APPENDIX F

Noise Impact Report

SCATTERGOOD GENERATING REPOWERING PROJECT NOISE IMPACT REPORT

taha
environmental planners

Prepared for

POWER ENGINEERS

Prepared by

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MAY 3, 2012
taha 2010-079

SCATTERGOOD GENERATING REPOWERING PROJECT NOISE IMPACT REPORT

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May 3, 2012

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1.0 SUMMARY OF FINDINGS

Terry A. Hayes Associates Inc. has completed a noise impact analysis for the Scattergood Generating Repowering Project. Key findings are listed below.

- Without mitigation, construction activity would generate noise levels that exceed the significance threshold at residential land uses south of Grand Avenue. Mitigation Measures **N1** through **N5**, shown below, would reduce noise levels, below the applicable significance thresholds. Therefore, construction activity would result in a less-than-significant impact.

  N1 All construction equipment shall be properly maintained and equipped with mufflers and other suitable noise attenuation devices.

  N2 Grading and construction contractors shall endeavor to use quieter equipment as opposed to noisier equipment (such as rubber-tired equipment rather than track equipment).

  N3 The construction contractor shall ensure that all stockpiling and vehicle staging areas are located away from noise-sensitive receivers, to the extent feasible.

  N4 The construction contractor shall plan work such that activities that generate high noise levels will not be started outside the hours codified in the Los Angeles and El Segundo Municipal Codes, and all reasonable efforts to conclude work in progress prior to the hours listed in these codes will be taken by the construction contractor.

  N5 A public liaison for project construction shall be identified who shall be responsible for addressing public concerns about construction activities, including excessive noise. The liaison shall determine the cause of the concern (e.g., starting too early, bad muffler, etc.) and shall be required to implement reasonable measures to address the concern.

- Operational noise impacts would be less than significant under both the General Electric and Siemens options, and no mitigation measures are required.

- Construction and operational vibration impacts would be less than significant, and no mitigation measures are required.

- Cumulative noise and vibration impacts would be less than significant, and no mitigation measures are required.

2.0 INTRODUCTION

2.1 PURPOSE

The purpose of this report is to evaluate the potential for noise impacts of the proposed Scattergood Generating Repowering Project. Potential noise levels are analyzed for construction and operation of the proposed project. Mitigation measures for potentially significant impacts are recommended when appropriate to reduce noise and vibration levels.

2.2 PROJECT DESCRIPTION

The Los Angeles Department of Water and Power (LADWP) Scattergood Generating Station (SGS) is proposing to undergo a repowering project in several phases to replace aging equipment. SGS, located 12700 Vista Del Mar in the City of Los Angeles, is adjacent to Dockweiler State Beach to the west, a Chevron oil refinery to the south, Hyperion Treatment Plant to the north, and residential neighborhoods to the northeast and east. The terrain is a hillside rising from west to east from sea level to approximately 125 feet in elevation.

The existing facility includes three gas-fired boilers and steam turbine generators. Units 1 and 2 have a rated gross capacity of 185 megawatts (MW) each, are functionally identical, and share the north buildings and north exhaust stack. Unit 3 has a rated gross capacity of 460 MW, is located in the south buildings, and exhausts to the south exhaust stack adjacent to Units 1 and 2.

There are two power generation system scenarios that are currently under consideration and that represent the expected high and low range of generating capacities that could be implemented at SGS. Each scenario would replace Unit 3 with a new generation system. Under Generation Scenario 1, base load would be provided by a new Combined Cycle Generating Systems (CCGS) and peak load would be provided by a Simple Cycle Generating Systems (SCGS) consisting of two separate natural-gas fired combustion turbine generators (CTGs). Under Generation Scenario 2, base load would be provided by a new CCGS similar to Generation Scenario 1. Peak load would be provided by a single additional CCGS unit rather than a SCGS consisting of more than one CTG.

3.0 NOISE AND VIBRATION

This section evaluates noise and vibration levels associated with the implementation of the proposed project. This analysis in this section assesses existing noise and vibration conditions at the project site and in its vicinity, as well as short-term construction and long-term operational noise and vibration impacts associated with the proposed project. Mitigation measures for potentially significant impacts are recommended when appropriate to reduce noise and vibration levels.

3.1 NOISE AND VIBRATION CHARACTERISTICS AND EFFECTS

3.1.1 Noise

Characteristics of Sound

Sound is technically described in terms of the loudness (amplitude) and frequency (pitch) of the sound. The standard unit of measurement for sound is the decibel (dB). The human ear is not equally sensitive to sound at all frequencies. The "A-weighted scale," abbreviated dBA, reflects the normal hearing sensitivity range of the human ear. On this scale, the range of human hearing extends from approximately 3 to 140 dBA. **Figure 3-1** provides examples of A-weighted noise levels from common sounds.

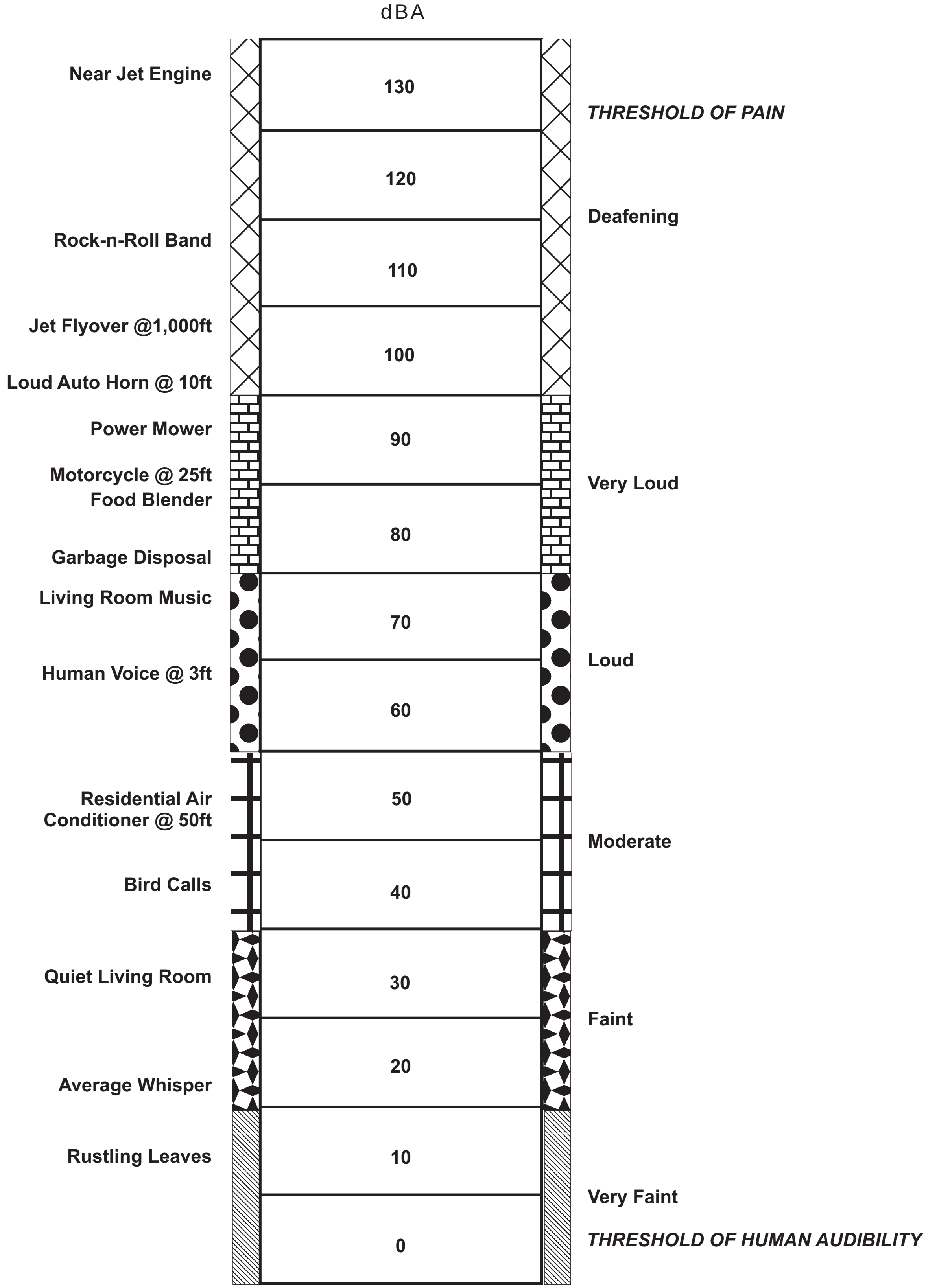
Noise Definitions

This noise analysis discusses sound levels in terms of Community Noise Equivalent Level (CNEL), Equivalent Noise Level (L_{eq}), and the noise level exceeded X percent of a specific time period (L_X).

Community Noise Equivalent Level. CNEL is an average sound level during a 24-hour period. CNEL is a noise measurement scale, which accounts for noise source, distance, single event duration, single event occurrence, frequency, and time of day. Human reaction to sound between 7:00 p.m. and 10:00 p.m. is as if the sound were actually 5 dBA higher than if it occurred from 7:00 a.m. to 7:00 p.m. From 10:00 p.m. to 7:00 a.m., humans perceive sound as if it were 10 dBA higher due to the lower background level. Hence, the CNEL is obtained by adding an additional 5 dBA to sound levels in the evening from 7:00 p.m. to 10:00 p.m. and 10 dBA to sound levels in the night from 10:00 p.m. to 7:00 a.m. Because CNEL accounts for human sensitivity to sound, the CNEL 24-hour figure is always a higher number than the actual 24-hour average.

Equivalent Noise Level. L_{eq} is the average noise level on an energy basis for any specific time period. The L_{eq} for one hour is the energy average noise level during the hour. The average noise level is based on the energy content (acoustic energy) of the sound. L_{eq} can be thought of as the level of a continuous noise which has the same energy content as the fluctuating noise level. The equivalent noise level is expressed in units of dBA.

L_X. L_X is the noise level exceeded X percent of a specific time period. The value of X is commonly 10 (e.g., L_{10}). Other values such as 50 and 90 are also commonly used.



SOURCE: Cowan, James P., *Handbook of Environmental Acoustics*

FIGURE 3-1

A-WEIGHTED DECIBEL SCALE

Effects of Noise

Noise is generally defined as unwanted sound. The degree to which noise can impact the human environment ranges from levels that interfere with speech and sleep (annoyance and nuisance) to levels that cause adverse health effects (hearing loss and psychological effects). Human response to noise is subjective and can vary greatly from person to person. Factors that influence individual response include the intensity, frequency, and pattern of noise, the amount of background noise present before the intruding noise, and the nature of work or human activity that is exposed to the noise source.

