P-8: Develop noise attenuation programs for mitigation of noise adjacent to existing residential areas, including such measures as wider setbacks, intense landscaping, double-pane windows, and building orientation muffling the noise source.

- Policy 12-P-9: Limit generation of loud noises on construction sites adjacent to existing development to normal business hours between 8:00 a.m. and 5:00 p.m.

City of Pittsburg Municipal Code. The City's Noise Ordinance is contained in Chapter 9.44.010 (Prohibitions), and includes noise levels that are considered unreasonably and potentially dangerous to the public health and welfare.

7.5.6 Involved Agencies and Agency Contacts

Agencies contacted and likely to be involved in this project are included in Table 7.5-10.

7.5.7 Permits Required and Permit Schedule

No noise-specific permits are required for construction of the WPGS project.

7.5.8 References

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Table 7.5-1
Sound Levels of Typical Noise Sources and Noise Environments
(A-Weighted Sound Levels)

Noise Source (at Given Distance)	Scale of A-Weighted Sound Level in Decibels	Noise Environment	Human Judgment of Noise Loudness (Relative to a Reference Loudness of 70 Decibels*)
Military Jet Take-off with After-burner (50 feet)	140	Carrier Flight Deck	–
Civil Defense Siren (100 feet)	130	–	–
Commercial Jet Take-off (200 feet)	120	–	**Threshold of Pain** *32 times as loud
Pile Driver (50 feet)	110	Rock Music Concert	*16 times as loud
Ambulance Siren (100 feet) Newspaper Press (5 feet) Power Lawn Mower (3 feet)	100		**Very Loud** *8 times as loud
Propeller Plane Flyover (1,000 feet) Diesel Truck, 40 mph (50 feet) Motorcycle (25 feet)	90	Boiler Room Printing Press Plant	*4 times as loud
Garbage Disposal (3 feet)	80	High Urban Ambient Sound	*2 times as loud
Passenger Car, 65 mph (25 feet) Living Room Stereo (15 feet) Vacuum Cleaner (3 feet)	70	–	**Moderately Loud** *70 decibels (Reference Loudness)
Air Conditioning Unit (100 feet) Normal Conversation (5 feet)	60	Data Processing Center Department Store	*1/2 as loud
Light Traffic (100 feet)	50	Private Business Office	*1/4 as loud
Bird Calls (distant)	40	Lower Limit of Urban Ambient Sound	**Quiet** *1/8 as loud
Soft Whisper (5 feet)	30	Quiet Bedroom	**Very Quiet**
	20	Recording Studio	
	10	–	**Extremely Quiet**
	0	–	**Threshold of Hearing**

Source: Compiled by URS Corporation from various published sources and widely-used references such as The Handbook of Acoustical Measurements and Noise Control, Third Edition, edited by C.M. Harris, 1991; Federal Agency Review of Selected Airport Noise Analysis Issues, 1992, Modified by The Louis Berger Group, Inc, 2004. and Noise and Vibration Control, Second Edition, edited by L.L. Beranek, 1988 Institute of Noise Control Engineering.

Table 7.5-2
Hourly Long-Term Results (Location LT-1) in dBA

Start Time	L_{eq}	L_{max}	L_{min}	L_{10}	L_{50}	L_{90}
4:00	55.6	68.0	46.0	56.9	52.4	47.9
5:00	52.0	64.2	45.6	54.5	50.2	48.5
6:00	57.8	68.9	49.3	60.3	56.0	53.2
7:00	54.9	64.9	49.8	57.0	53.8	51.8
8:00	57.5	68.9	50.1	59.9	55.6	53.0
9:00	64.5	70.7	55.0	66.6	64.0	61.4
10:00	64.2	76.0	57.1	66.5	63.2	60.7
11:00	63.7	71.7	58.2	66.0	63.1	60.7
12:00	63.2	71.5	57.2	65.4	62.6	59.8
13:00	63.1	70.8	57.2	65.1	62.6	60.2
14:00	63.4	78.4	56.6	65.5	62.3	59.9
15:00	64.7	72.6	57.9	66.8	64.1	61.4
16:00	65.3	75.6	58.1	67.6	64.4	61.5
17:00	64.9	73.0	57.0	67.2	64.2	61.3
18:00	64.2	72.6	57.0	66.4	63.7	61.2
19:00	64.8	73.5	58.6	66.8	64.2	61.9
20:00	64.1	71.5	58.6	66.1	63.7	61.5
21:00	63.0	69.7	57.1	64.9	62.5	60.4
22:00	64.5	72.7	58.1	66.8	63.9	61.2
23:00	64.6	70.7	58.1	66.8	64.1	61.5
0:00	64.3	70.7	58.9	66.4	63.9	61.8
1:00	64.4	69.9	59.2	66.4	64.0	62.0
2:00	64.7	69.8	60.3	66.6	64.5	62.5
3:00	61.8	69.5	44.9	58.1	55.9	54.2
4:00	52.8	78.9	41.9	49.5	45.4	43.9
25-hour	63.1	78.9	41.9	63.6	60.6	58.1
Quietest 4-hour (L_{90}) Period (0400-0700)	55.5	68.9	45.6	57.2	53.1	50.3
CNEL	69.5					