Audible Noise Changes

Studies have shown that the smallest perceptible change in sound level for a person with normal hearing sensitivity is approximately 3 dBA. A change of at least 5 dBA would be noticeable and may evoke a community reaction. A 10-dBA increase is subjectively heard as a doubling in loudness and would likely cause a community response.

Noise levels decrease as the distance from the noise source to the receiver increases. Noise generated by a stationary noise source, or "point source," will decrease by approximately 6 dBA over hard surfaces (e.g., reflective surfaces such as parking lots or smooth bodies of water) and 7.5 dBA over soft surfaces (e.g., absorptive surfaces such as soft dirt, grass, or scattered bushes and trees) for each doubling of the distance. For example, if a noise source produces a noise level of 89 dBA at a reference distance of 50 feet, then the noise level would be 83 dBA at a distance of 100 feet from the noise source, 77 dBA at a distance of 200 feet, and so on, over hard or reflective surfaces. Noise generated by a mobile source will decrease by approximately 3 dBA over hard surfaces and 4.5 dBA over soft surfaces for each doubling of the distance.

Generally, noise is most audible when traveling by direct line-of-sight, which is an unobstructed visual path between the noise source and the noise receptor. Barriers, such as walls, berms, or buildings, that break the line-of-sight between the source and the receiver greatly reduce noise levels from the source since sound can only reach the receiver by bending over the top of the barrier (diffraction). Sound barriers can reduce sound levels by up to 20 dBA. However, if a barrier is not high or long enough to break the line-of-sight from the source to the receiver, its effectiveness is greatly reduced.

Applicable Regulations

SGS is located on City of Los Angeles property. Adjacent jurisdictions include the City of El Segundo and the County of Los Angeles.

City of Los Angeles. The City of Los Angeles has established policies and regulations concerning the generation and control of noise that could adversely affect and noise sensitive land uses. Regarding construction, the Los Angeles Municipal Code (LAMC) indicates that no construction or repair work shall be performed before 7:00 a.m. or after 9:00 p.m., Monday through Friday, since such activities would generate loud noises and disturb persons occupying sleeping quarters in any adjacent dwelling, hotel, apartment or other place of residence. No person, other than an individual home owner shall engaged in the repair or construction of his/her single-family dwelling, shall perform any construction or repair work of any kind or perform such work within 500 feet of land so occupied before 8:00 a.m. or after 6:00 p.m. on any Saturday or on a federal holiday, or at any time on any Sunday. Under certain conditions, the City may grant a waiver to allow limited construction activities to occur outside of the limits described above.

City of El Segundo. The City of El Segundo noise policies are defined in Chapter 2 (Noise and Vibration), Title 7 (Nuisances and Offenses) of the Municipal Code. The Code states that no person should generate noise that causes greater than a 5-decibel increase in ambient noise levels at a residential property. The Code does not state what noise metric should be used to determine compliance with the noise ordinance. Therefore, the noise increase per the City standard is measured against the hourly noise level in this analysis.

Regarding construction noise, the City of El Segundo exempts noise sources associated with or vibration created by construction, repair, or remodeling of any real property, provided that activities do not take place between the hours of 6:00 p.m. and 7:00 a.m. Monday through Saturday, or at any time on Sunday or a Federal holiday, and provided the noise level created by such activities does not exceed the noise standard of 65 dBA as measured on the receptor residential property line and provided any vibration created does not endanger the public health, welfare, or safety.

County of Los Angeles. Dockweiler State Beach is operated by the County of Los Angeles. The County has not established noise standards for beach areas.

3.1.2 Vibration

Characteristics of Vibration

Vibration is an oscillatory motion through a solid medium in which the motion's amplitude can be described in terms of displacement, velocity, or acceleration. Vibration can be a serious concern, causing buildings to shake and rumbling sounds to be heard. In contrast to noise, vibration is not a common environmental problem. It is unusual for vibration from sources such as buses and trucks to be perceptible, even in locations close to major roads. Some common sources of vibration are trains, buses on rough roads, and construction activities, such as blasting, pile driving, and heavy earth-moving equipment.

Vibration Definitions

There are several different methods that are used to quantify vibration. The peak particle velocity (PPV) is defined as the maximum instantaneous peak of the vibration signal. The PPV is most frequently used to describe vibration impacts to buildings and is usually measured in inches per second. The root mean square (RMS) amplitude is most frequently used to describe the effect of vibration on the human body. The RMS amplitude is defined as the average of the squared amplitude of the signal. Decibel notation (Vdb) is commonly used to measure RMS. The decibel notation acts to compress the range of numbers required to describe vibration.[1]

Effects of Vibration

High levels of vibration may cause physical personal injury or damage to buildings. However, vibration levels rarely affect human health. Instead, most people consider vibration to be an annoyance that may affect concentration or disturb sleep. In addition, high levels of vibration

[1]Federal Transit Administration, *Transit Noise and Vibration Impact Assessment*, May 2006.

may damage fragile buildings or interfere with equipment that is highly sensitive to vibration (e.g., electron microscopes).

Perceptible Vibration Changes

In contrast to noise, vibration is not a phenomenon that most people experience every day. The background vibration velocity level in residential areas is usually 50 RMS or lower, well below the threshold of perception for humans which is around 65 RMS.[2] Most perceptible indoor vibration is caused by sources within buildings, such as operation of mechanical equipment, movement of people, or slamming of doors. Typical outdoor sources of perceptible vibration are construction equipment, steel-wheeled trains, and traffic on rough roads. If the roadway is smooth, the vibration from traffic is rarely perceptible.

Applicable Regulations

There are no adopted City of Los Angeles standards for vibration.

Regarding the City of El Segundo, Section 7-2-9 of the Municipal Code states that a person shall not create, maintain or cause any ground vibration which is perceptible, without the use of instruments, to any reasonable person of normal sensitivity at any point on any affected property.

Regarding the County of Los Angeles, Section 12.08.560 of the Code prohibits operating or permitting the operation of any device that creates vibration which is above the vibration perception threshold of any individual at or beyond the property boundary of the source if on private property, or at 150 feet from the source if on a public space or public right-of-way is prohibited. The perception threshold shall be a motion velocity of 0.01 inches per second over the range of 1 to 100 Hertz.

3.2 EXISTING SETTING

3.2.1 Existing Noise Environment

The existing noise environment of the project area is characterized by mechanical equipment noise associated with SGS, vehicular traffic along Vista Del Mar and Grand Avenue, and aircraft associated with Los Angeles International Airport. Additional sources of noise are typical of dense urban areas and include sirens and helicopters.

Sound measurements surrounding SGS were taken by ATCO Noise Management using a Brüel & Kjaer 2250 Real Time Analyzers over a 48-hour period from 10:00 a.m. August 10, 2010 to 10:00 a.m. August 12, 2010. These readings were used to establish existing ambient noise conditions and to provide a baseline for evaluating construction and operational noise impacts. Noise monitoring locations (locations 1 through 4) are shown in **Figure 3-2**.

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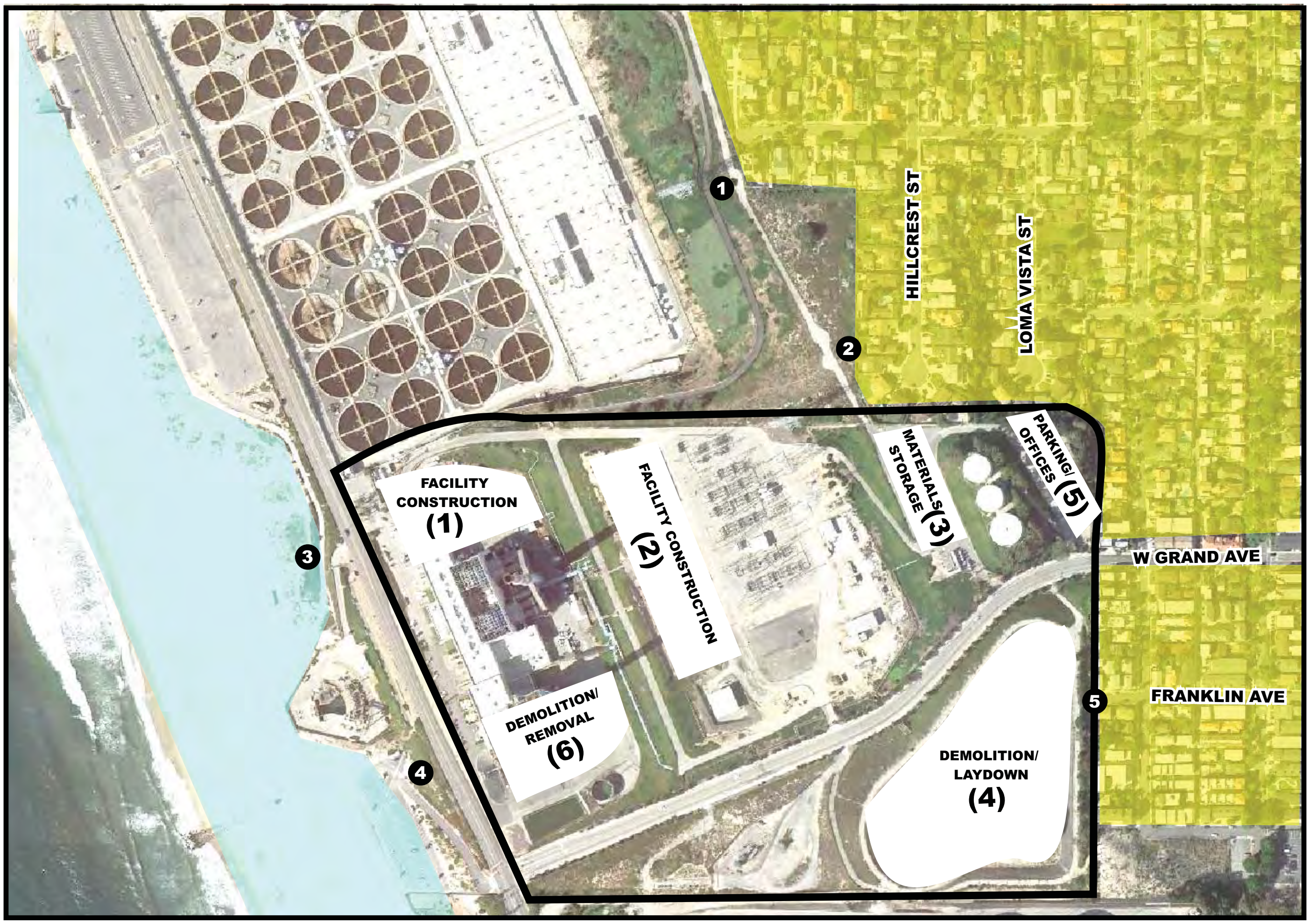
[2] *Ibid*.



LEGEND:

Residential Sensitive Receptors

Dockweiler State Beach

Project Site

(1) Construction Noise Source 1
(2) Construction Noise Source 2
(3) Construction Noise Source 3
(4) Construction Noise Source 4
(5) Construction Noise Source 5
(6) Construction Noise Source 6

Noise Monitoring Locations

1. Residential
2. Residential
3. Beach
4. Beach
5. Residential

APPROX. SCALE
0 210 420 FEET

N

SOURCE: Google Earth, 2012 and TAHA, 2012.

Scattergood Generating Station Repowering Project
Noise Impact Report

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FIGURE 3-2

NOISE MONITORING AND SENSITIVE RECEPTOR LOCATIONS

Monitored noise levels are shown in **Table 3-1**. Existing ambient sound levels range between 55.0 and 60.0 dBA L_{eq}. A sound measurement was also taken using a SoundPro DL Sound Level Meter between 11:00 a.m. and 11:15 a.m. on July 26, 2011 to determine existing ambient daytime off-peak noise level for single and multi-family residences south of Grand Avenue (location 5). This location is also shown on **Figure 3-2**. The existing ambient reading was 55.0 dBA $L_{eq.}$

TABLE 3-1: EXISTING NOISE LEVELS

Key to Figure 3-2	Noise Monitoring Location	Noise Levels, dBA Lowest Daytime $L_{eq\ 1\text{-}hr}$	Noise Levels, dBA Lowest Nighttime $L_{eq\ 1\text{-}hr}$
1	Residential	60	60
2	Residential	57	57
3	Beach	58	59
4	Beach	55	57

SOURCE: ATCO Noise Management, *Operational Noise Analysis*, September 28, 2011.

3.2.2 Existing Vibration Environment

There are no stationary sources of vibration located near the project site. Heavy-duty trucks can generate vibrations that vary depending on vehicle type and weight, and pavement conditions. However, vibration levels from adjacent roadways are not typically perceptible at the project site. In addition, mechanical equipment associated with the existing SGS facility does not generate perceptible vibration past the property line.

3.2.3 Sensitive Receptors

Noise- and vibration-sensitive land uses are locations where people reside or where the presence of unwanted sound could adversely affect the use of the land. Residences, schools, hospitals, guest lodging, libraries, and some passive recreation areas would be considered noise- and vibration-sensitive and may warrant measures for protection from intruding noise. Sensitive receptor locations are identified in **Figure 3-2** above and included the following areas in jurisdictions adjacent to SGS.

City of Los Angeles. No sensitive receptors within the City of Los Angeles are located within one-quarter mile of the project site. Noise levels at sensitive receptors outside this range would not be affected by construction or operational activities.

City of El Segundo. Residential land uses are located adjacent and to the east of the project site on the north and south sides of Grand Avenue.

County of Los Angeles. Dockweiler State Beach is located approximately 100 feet west of the project site.

3.3 METHODOLOGY AND SIGNIFICANCE CRITERIA

3.3.1 Methodology

Construction. The construction analysis presents three scenarios, representing various phases of construction that can be characterized based on their location and type of activity. There are two power generation system options that are currently under consideration that could be implemented at SGS. It was assumed that these options would result in similar construction noise levels.

The first construction scenario represents the beginning of construction activity when the oil tanks south of Grand Avenue will be demolished. It was assumed that this demolition activity would generate a noise level of 85 dBA L_{eq} at 50 feet, consistent with USEPA source equipment operating standards.

The second scenario is a worst-case scenario when activity would be occurring throughout the project site. The project site was divided into five distinct noise sources. The location of these noise sources is shown in **Figure 3-2**, above. Noise Sources 1 and 2 involve the placement of generating systems and associated mechanical equipment. Noise Source 3 is a paved materials storage area. Noise Source 4 is the Oil Tank (OT) Farm Area laydown area. Noise Source 5 is the parking and construction management area. The noise level associated with Noise Sources 1 and 2 was based on a reference level of 89 dBA L_{eq} at 50 feet for high intensity construction activity with multiple pieces equipment operating simultaneously.[3] It was assumed that Noise Source 3 would be a laydown area for small pieces of equipment and associated supplies. The noise level in this area would typically not exceed 68 dBA L_{eq} at 50 feet based on a small truck moving at 15 miles per hour. The Noise Source 4 reference level was 78 dBA Leq at 50 feet based on low intensity construction activity with multiple pieces equipment operating simultaneously. The noise level in the Noise Source 5 parking area is based on a reference level of 58.1 dBA L_{eq} at 50 feet.

The third construction scenario represents the demolition of Unit 3 (Noise Source 6 as identified on **Figure 3-2**) at the southwest corner of the SGS site. This activity would occur at the end of the construction process and would generate a noise level of approximately 89 dBA L_{eq} at 50 feet.

Construction noise levels were assessed for the sensitive receptors nearest to the project site on the north and south sides of Grand Avenue. These would be the receptors most affected by construction noise. Construction noise was also estimated at Dockweiler State Beach. The noise level at each receptor location was calculated by (1) making a distance adjustment to the construction source sound level and (2) logarithmically adding the adjusted construction noise source level to the ambient noise level.

Operations. The operational noise is based on a report prepared for LADWP by Worley Parsons and ATCO Noise Management (Appendix B).[4] The methodology is described in detail in the ATCO Noise Management technical report. To summarize, the acoustical modeling was completed using the Cadna/A computer software program from DataKustik GmbH. Atmospheric conditions were based on average conditions. Noise radiating elements were modeled based on their noise emission pattern. Concentrated sources, such as pumps and

[3] City of Los Angeles, *L.A. CEQA Thresholds Guide*, 2006.
[4] ATCO Noise Management, *Operational Noise Analysis*, September 28, 2011.

valves were included as point sources, which radiate sound hemi-spherically over ground. The analysis also includes directivity patterns associated with the exhaust stacks. Noise breakout through building walls was entered as area sources, which radiates sound over a much larger area. Pipes were entered as line sources, which radiate sound in a cylindrical pattern. Buildings and other obstacles were modeled as solid barrier elements. Source sound power levels for the SGS generator repowering options were obtained from vendor data or measurement data from similar units compiled from past projects where available. For equipment with no prior vendor or measurement data available, a sound power level for a similar piece of equipment was used with corrections for dimensions and mechanical differences. The following assumptions were used to develop the noise prediction model:

- Noise sources with infrequent operation were not included;
- Equipment was assumed to be in full load steady state operation;
- Units 1 and 2 were assumed to have nearly identical noise emission based on their mechanical similarity;
- The combustion turbine air inlet filter house would have standard silencing; and
- Doors were assumed closed.

3.3.2 Noise Significance Criteria

Construction Phase Significance Criteria

The determination of significance at residential receptors is based on standards listed in the El Segundo Municipal Code. Dockweiler State Beach is a recreational land use where general noise compatibility is important. As such, the determination of significance at the beach is based on the State land use compatibility matrix for water recreation as shown in **Table 3-2**. The maximum normally acceptable noise level for water recreation is 75 dBA L_{dn}, which overlaps with the minimum normally unacceptable noise level of 70 dBA L_{dn}. However, the maximum normally acceptable noise level is used as the threshold for this analysis given that Dockweiler State Beach is located near several substantial sources of noise including the existing SGS, Hyperion Treatment Plant, the Pacific Coast Highway, and Los Angeles International Airport. For a continuously operating stationary sound source, the L_{dn} is equivalent to the hourly equivalent sound level plus 6.4 dB. Therefore, the maximum hourly equivalent sound level is 68.6 dBA L_{eq}. However, it is important to remember that this is only a guideline and not a noise limit, since the County of Los Angeles has not established a noise limit for Dockweiler State Beach.

The proposed project would result in significant construction noise impacts if:

- Construction noise levels at residences in the City of El Segundo would exceed 65 dBA L_{eq}.
- Construction noise levels at Dockweiler State Beach exceed 68.6 dBA L_{eq}.

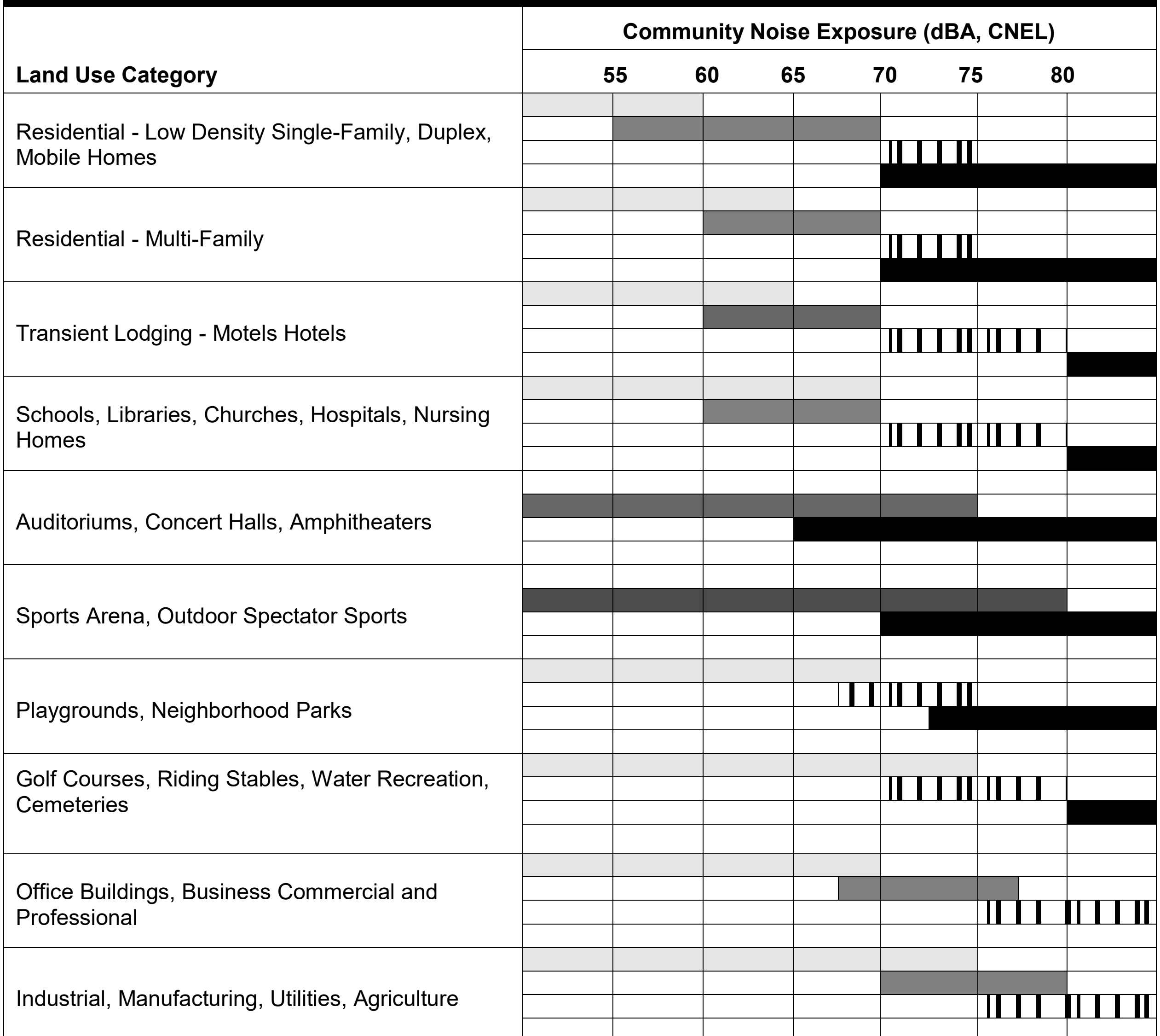
Operational Phase Significance Criteria

The determination of significance at residential receptors is based on standards listed in the El Segundo Municipal Code. The determination of significance at Dockweiler Beach is based on the State land use compatibility matrix shown in **Table 3-2**.