Note: Measurement survey conducted April 29 and 30, 2008

Table 7.5-3
Hourly Long-Term Results (Location LT-2) in dBA

Start Time	L_{eq}	L_{max}	L_{min}	L_{10}	L_{50}	L_{90}
7:00	58.9	68.3	51.6	61.8	57.5	54.8
8:00	63.6	72.6	56.3	65.8	62.6	60.2
9:00	65.5	81.4	54.1	66.8	61.9	58.1
10:00	68.7	88.9	54.5	67.4	61.3	58.0
11:00	68.2	81.7	58.3	70.1	65.5	62.2
12:00	63.9	84.8	57.2	65.6	62.8	60.7
13:00	63.1	74.6	57.4	65.1	62.4	60.3
14:00	61.5	74.5	53.4	63.9	60.4	57.7
15:00	62.7	87.7	53.8	65.4	60.4	57.0
16:00	62.2	73.0	54.4	65.0	60.4	57.4
17:00	61.2	72.0	53.2	63.8	59.4	56.6
18:00	60.7	72.0	53.7	63.7	59.2	56.4
19:00	60.5	73.1	53.0	63.2	58.7	56.1
20:00	57.6	67.7	52.2	59.7	56.8	54.8
21:00	55.7	66.5	50.3	57.4	55.0	53.2
22:00	58.4	69.2	51.9	60.7	57.2	55.0
23:00	58.6	66.8	52.1	60.5	57.9	55.9
0:00	58.0	68.9	52.9	59.9	57.5	55.6
1:00	56.3	63.7	51.5	57.8	56.0	54.3
2:00	55.1	59.5	51.7	56.6	54.8	53.3
3:00	53.1	60.5	45.2	54.5	51.4	49.8
4:00	47.5	56.6	44.0	49.2	47.0	45.5
5:00	49.6	60.5	45.1	51.3	48.7	47.5
6:00	51.8	60.7	48.1	53.5	50.9	49.5
7:00	52.4	62.7	48.1	54.6	51.4	49.8
25-hour	61.8	88.9	44.0	60.9	57.5	55.2
Quietest 4-hour (L_{90}) Period (0400-0700)	50.7	62.7	44.0	52.1	49.5	48.1
CNEL	64.7					

Note: Measurement survey conducted April 29 and 30, 2008

Table 7.5-4
Estimated Construction Noise Levels (dBA)

Noise Source	Estimated Noise Levels at Nearest Sensitive Receptor and Onsite During Construction	
	LT-1 (500 feet from Plant Construction Activity)	100 Feet from Construction Activity
Construction Phase	L_{eq}	L_{eq}
Excavation, site preparation	58	80
Concrete pouring	54	76
Steel erection	58	80
Mechanical, electrical	53	75
Clean-up	48	70

Table 7.5-5
Existing L_{eq} Sound Level and WPGS L_{eq} Sound Level

Receptor	Distance from Source to Receptor	Measured Sound Level (L_{eq})	Calculated Project Sound Level (L_{eq})	Calculated Project Plus Measured (L_{eq})	Project Change (L_{eq})
LT-1	700 feet	63.1 dBA	54.4 dBA	63.6 dBA	0.5 dBA
LT-2	1,690 feet	61.8 dBA	50.2 dBA	62.1 dBA	0.3 dBA