The proposed project would result in significant operational impacts if:

- Operational noise levels at residences in the City of El Segundo would exceed the ambient noise level by 5 dBA; and/or
- Operational noise levels at Dockweiler State Beach exceed 68.6 dBA L_{eq}.

TABLE 3-2: LAND USE COMPATIBILITY FOR COMMUNITY NOISE ENVIRONMENTS



Normally Acceptable - Specified land use is satisfactory, based upon 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. Conventional construction, but with closed windows and fresh air supply system or air conditionally will normally suffice.

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 should generally not be undertaken.

SOURCE: California Office of Noise Control, Department of Health Services.

3.3.3 Vibration Significance Criteria

There are no adopted State or local vibration standards. Based on federal guidelines, the proposed project would result in a significant construction or operational vibration impact if:

- The proposed project would expose buildings to the FTA building damage threshold for non-engineered timber and masonry buildings of 0.2 inches per second.

3.4 ENVIRONMENTAL IMPACTS

3.4.1 Noise Impacts

Construction Noise Impacts

Construction of the proposed project would result in temporary increases in ambient noise levels in the project area on an intermittent basis. Noise levels would fluctuate depending on the construction phase, equipment type and duration of use, distance between the noise source and receptor, and presence or absence of noise attenuation barriers.

Construction activities typically require the use of numerous pieces noise-generating equipment. Typical noise levels from various types of equipment that may be used during construction are listed in **Table 3-3.** The table shows noise levels at distances of 50 and 100 feet from the construction noise source.

TABLE 3-3: MAXIMUM NOISE LEVELS OF COMMON CONSTRUCTION MACHINES

	Noise Level (dBA)	
Noise Source	**50 Feet**	**100 Feet**
Front Loader	80	74
Trucks	89	83
Cranes (derrick)	88	82
Jackhammers	90	84
Generators	77	71
Back Hoe	84	78
Tractor	88	82
Scraper/Grader	87	81
Paver	87	81
Auger Drilling	77	71

SOURCE: City of Los Angeles, *L.A. CEQA Thresholds Guide*, 2006.

Construction Scenario 1. The first scenario represents the beginning of construction activity when the oil tanks south of Grand Avenue will be demolished. It was assumed that demolition activity would generate a noise level of 85 dBA L_{eq} at 50 feet. **Figure 3-3** shows the distance from each of the noise sources to the analyzed receptors. **Table 3-4** presents the estimated noise levels during construction activity. Noise levels would exceed the significance threshold at receptor location 5. Therefore, without mitigation, construction scenario 1 would result in a significant impact related to construction noise levels.

TABLE 3-4: CONSTRUCTION NOISE IMPACT – SCENARIO 1 UNMITIGATED					
Receptor Location and Land Use	**Construction Noise Level (dBA)**	**Existing Ambient (dBA, L_{eq})**	**New Ambient (dBA, L_{eq})**	**Threshold**	**Impact?**
1 – Residence	54.5	60.0	61.1	65	No
2 – Residence	57.9	57.0	60.5	65	No
3 – Beach	47.9	58.0	58.4	68.6	No
4 – Beach	49.4	55.0	56.1	68.6	No
5 – Residence	66.0	55.0	66.3	65	Yes
SOURCE: TAHA, 2011.					

Construction Scenario 2. Construction scenario 2 represents a worst-case scenario when activity would be occurring throughout the project site. **Figure 3-4** shows the distance from each of the noise sources to the analyzed receptors. **Table 3-5** presents the estimated noise levels at receptors during construction activity. Noise levels would exceed the significance threshold at receptor locations 1, 2, 3, and 5. Therefore, without mitigation, construction scenario 2 would result in a significant impact related to construction noise levels.

TABLE 3-5: CONSTRUCTION NOISE IMPACT – SCENARIO 2 UNMITIGATED					
Receptor Location and Land Use	**Construction Noise Level (dBA)**	**Existing Ambient (dBA, L_{eq})**	**New Ambient (dBA, L_{eq})**	**Threshold**	**Impact?**
1 – Residence	65.3	60.0	66.4	65	Yes
2 – Residence	67.0	57.0	67.4	65	Yes
3 – Beach	70.4	58.0	70.6	68.6	Yes
4 – Beach	65.9	55.0	66.3	68.6	No
5 – Residence	66.4	55.0	66.7	65	Yes
SOURCE: TAHA, 2011.					

Construction Scenario 3. Removal of the existing Unit 3 Power Plant would occur after the new generation is completed. This activity would not be concurrent with any other construction activities. **Figure 3-5** shows the distance from each of the noise sources to the analyzed receptors. **Table 3-6** presents the estimated noise levels at receptors during construction activity. Noise levels would exceed the significance threshold at receptor location 4. Therefore, without mitigation, construction scenario 3 would result in a significant impact related to construction noise levels.

TABLE 3-6: CONSTRUCTION NOISE IMPACT – SCENARIO 3 UNMITIGATED					
Receptor Location and Land Use	**Construction Noise Level (dBA)**	**Existing Ambient (dBA, L_{eq})**	**New Ambient (dBA, L_{eq})**	**Threshold**	**Impact?**
1 – Residence	48.9	60.0	60.3	65	No
2 – Residence	50.4	57.0	57.9	65	No
3 – Beach	64.8	58.0	65.6	68.6	No
4 – Beach	70.6	55.0	70.7	68.6	Yes
5 – Residence	49.3	55.0	56.0	65	No
SOURCE: TAHA, 2011.					

Construction Noise Mitigation Measures

N1 All construction equipment shall be properly maintained and equipped with mufflers and other suitable noise attenuation devices.

N2 Grading and construction contractors shall endeavor to use quieter equipment as opposed to noisier equipment (such as rubber-tired equipment rather than track equipment).

N3 The construction contractor shall ensure that all laydown and vehicle staging areas are located away from noise-sensitive receivers, to the extent feasible.

N4 The construction contractor shall plan work such that activities that generate high noise levels will not be started outside the hours codified in the Los Angeles and El Segundo Municipal Codes, and all reasonable efforts to conclude work in progress prior to the hours listed in these codes will be taken by the construction contractor.

N5 A public liaison for project construction shall be identified who shall be responsible for addressing public concerns about construction activities, including excessive noise. The liaison shall determine the cause of the concern (e.g., starting too early, bad muffler, etc.) and shall be required to implement reasonable measures to address the concern.

Impacts After Mitigation

Mitigation Measure **N1** would reduce noise levels by approximately 3 dBA. The other mitigation measures (**N2** through **N5**) would assist in attenuating construction noise levels, but the level of attenuation is non-quantifiable.

Construction Scenario 1. **Table 3-7** shows mitigated construction noise levels for Construction Scenario 1. Mitigated noise levels would not exceed the significance threshold at identified receptors. Therefore, Scenario 1 would result in a less-than-significant impact related to construction noise.

TABLE 3-7: CONSTRUCTION NOISE IMPACT – SCENARIO 1 MITIGATED

Receptor Location and Land Use	Construction Noise Level (dBA)	Existing Ambient (dBA, L_{eq})	New Ambient (dBA, L_{eq})	Threshold	Impact?
1 – Residence	51.5	60.0	60.6	65	No
2 – Residence	54.9	57.0	59.1	65	No
3 – Beach	44.9	58.0	58.2	68.6	No
4 – Beach	46.4	55.0	55.6	68.6	No
5 – Residence	63.0	55.0	63.6	65	No
SOURCE: TAHA, 2011.					

Construction Scenario 2. **Table 3-8** shows mitigated construction noise levels for construction scenario 2. Mitigated noise levels would not exceed the significance threshold at identified receptors. Therefore, construction scenario 2 would result in a less-than-significant impact related to construction noise.

TABLE 3-8: CONSTRUCTION NOISE IMPACT – SCENARIO 2 MITIGATED					
Receptor Location and Land Use	**Construction Noise Level (dBA)**	**Existing Ambient (dBA, L_{eq})**	**New Ambient (dBA, L_{eq})**	**Threshold**	**Impact?**
1 – Residence	62.3	60.0	64.3	65	No
2 – Residence	64.0	57.0	64.9	65	No
3 – Beach	67.4	58.0	67.8	68.6	No
4 – Beach	62.9	55.0	63.6	68.6	No
5 – Residence	63.4	55.0	62.2	65	No
SOURCE: TAHA, 2011.					

Construction Scenario 3. **Table 3-9** shows mitigated construction noise levels for construction scenario 3. Mitigated noise levels would not exceed the significance threshold at identified receptors. Therefore, construction scenario 3 would result in a less-than-significant impact related to construction noise.

TABLE 3-9: CONSTRUCTION NOISE IMPACT – SCENARIO 3 MITIGATED					
Receptor Location and Land Use	**Construction Noise Level (dBA)**	**Existing Ambient (dBA, L_{eq})**	**New Ambient (dBA, L_{eq})**	**Threshold**	**Impact?**
1 – Residence	45.9	60.0	60.2	65	No
2 – Residence	47.4	57.0	57.0	65	No
3 – Beach	61.8	58.0	63.3	68.6	No
4 – Beach	67.6	55.0	67.8	68.6	No
5 – Residence	46.3	55.0	55.5	65	No
SOURCE: TAHA, 2011.					

LEGEND:

Project Site

Construction Noise Source 4

Sensitive Receptor

1. Residential

2. Residential

3. Beach

4. Beach

5. Residential

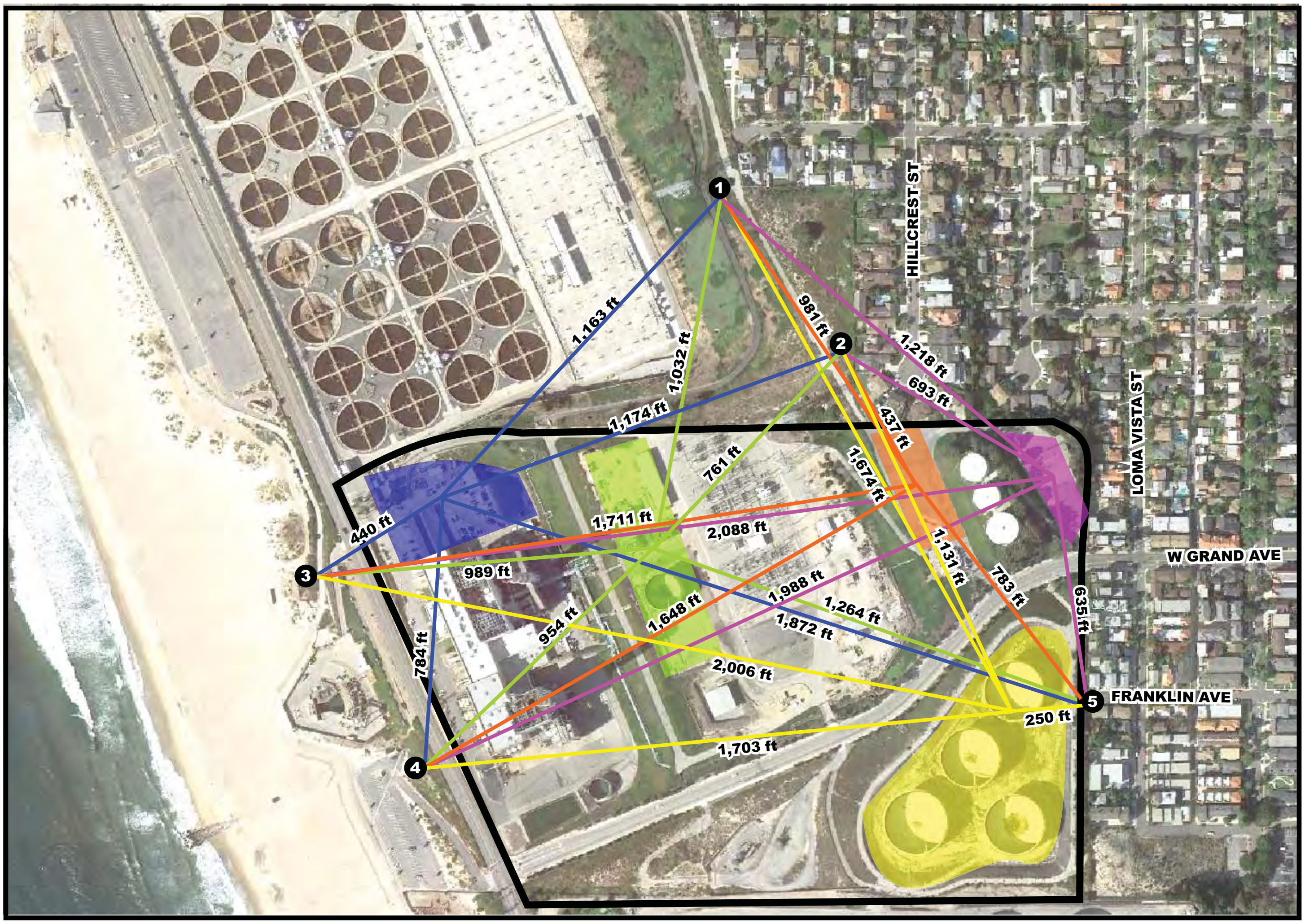
SOURCE: Google Earth, 2012 and TAHA, 2012.

Approx. Scale 0 210 420 Feet

N

FIGURE 3-3

NOISE SENSITIVE RECEPTOR LOCATIONS FOR SCENARIO 1



LEGEND:

- Project Site
- Construction Noise Source 1
- Construction Noise Source 2
- Construction Noise Source 3
- Construction Noise Source 4
- Construction Noise Source 5
- # Sensitive Receptor

1. Residential
2. Residential
3. Beach
4. Beach
5. Residential

APPROX. SCALE
0 210 420 FEET

SOURCE: Google Earth, 2012 and TAHA, 2012.

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FIGURE 3-4

NOISE SENSITIVE RECEPTORS LOCATIONS FOR SCENARIO 2

LEGEND:

Project Site

Construction Noise Source 6

Sensitive Receptor

1. Residential
2. Residential
3. Beach
4. Beach
5. Residential

SOURCE: Google Earth, 2012 and TAHA, 2012.

Approx. Scale

0 210 420 Feet

N

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FIGURE 3-5

NOISE SENSITIVE RECEPTOR LOCATIONS FOR SCENARIO 3

Operational Phase Noise Impacts

The Scattergood Generating station power plant upgrade currently has two design options, one powered by General Electric equipment and one powered by Siemens equipment. The General Electric (GE) option would consist of one GE Rapid Response combustion turbine/steam turbine power generation trains operating in combined cycle mode with a dry cooling system along with two GE simple cycle power generation trains with dry cooling systems. The Siemens option would consist of one base-load combustion turbine/steam turbine power generation trains and one peak-load combustion turbine/steam turbine power generation trains, both operating in combined cycle mode with dry cooling systems. In addition to gas combustion turbines, the combined cycle trains would use heat recovery steam generators, steam turbine power generation trains, dry air-cooled condenser cooling systems, boiler feed water pumps, and other ancillary equipment.

Operational noise levels were assessed at the receptors closest to the SGS. For example, it was assumed that noise levels at residences located to the south across Grand Avenue (i.e., at Franklin Avenue) and east behind the tanks (i.e., at Loma Vista Street) would be exposed to less noise than the residences on the bluffs facing SGS. In addition, the noise modeling assumed a base case scenario with no noise attenuation beyond that which is inherently included in the generation equipment packages.

GE Option (Generating Scenario 1). The GE Option scenario was modeled for the expected noise emission from the SGS facility under the following operating conditions:

- Units 1 and 2 under full load;
- 7FA 1x1 combined cycle turbine generator system in the north parking lot at full load;
- Two new LMS100 simple cycle turbine generator systems on the east terrace at full load; and
- Unit 3 is not operating (removed from service).

Siemens Option (Generating Scenario 2). The Siemens Option scenario was modeled for the expected noise emission from the SGS facility under the following operating conditions:

- Units 1 and 2 under full load;
- New combined cycle turbine generator system in the north parking lot at full load
- New combined cycle turbine generator system on the east terrace at full load; and
- Unit 3 is not operating (removed from service).

As shown in **Table 3-10** and **Figure 3-6**, noise levels would not exceed the established thresholds. Therefore, the proposed project would result in a less-than-significant impact related to GE operational noise levels.

As shown in **Table 3-10** and **Figure 3-7**, noise levels would not exceed the established thresholds. Therefore, the proposed project would result in a less-than-significant impact related to Siemens operational noise levels.

TABLE 3-10: OPERATIONAL SOUND LEVELS			
Location	**Threshold (dBA, L_{eq})**	**SGS Noise (dBA, L_{eq})**	**Impact?**
Siemens Option			
Receptor 1	62	59	No
Receptor 2	62	59	No
Receptor 3	68.6	62	No
Receptor 4	68.6	56	No
GE Option			
Receptor 1	62	55	No
Receptor 2	62	56	No
Receptor 3	68.6	67	No
Receptor 4	68.6	53	No
SOURCE: TAHA, 2011.			

Operational Noise Mitigation Measures

Operational noise impacts would be less-than-significant, and no mitigation measures are required.

Impacts After Mitigation

Not applicable. Operational noise would result in a less-than-significant impact without mitigation.

3.4.2 Vibration Impacts

Construction Vibration Impacts

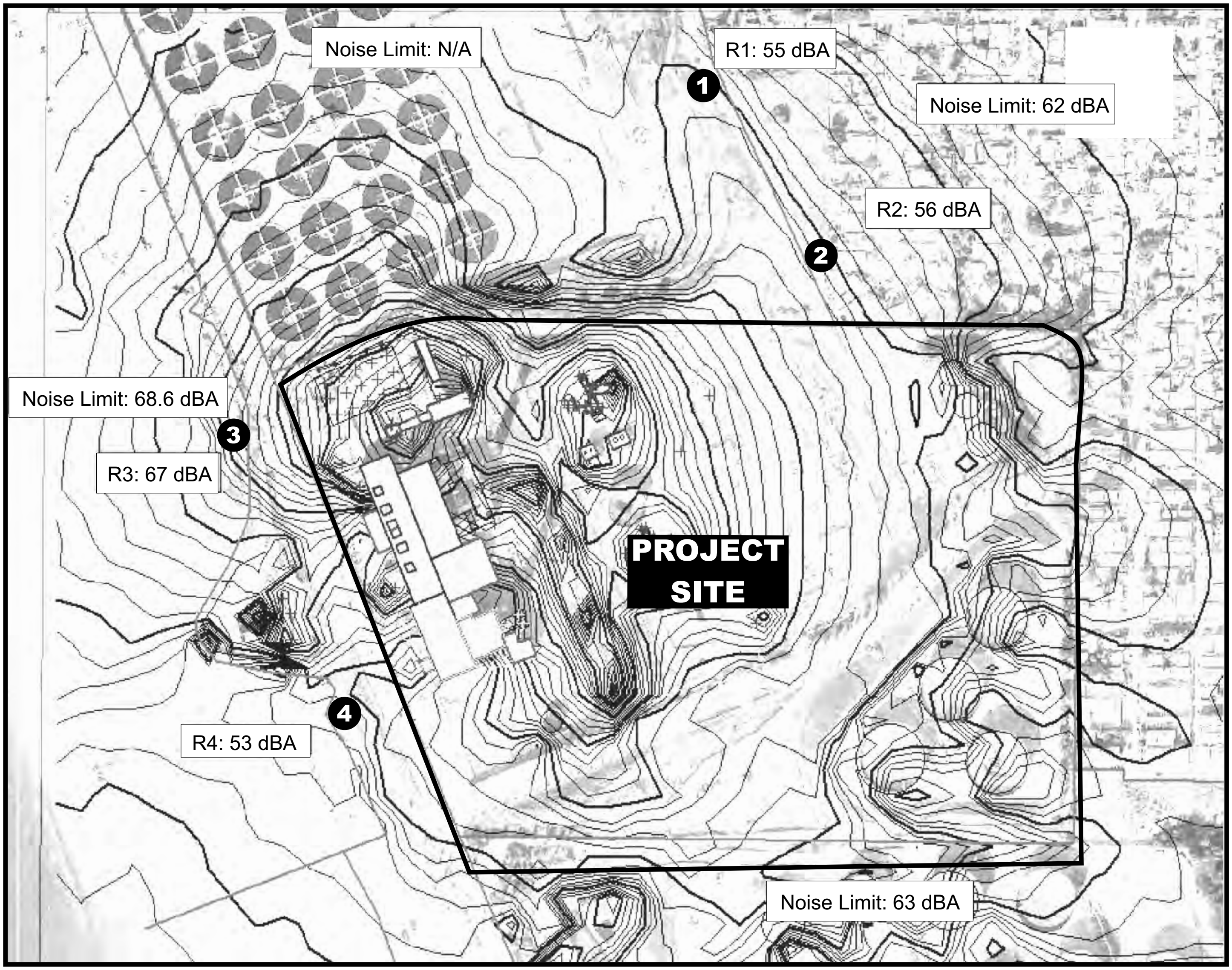
The FTA has published methodology for estimating vibration levels and potential impacts. According to the FTA, standard construction equipment (e.g., a large bulldozer) generates a vibration level of 0.089 inches per second at a distance of 25 feet. It is not anticipated that heavy construction activity would occur within 50 feet of residential buildings. Even at 50 feet, the typical equipment-generated vibration level would be 0.03 inches per second. Vibration levels at these receptors would not exceed the potential building damage threshold of 0.2 inches per second. Therefore, the proposed project would result in a less-than-significant impact related to construction vibration.