Table 7.5-6
Existing CNEL Sound Level and WPGS CNEL Sound Level

Receptor	Distance from Source to Receptor	Measured Sound Level (CNEL)	Calculated Project Sound Level (CNEL)	Calculated Project Plus Measured (CNEL)	Project Change (CNEL)
LT-1	700 feet	69.5 dBA	61.1 dBA	70.0 dBA	0.6 dBA
LT-2	1,690 feet	64.7 dBA	56.9 dBA	65.4 dBA	0.7 dBA

Table 7.5-7
Existing L_{90} Sound Level and WPGS L_{90} Sound Level

Receptor	Distance from Source to Receptor	Measured Sound Level (L_{90})*	Calculated Project Sound Level (L_{90})	Calculated Project Plus Measured (L_{90})	Project Change (L_{90})
LT-1	700 feet	50.3 dBA	52.9 dBA	54.8 dBA	4.5 dBA
LT-2	1,690 feet	48.1 dBA	48.7 dBA	51.4 dBA	3.3 dBA

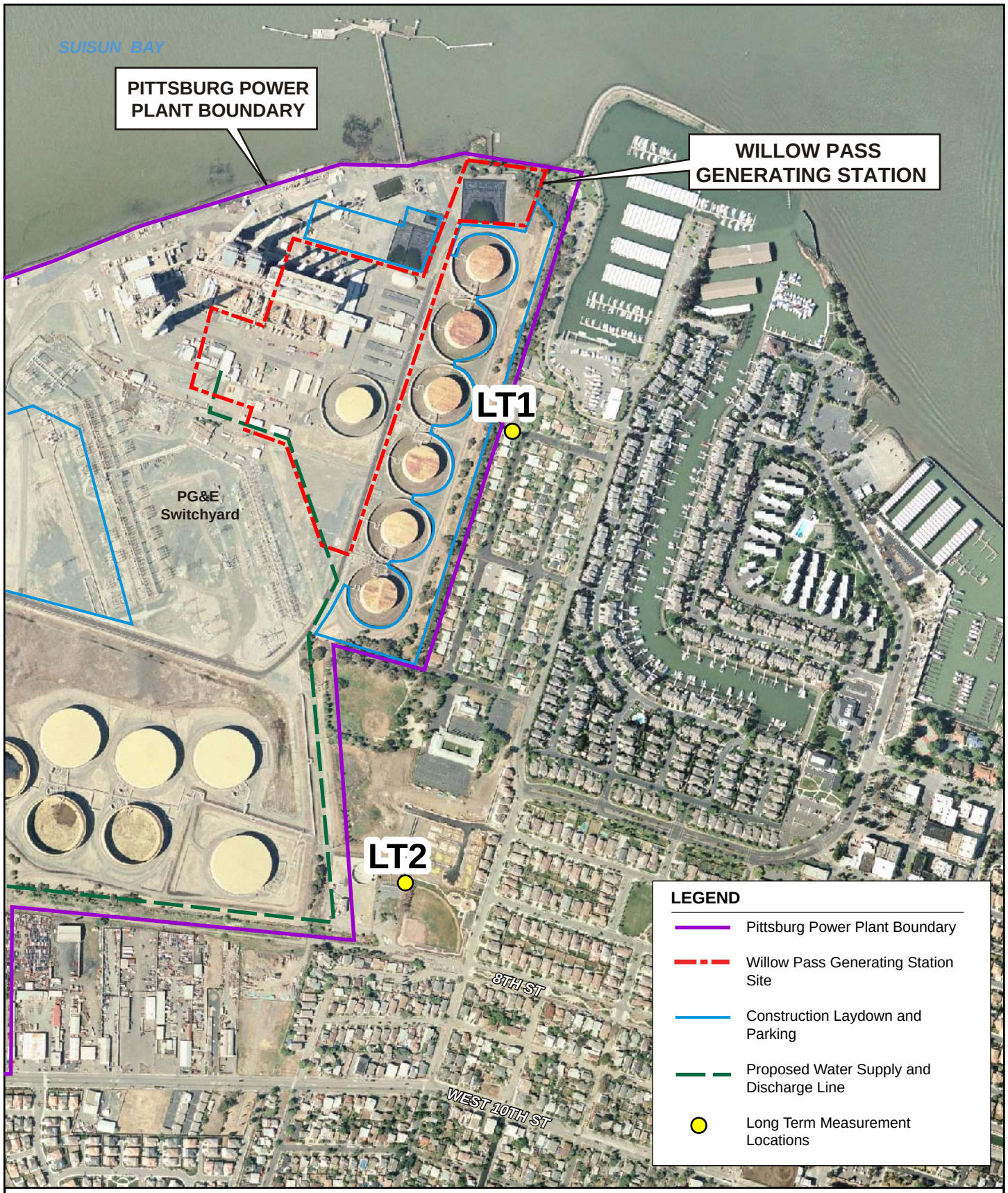
*Note: L_{90} for LT-1 and LT-2 is the arithmetic average of the L_{90} during the quietest consecutive 4 hours of the 25-hour measurement period.