Construction Vibration Mitigation Measures

Construction vibration impacts would be less-than-significant, and no mitigation measures are required.

Impacts After Mitigation

Not applicable. Construction vibration impacts would result in a less-than-significant impact without mitigation.



LEGEND:

Project Site

Noise Monitoring Locations

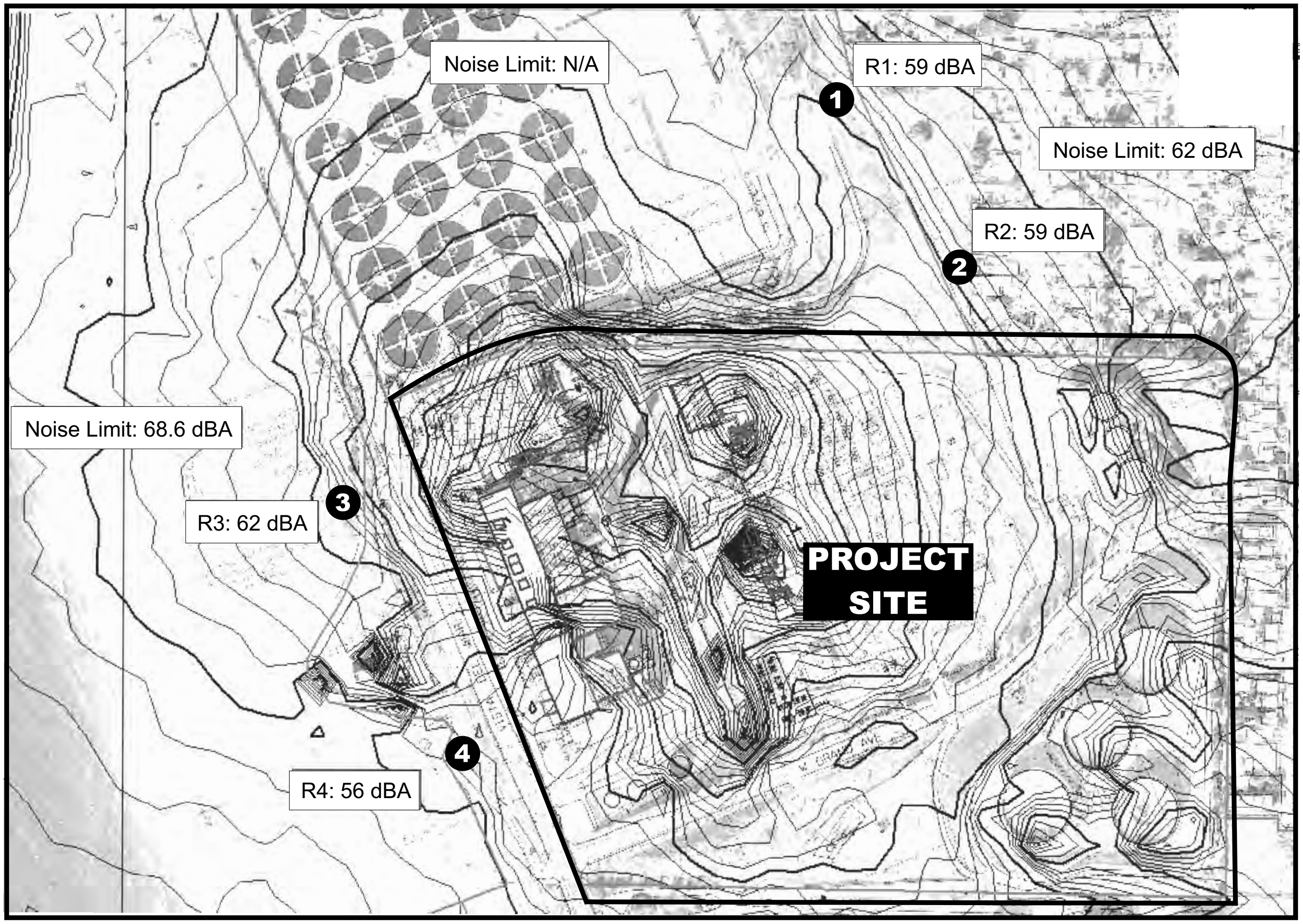
1. Residential
2. Residential
3. Beach
4. Beach

SOURCE: Worley Parsons, 2011.

APPROX. SCALE 0 350 700 FEET

FIGURE 3-6

GE OPTION NOISE CONTOURS



LEGEND:

Project Site

Noise Monitoring Locations

1. Residential
2. Residential
3. Beach
4. Beach

SOURCE: Worley Parsons, 2011.

APPROX. SCALE 0 350 700 FEET

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FIGURE 3-7

SIEMENS OPTION NOISE CONTOURS

Operational Vibration Mitigation Measures

Operational vibration impacts would be less-than-significant, and no mitigation measures are required.

Impacts After Mitigation

Not applicable. Operational vibration would result in a less than significant impact without mitigation.

3.5 CUMULATIVE IMPACTS

Cumulative impacts related to noise and vibration would result if the proposed project, in conjunction with other projects in the area, would contribute to a significant increase in ambient noise and vibration levels at nearby sensitive receptors.

Construction Noise Impacts

Construction activity generates localized noise levels that are generally audible at a maximum distance of 3,000 feet when there is a direct line-of-site from the source to the receptors. Topography and intervening structures typically associated with an urban environment quickly reduce the audible distance of construction noise. No projects have been identified within 3,000 feet of the project site with construction schedules that overlap with the proposed project. However, the proposed project would result in a significant and unavoidable construction noise impact. Therefore, it is anticipated that the proposed project would contribute to a cumulatively considerable construction noise impact.

Operational Noise Impacts

In addition to project-only noise, the operational noise analysis accounted for monitored ambient noise levels and operations of Units 1 and 2 under full load. This scenario represents a conservative cumulative condition, especially since the generation capacity of Unit 1 would permanently reduced as part of the proposed project. As previously discussed, operational SGS noise levels would not exceed the established significance thresholds. In addition, operation of the proposed project would not add any additional trips to the roadway system and, therefore, would not increase mobile noise in the region. Therefore, the proposed project would not contribute to a cumulatively considerable operational noise impact.

Construction and Operational Ground-borne Vibration Impacts

The predominant vibration source at the project site would be construction activity and operation of generator facilities. As previously discussed, the proposed project would not exceed the significance thresholds for vibration during either the construction or operational phases of the SCGS facility. In addition, no project has been identified near the project site that could generate perceptible vibration overlapping with the proposed project. Therefore, the proposed project would not contribute to a cumulatively considerable vibration impact.

Appendix A

Construction Noise Calculations

Receptor 1 - Residential Unmitigated

Construction Noise 1- Placement of Unit 3 Power Plant

Reference Noise Distance	**50**
Reference Noise Level	**89**

Construction Noise 1- Placement of Unit 3 Power Plant	Distance (feet)	Mitigation Factors	Attenuation Factors	Maximum Noise Level (dBA)
1 - Residential	1163	0	0	**61.7**

Construction Noise 2- Cooling Tower (CT) Area

Reference Noise Distance	**50**
Reference Noise Level	**89**

Construction Noise 2 Near Cooling Towers	Distance (feet)	Mitigation Factors	Attenuation Factors	Maximum Noise Level (dBA)
1 - Residential	1036	0	0	**62.7**

Construction Noise 3- Fuel Unloading (FU) Area

Reference Noise Distance	**50**
Reference Noise Level	**68**

Construction Noise 3 at Water Storage Facility	Distance (feet)	Mitigation Factors	Attenuation Factors	Maximum Noise Level (dBA)
1 - Residential	981	0	0	**42.1**

Construction Noise 4 at Oil Tank (OT) Farm Area

Reference Noise Distance	**50**
Reference Noise Level	**78**

Construction Noise 4 at Fuel Oil Storage Tank Facility	Distance (feet)	Mitigation Factors	Attenuation Factors	Maximum Noise Level (dBA)
1 - Residential	1674	0	10	**37.5**

Construction Noise 5- Parking and Construction Management Area

Reference Noise Distance	**50**
Reference Noise Level	**58.1**

Construction Noise 4 at Fuel Oil Storage Tank Facility	Distance (feet)	Mitigation Factors	Attenuation Factors	Maximum Noise Level (dBA)
1 - Residential	1,218	0	10	**40.3**

SUMMARY

Construction Noise Levels	Constuction Noise 1	Construction Noise 2	Construction Noise 3	Construction Noise 4	Construction Noise 5	Combined Noise Level (dBA)
1 - Residential	61.7	62.7	42.1	37.5	40.3	65.3

Construction Noise Levels	Maximum Construction Noise Level (dBA)	Existing Ambient (dBA, Leq)	New Ambient (dBA, Leq)
1 - Residential	65.3	60	66.4

Receptor 2 - Residential Unmitigated

Construction Noise 1- Placement of Unit 3 Power Plant

Reference Noise Distance	**50**
Reference Noise Level	**89**

Construction Noise 1- Placement of Unit 3 Power Plant	Distance (feet)	Mitigation Factors	Attenuation Factors	Maximum Noise Level (dBA)
2 - Residential	1,174	0	0	**61.6**

Construction Noise 2- Cooling Tower (CT) Area

Reference Noise Distance	**50**
Reference Noise Level	**89**

Construction Noise 2- Cooling Tower (CT) Area	Distance (feet)	Mitigation Factors	Attenuation Factors	Maximum Noise Level (dBA)
2 - Residential	761	0	0	**65.4**

Construction Noise 3- Fuel Unloading (FU) Area

Reference Noise Distance	**50**
Reference Noise Level	**68**

Construction Noise 3- Fuel Unloading (FU) Area	Distance (feet)	Mitigation Factors	Attenuation Factors	Maximum Noise Level (dBA)
2 - Residential	437	0	0	**49.2**

Construction Noise 4- Oil Tank (OT) Farm Area

Reference Noise Distance	**50**
Reference Noise Level	**78**

Construction Noise 4- Oil Tank (OT) Farm Area	Distance (feet)	Mitigation Factors	Attenuation Factors	Maximum Noise Level (dBA)
2 - Residential	1131	0	10	**40.9**

Construction Noise 5- Parking and Construction Management Area

Reference Noise Distance	**50**
Reference Noise Level	**58.1**

Construction Noise 5- Parking and Construction Management Area	Distance (feet)	Mitigation Factors	Attenuation Factors	Maximum Noise Level (dBA)
2 - Residential	693	0	10	**25.3**

SUMMARY

Construction Noise Levels	Constuction Noise 1	Construction Noise 2	Construction Noise 3	Construction Noise 4	Construction Noise 5	Combined Noise Level (dBA)
2 - Residential	61.6	65.4	49.2	40.9	25.3	67.0

Construction Noise Levels	Maximum Construction Noise Level (dBA)	Existing Ambient (dBA, Leq)	New Ambient (dBA, Leq)
2 - Residential	67.0	57	67.4

Receptor 3 - Beach Unmitigated

Construction Noise 1- Placement of Unit 3 Power Plant

Reference Noise Distance	**50**
Reference Noise Level	**89**

Construction Noise 1- Placement of Unit 3 Power Plant	Distance (feet)	Mitigation Factors	Attenuation Factors	Maximum Noise Level (dBA)
3 - Beach	440	0	0	**70.1**

Construction Noise 2- Cooling Tower (CT) Area

Reference Noise Distance	**50**
Reference Noise Level	**89**

Construction Noise 2 Near Cooling Towers	Distance (feet)	Mitigation Factors	Attenuation Factors	Maximum Noise Level (dBA)
3 - Beach	989	0	5	**58.1**

Construction Noise 3- Fuel Unloading (FU) Area

Reference Noise Distance	**50**
Reference Noise Level	**68**

Construction Noise 3 at Water Storage Facility	Distance (feet)	Mitigation Factors	Attenuation Factors	Maximum Noise Level (dBA)
3 - Beach	1711	0	5	**32.3**

Construction Noise 4 at Oil Tank (OT) Farm Area

Reference Noise Distance	**50**
Reference Noise Level	**78**

Construction Noise 4 at Fuel Oil Storage Tank Facility	Distance (feet)	Mitigation Factors	Attenuation Factors	Maximum Noise Level (dBA)
3 - Beach	2,006	0	15	**30.9**

Construction Noise 5- Parking and Construction Management Area

Reference Noise Distance	**50**
Reference Noise Level	**58.1**

Construction Noise 4 at Fuel Oil Storage Tank Facility	Distance (feet)	Mitigation Factors	Attenuation Factors	Maximum Noise Level (dBA)
3 - Beach	2,088	0	20	**25.6**

SUMMARY

Construction Noise Levels	Constuction Noise 1	Construction Noise 2	Construction Noise 3	Construction Noise 4	Construction Noise 5	Combined Noise Level (dBA)
3 - Beach	70.1	58.1	32.3	30.9	25.6	70.4

Construction Noise Levels	Maximum Construction Noise Level (dBA)	Existing Ambient (dBA, Leq)	New Ambient (dBA, Leq)
3 - Beach	70.4	58	70.6

Receptor 4 - Beach Unmitigated

Construction Noise 1- Placement of Unit 3 Power Plant

Reference Noise Distance	**50**
Reference Noise Level	**89**

Construction Noise 1- Placement of Unit 3 Power Plant	Distance (feet)	Mitigation Factors	Attenuation Factors	Maximum Noise Level (dBA)
4 - Beach	784	0	0	**65.1**

Construction Noise 2- Cooling Tower (CT) Area

Reference Noise Distance	**50**
Reference Noise Level	**89**

Construction Noise 2 Near Cooling Towers	Distance (feet)	Mitigation Factors	Attenuation Factors	Maximum Noise Level (dBA)
4 - Beach	954	0	5	**58.4**

Construction Noise 3- Fuel Unloading (FU) Area

Reference Noise Distance	**50**
Reference Noise Level	**68**

Construction Noise 3 at Water Storage Facility	Distance (feet)	Mitigation Factors	Attenuation Factors	Maximum Noise Level (dBA)
4 - Beach	1648	0	0	**37.6**

Construction Noise 4 at Oil Tank (OT) Farm Area

Reference Noise Distance	**50**
Reference Noise Level	**78**

Construction Noise 4 at Fuel Oil Storage Tank Facility	Distance (feet)	Mitigation Factors	Attenuation Factors	Maximum Noise Level (dBA)
4 - Beach	1,703	0	15	**32.4**

Construction Noise 5 at Parking and Construction Management Area

Reference Noise Distance	**50**
Reference Noise Level	**58.1**

Construction Noise 4 at Fuel Oil Storage Tank Facility	Distance (feet)	Mitigation Factors	Attenuation Factors	Maximum Noise Level (dBA)
4 - Beach	1,988	0	20	**6.1**

SUMMARY

Construction Noise Levels	Constuction Noise 1	Construction Noise 2	Construction Noise 3	Construction Noise 4	Construction Noise 5	Combined Noise Level (dBA)
4 - Beach	65.1	58.4	37.6	32.4	6.1	65.9

Construction Noise Levels	Maximum Construction Noise Level (dBA)	Existing Ambient (dBA, Leq)	New Ambient (dBA, Leq)
4 - Beach	65.9	55	66.3

Receptor 5 - Residential Unmitigated

Construction Noise 1- Placement of Unit 3 Power Plant

Reference Noise Distance	**50**
Reference Noise Level	**89**

Construction Noise 1- Placement of Unit 3 Power Plant	Distance (feet)	Mitigation Factors	Attenuation Factors	Maximum Noise Level (dBA)
5 - Residential	1872	0	0	**57.5**

Construction Noise 2- Cooling Tower (CT) Area

Reference Noise Distance	**50**
Reference Noise Level	**89**

Construction Noise 2- Cooling Tower (CT) Area	Distance (feet)	Mitigation Factors	Attenuation Factors	Maximum Noise Level (dBA)
5 - Residential	1264	0	0	**60.9**

Construction Noise 3- Fuel Unloading (FU) Area

Reference Noise Distance	**50**
Reference Noise Level	**68**

Construction Noise 3- Fuel Unloading (FU) Area	Distance (feet)	Mitigation Factors	Attenuation Factors	Maximum Noise Level (dBA)
5 - Residential	783	0	0	**44.1**

Construction Noise 4- Oil Tank (OT) Farm Area

Reference Noise Distance	**50**
Reference Noise Level	**78**

Construction Noise 4- Oil Tank (OT) Farm Area	Distance (feet)	Mitigation Factors	Attenuation Factors	Maximum Noise Level (dBA)
5 - Residential	250	0	0	**64.0**

Construction Noise 5- Parking and Construction Management Area

Reference Noise Distance	**50**
Reference Noise Level	**58.1**

Construction Noise 5- Parking and Construction Management Area	Distance (feet)	Mitigation Factors	Attenuation Factors	Maximum Noise Level (dBA)
5 - Residential	635	0	10	**45.9**

SUMMARY

Construction Noise Levels	Constuction Noise 1	Construction Noise 2	Construction Noise 3	Construction Noise 4	Construction Noise 5	Combined Noise Level (dBA)
5 - Residential	57.5	60.9	44.1	64.0	45.9	66.4

Construction Noise Levels	Maximum Construction Noise Level (dBA)	Existing Ambient (dBA, Leq)	New Ambient (dBA, Leq)
5 - Residential	66.4	55	66.7

CONSTRUCTION NOISE CALCULATIONS
Scattergood Generating Station Repowering Project

Construction Scenario 1 - Unmitigated

Construction Noise 4- Oil Tank (OT) Farm Area

Reference Noise Distance	**50**
Reference Noise Level	**85**

Construction Noise 4- Oil Tank (OT) Farm Area	Distance (feet)	Attenuation Factors	Maximum Noise Level (dBA)	Existing Ambient (dBA, Leq)	New Ambient (dBA, Leq)
1 - Residential	1,674	0	54.5	60.0	61.1
2 - Residential	1,131	0	57.9	57.0	60.5
3 - Beach	2,006	5	47.9	58.0	58.4
4 - Beach	1,703	5	49.4	55.0	56.1
5 - Residential	250	5	66.0	55.0	66.3

Construction Scenario 3 - Unmitigated

Construction Noise 5- Removal of Existing Unit 3 Power Plant

Reference Noise Distance	50				
Reference Noise Level	89				
Construction Noise 5- Removal of Existing Unit 3 Power Plant	**Distance (feet)**	**Attenuation Factors**	**Maximum Noise Level (dBA)**	**Existing Ambient (dBA, Leq)**	**New Ambient (dBA, Leq)**
1 - Residential	1,602	10	48.9	60.0	60.3
2 - Residential	1,353	10	50.4	57.0	57.9
3 - Beach	807	0	64.8	58.0	65.6
4 - Beach	415	0	70.6	55.0	70.7
5 - Residential	1,524	10	49.3	55.0	56.0

Construction Scenario 1 - Mitigated

Construction Noise 4- Oil Tank (OT) Farm Area

Construction Noise 4- Oil Tank (OT) Farm Area	Distance (feet)	Mitigation Factors	Attenuation Factors	Maximum Noise Level (dBA)	Existing Ambient (dBA, Leq)	New Ambient (dBA, Leq)
Reference Noise Distance	**50**					
Reference Noise Level	**85**					
1 - Residential	1,674	3	0	51.5	60.0	60.6
2 - Residential	1,131	3	0	54.9	57.0	59.1
3 - Beach	2,006	3	5	44.9	58.0	58.2
4 - Beach	1,703	3	5	46.4	55.0	55.6
5 - Residential	250	3	5	63.0	55.0	63.6

Receptor 1 - Residential Mitigated

Construction Noise 1- Placement of Unit 3 Power Plant

Reference Noise Distance	**50**
Reference Noise Level	**89**

Construction Noise 1- Placement of Unit 3 Power Plant	Distance (feet)	Mitigation Factors	Attenuation Factors	Maximum Noise Level (dBA)
1 - Residential	1163	3	0	**58.7**

Construction Noise 2- Cooling Tower (CT) Area

Reference Noise Distance	**50**
Reference Noise Level	**89**

Construction Noise 2 Near Cooling Towers	Distance (feet)	Mitigation Factors	Attenuation Factors	Maximum Noise Level (dBA)
1 - Residential	1036	3	0	**59.7**

Construction Noise 3- Fuel Unloading (FU) Area

Reference Noise Distance	**50**
Reference Noise Level	**68**

Construction Noise 3 at Water Storage Facility	Distance (feet)	Mitigation Factors	Attenuation Factors	Maximum Noise Level (dBA)
1 - Residential	981	3	0	**39.1**