Table 7.5-8
Applicable Noise Laws, Ordinances, Regulations, and Standards

Agency	Laws, Ordinances, Regulations, and Standards	Applicability	AFC Section
Federal			
U.S. EPA	U.S. EPA Report 550/9-74-004. The U.S. EPA set this guideline as the level of environmental noise requisite to protect public health and welfare with an adequate margin of safety.	Not applicable by statute.	Section 7.5.1.1 discusses this guideline. As designed, the project will comply with this guideline.
State			
CEC	The CEC uses their siting guidelines (CEC-140-2007-003) in combination with local noise regulations and standards to evaluate the significance of noise impacts through the comparison of existing ambient noise levels with the noise levels projected to result from a project.	This requirement is applicable to the control of operation noise from the project. It evaluates noise increases of 5 dBA or greater in nearby noise-sensitive areas.	Section 7.5.1.2 discusses conformance with this requirement. The project has been designed to comply with this requirement.
Cal/OSHA	Occupational exposure to noise is regulated by Cal/OSHA in Title 8, Group 15, Article 105, Sections 5095 – 5100	This requirement is applicable to protect employees from significant noise exposure during a work period.	Section 7.5.1.2 discusses conformance with is requirement. The project has been designed to comply with this requirement.
Local			
Contra Costa County	Contra Costa County Code Chapter 82-44	This requirement is applicable to noise generated during construction of the project as a "Temporary Event"	Section 7.5.1.3 discusses this requirement. The project has been planned to comply with this requirement.
City of Pittsburg	Noise Ordinance is contained in Chapter 9.44.010	Prohibition against noise levels that are considered unreasonably and potentially dangerous	Section 7.5.1.3 discusses this requirement. The project has been planned to comply with this requirement.

Table 7.5-9 Contra Costa County Allowable Exterior Noise Levels		
Cumulative Duration of Noise	**9 a.m. – 8 p.m.**	**8 p.m. – 10 p.m.**
30 minutes per hour	60 dBA	55 dBA
15 minutes per hour	65 dBA	60 dBA
5 minutes per hour	70 dBA	65 dBA
1 minute per hour	75 dBA	70 dBA
Level not to be exceeded at any time	80 dBA	75 dBA

Table 7.5-10 Involved Agencies			
Issue	**Agency/Address**	**Contact/Title**	**Telephone**
Noise Ordinance	City of Pittsburg Planning Department 65 Civic Avenue Pittsburg, CA 94565	Kristin Vahl Associated Planner	(925) 252-6941 kvahl@ci.pittsburg.ca.us



N

0 1000

Scale in Feet

Source: AirPhoto USA 2008

NOISE MEASUREMENT SITE LOCATIONS

Willow Pass Generating Station
June 2008 Mirant Willow Pass, LLC
28067343 Pittsburg, California

URS

FIGURE 7.5-1

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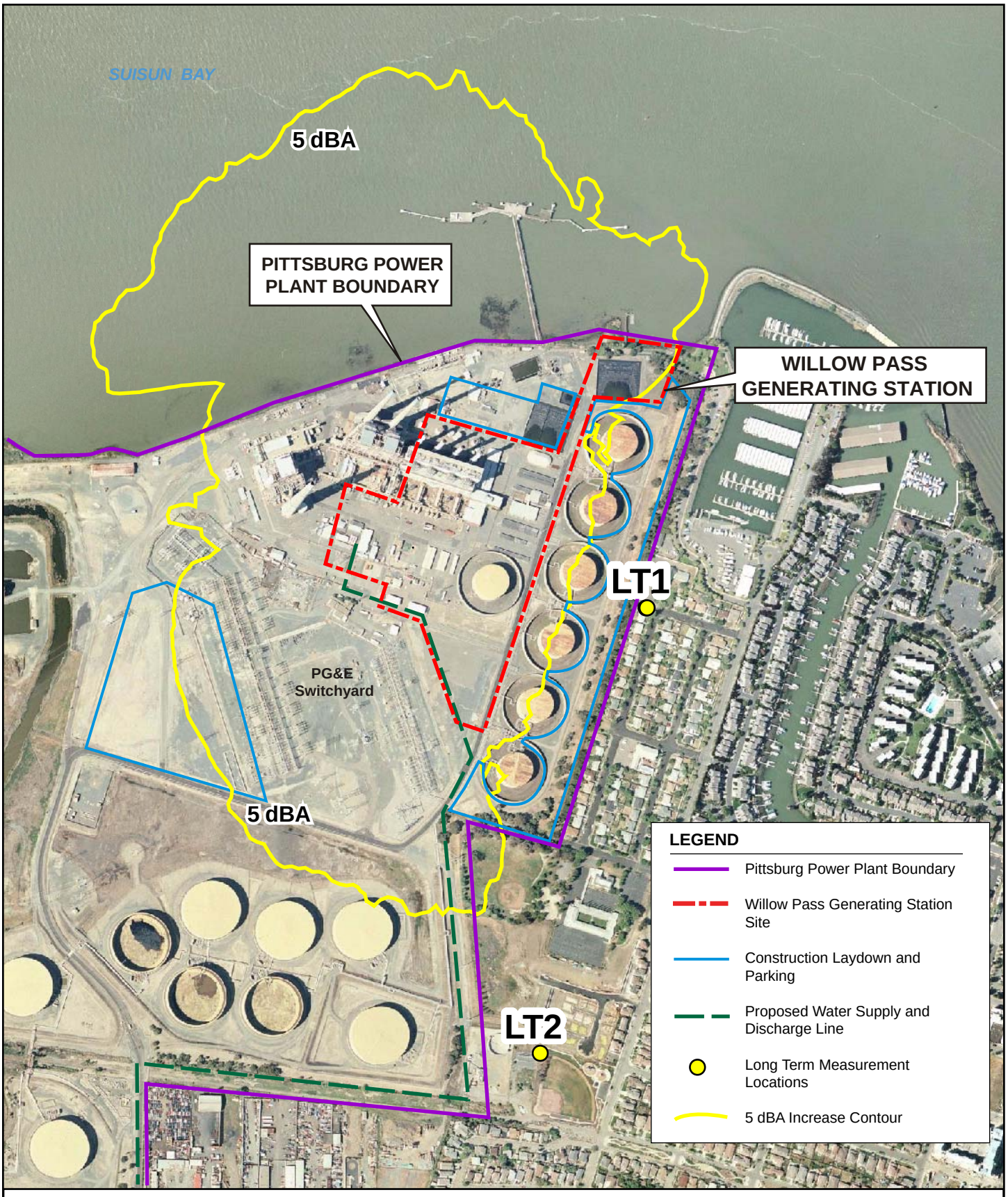

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Scale in Feet

N

Source: AirPhoto USA 2008

AREA OF 5 dBA INCREASE IN L_{90}

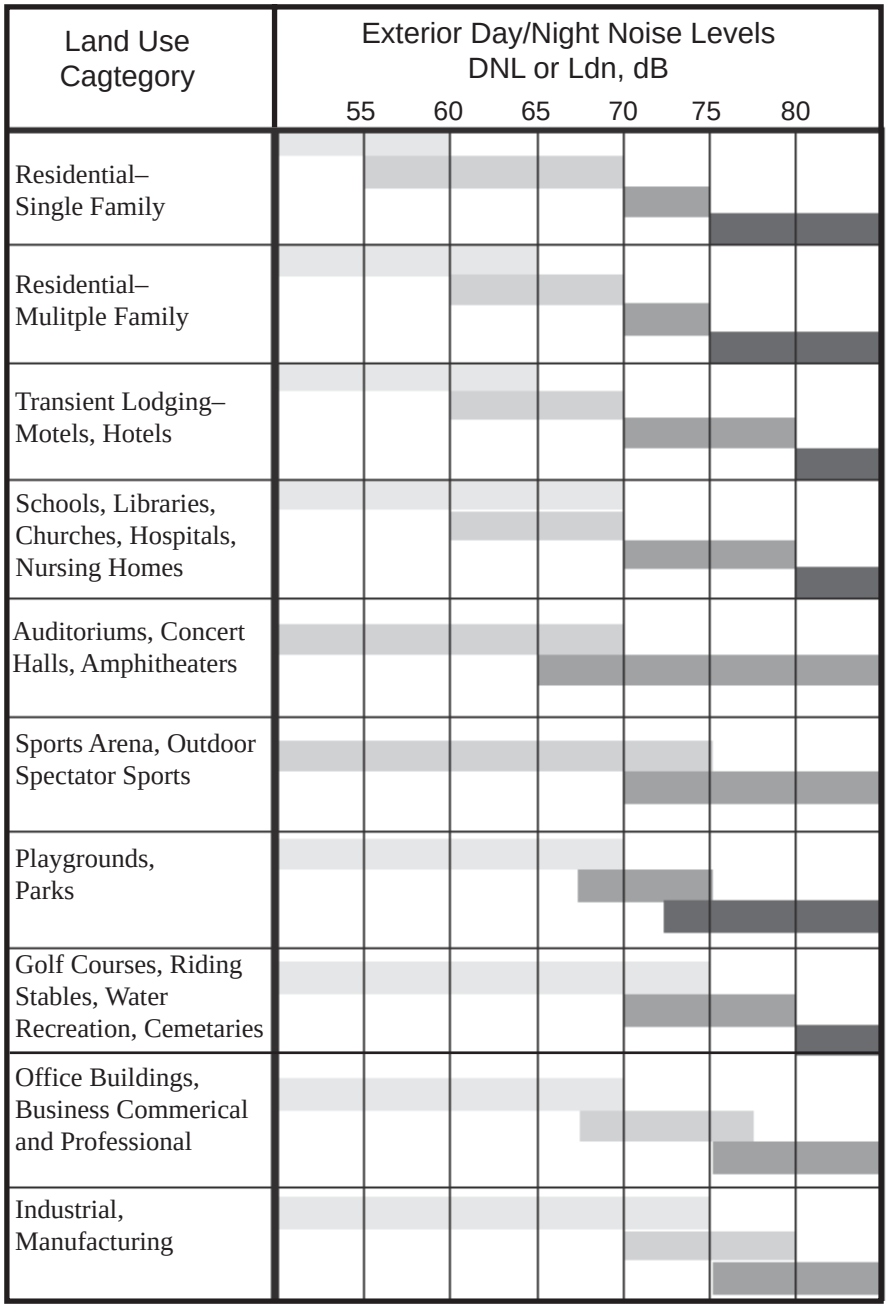
Willow Pass Generating Station
Mirant Willow Pass, LLC
Pittsburg, California

June 2008
28067343

URS

FIGURE 7.5-2

6/24/08 vsa ..\T:\Mirant Pittsburg-Willow Pass\Graphics\7.05 noise\7.5-2_Area5dBA.ai



INTERPRETATION

Normally Acceptable:
Specified land use is satisfactory, based upn the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements

Conditionally Acceptable:
New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design

Normally Unacceptable:
New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design

Clearly Unacceptable:
New construction or development clearly should not be undertaken

Source:
State of California Office of Noise Control General Plan Guidelines

CALIFORNIA LAND USE COMPATIBILITY GUIDELINES

Willow Pass Generating Station
June 2008
28067343
Mirant Willow Pass, LLC
Pittsburg, California

URS

FIGURE 7.5-3

6/25/08 vsa ..\T:\Mirant Pittsburg-Willow Pass\Graphics\7.05 noise\7.5-3_compatibility.ai