Construction Noise 4 at Oil Tank (OT) Farm Area

Reference Noise Distance	**50**
Reference Noise Level	**78**

Construction Noise 4 at Fuel Oil Storage Tank Facility	Distance (feet)	Mitigation Factors	Attenuation Factors	Maximum Noise Level (dBA)
1 - Residential	1674	3	10	**34.5**

Construction Noise 5- Parking and Construction Management Area

Reference Noise Distance	**50**
Reference Noise Level	**58.1**

Construction Noise 4 at Fuel Oil Storage Tank Facility	Distance (feet)	Mitigation Factors	Attenuation Factors	Maximum Noise Level (dBA)
1 - Residential	1,218	3	10	**37.3**

SUMMARY

Construction Noise Levels	Constuction Noise 1	Construction Noise 2	Construction Noise 3	Construction Noise 4	Construction Noise 5	Combined Noise Level (dBA)
1 - Residential	58.7	59.7	39.1	34.5	37.3	62.3

Construction Noise Levels	Maximum Construction Noise Level (dBA)	Existing Ambient (dBA, Leq)	New Ambient (dBA, Leq)
1 - Residential	62.3	60	64.3

Receptor 2 - Residential Mitigated

Construction Noise 1- Placement of Unit 3 Power Plant

Reference Noise Distance	**50**
Reference Noise Level	**89**

Construction Noise 1- Placement of Unit 3 Power Plant	Distance (feet)	Mitigation Factors	Attenuation Factors	Maximum Noise Level (dBA)
2 - Residential	1,174	3	0	**58.6**

Construction Noise 2- Cooling Tower (CT) Area

Reference Noise Distance	**50**
Reference Noise Level	**89**

Construction Noise 2- Cooling Tower (CT) Area	Distance (feet)	Mitigation Factors	Attenuation Factors	Maximum Noise Level (dBA)
2 - Residential	761	3	0	**62.4**

Construction Noise 3- Fuel Unloading (FU) Area

Reference Noise Distance	**50**
Reference Noise Level	**68**

Construction Noise 3- Fuel Unloading (FU) Area	Distance (feet)	Mitigation Factors	Attenuation Factors	Maximum Noise Level (dBA)
2 - Residential	437	3	0	**46.2**

Construction Noise 4- Oil Tank (OT) Farm Area

Reference Noise Distance	**50**
Reference Noise Level	**78**

Construction Noise 4- Oil Tank (OT) Farm Area	Distance (feet)	Mitigation Factors	Attenuation Factors	Maximum Noise Level (dBA)
2 - Residential	1131	3	10	**37.9**

Construction Noise 5- Parking and Construction Management Area

Reference Noise Distance	**50**
Reference Noise Level	**58.1**

Construction Noise 5- Parking and Construction Management Area	Distance (feet)	Mitigation Factors	Attenuation Factors	Maximum Noise Level (dBA)
2 - Residential	693	3	10	**22.3**

SUMMARY

Construction Noise Levels	Constuction Noise 1	Construction Noise 2	Construction Noise 3	Construction Noise 4	Construction Noise 5	Combined Noise Level (dBA)
2 - Residential	58.6	62.4	46.2	37.9	22.3	64.0

Construction Noise Levels	Maximum Construction Noise Level (dBA)	Existing Ambient (dBA, Leq)	New Ambient (dBA, Leq)
2 - Residential	64.0	57	64.8

Receptor 3 - Beach Mitigated

Construction Noise 1- Placement of Unit 3 Power Plant

Reference Noise Distance	50
Reference Noise Level	89

Construction Noise 1- Placement of Unit 3 Power Plant	Distance (feet)	Mitigation Factors	Attenuation Factors	Maximum Noise Level (dBA)
3 - Beach	440	3	0	**67.1**

Construction Noise 2- Cooling Tower (CT) Area

Reference Noise Distance	50
Reference Noise Level	89

Construction Noise 2 Near Cooling Towers	Distance (feet)	Mitigation Factors	Attenuation Factors	Maximum Noise Level (dBA)
3 - Beach	989	3	5	**55.1**

Construction Noise 3- Fuel Unloading (FU) Area

Reference Noise Distance	50
Reference Noise Level	68

Construction Noise 3 at Water Storage Facility	Distance (feet)	Mitigation Factors	Attenuation Factors	Maximum Noise Level (dBA)
3 - Beach	1711	3	5	**29.3**

Construction Noise 4 at Oil Tank (OT) Farm Area

Reference Noise Distance	50
Reference Noise Level	78

Construction Noise 4 at Fuel Oil Storage Tank Facility	Distance (feet)	Mitigation Factors	Attenuation Factors	Maximum Noise Level (dBA)
3 - Beach	2006	3	15	**27.9**

Construction Noise 5- Parking and Construction Management Area

Reference Noise Distance	50
Reference Noise Level	58.1

Construction Noise 4 at Fuel Oil Storage Tank Facility	Distance (feet)	Mitigation Factors	Attenuation Factors	Maximum Noise Level (dBA)
3 - Beach	2,088	3	20	**22.6**

SUMMARY

Construction Noise Levels	Constuction Noise 1	Construction Noise 2	Construction Noise 3	Construction Noise 4	Construction Noise 5	Combined Noise Level (dBA)
3 - Beach	67.1	55.1	29.3	27.9	22.6	67.4

Construction Noise Levels	Maximum Construction Noise Level (dBA)	Existing Ambient (dBA, Leq)	New Ambient (dBA, Leq)
3 - Beach	67.4	58	67.8

CONSTRUCTION NOISE CALCULATIONS
Scattergood Generating Station Repowering Project

Receptor 4 - Beach Mitigated

Construction Noise 1- Placement of Unit 3 Power Plant

Reference Noise Distance	50
Reference Noise Level	89

Construction Noise 1- Placement of Unit 3 Power Plant	Distance (feet)	Mitigation Factors	Attenuation Factors	Maximum Noise Level (dBA)
4 - Beach	784	3	0	**62.1**

Construction Noise 2- Cooling Tower (CT) Area

Reference Noise Distance	50
Reference Noise Level	89

Construction Noise 2 Near Cooling Towers	Distance (feet)	Mitigation Factors	Attenuation Factors	Maximum Noise Level (dBA)
4 - Beach	954	3	5	**55.4**

Construction Noise 3- Fuel Unloading (FU) Area

Reference Noise Distance	50
Reference Noise Level	68

Construction Noise 3 at Water Storage Facility	Distance (feet)	Mitigation Factors	Attenuation Factors	Maximum Noise Level (dBA)
4 - Beach	1648	3	0	**34.6**

Construction Noise 4 at Oil Tank (OT) Farm Area

Reference Noise Distance	50
Reference Noise Level	78

Construction Noise 4 at Fuel Oil Storage Tank Facility	Distance (feet)	Mitigation Factors	Attenuation Factors	Maximum Noise Level (dBA)
4 - Beach	1703	3	15	**29.4**

Construction Noise 5 at Parking and Construction Management Area

Reference Noise Distance	50
Reference Noise Level	58.1

Construction Noise 4 at Fuel Oil Storage Tank Facility	Distance (feet)	Mitigation Factors	Attenuation Factors	Maximum Noise Level (dBA)
4 - Beach	1,988	3	20	**3.1**

SUMMARY

Construction Noise Levels	Constuction Noise 1	Construction Noise 2	Construction Noise 3	Construction Noise 4	Construction Noise 5	Combined Noise Level (dBA)
4 - Beach	62.1	55.4	34.6	29.4	3.1	62.9

Construction Noise Levels	Maximum Construction Noise Level (dBA)	Existing Ambient (dBA, Leq)	New Ambient (dBA, Leq)
4 - Beach	62.9	55	63.6

Receptor 5 - Residential Mitigated

Construction Noise 1- Placement of Unit 3 Power Plant

Reference Noise Distance	**50**
Reference Noise Level	**89**

Construction Noise 1- Placement of Unit 3 Power Plant	Distance (feet)	Mitigation Factors	Attenuation Factors	Maximum Noise Level (dBA)
5 - Residential	1872	3	0	**54.5**

Construction Noise 2- Cooling Tower (CT) Area

Reference Noise Distance	**50**
Reference Noise Level	**89**

Construction Noise 2- Cooling Tower (CT) Area	Distance (feet)	Mitigation Factors	Attenuation Factors	Maximum Noise Level (dBA)
5 - Residential	1264	3	0	**57.9**

Construction Noise 3- Fuel Unloading (FU) Area

Reference Noise Distance	**50**
Reference Noise Level	**68**

Construction Noise 3- Fuel Unloading (FU) Area	Distance (feet)	Mitigation Factors	Attenuation Factors	Maximum Noise Level (dBA)
5 - Residential	783	3	0	**41.1**

Construction Noise 4- Oil Tank (OT) Farm Area

Reference Noise Distance	**50**
Reference Noise Level	**78**

Construction Noise 4- Oil Tank (OT) Farm Area	Distance (feet)	Mitigation Factors	Attenuation Factors	Maximum Noise Level (dBA)
5 - Residential	250	3	0	**61.0**

Construction Noise 5- Parking and Construction Management Area

Reference Noise Distance	**50**
Reference Noise Level	**58.1**

Construction Noise 5- Parking and Construction Management Area	Distance (feet)	Mitigation Factors	Attenuation Factors	Maximum Noise Level (dBA)
5 - Residential	635	3	10	**42.9**

SUMMARY

Construction Noise Levels	Constuction Noise 1	Construction Noise 2	Construction Noise 3	Construction Noise 4	Construction Noise 5	Combined Noise Level (dBA)
5 - Residential	54.5	57.9	41.1	61.0	42.9	63.4

Construction Noise Levels	Maximum Construction Noise Level (dBA)	Existing Ambient (dBA, Leq)	New Ambient (dBA, Leq)
5 - Residential	63.4	55	64.0

Construction Scenario 3 - Mitigated
Construction Noise 5- Removal of Existing Unit 3 Power Plant

Reference Noise Distance	**50**
Reference Noise Level	**89**

Construction Noise 5- Removal of Existing Unit 3 Power Plant	**Distance (feet)**	**Mitigation Factors**	**Attenuation Factors**	**Maximum Noise Level (dBA)**	**Existing Ambient (dBA, Leq)**	**New Ambient (dBA, Leq)**
1 - Residential	1,602	3	10	45.9	60.0	60.2
2 - Residential	1,353	3	10	47.4	57.0	57.5
3 - Beach	807	3	0	61.8	58.0	63.3
4 - Beach	415	3	0	67.6	55.0	67.8
5 - Residential	1,524	3	10	46.3	55.0	55.5

Appendix B

ATCO Operational Noise Study

October 5, 2011

Project 745400
FINAL

Los Angeles, CA
Worley Parsons

Scattergood Generating Station Re-power Project

Operational Noise Study

ATCO Noise Management

EXECUTIVE SUMMARY

ATCO Noise management (ATCO) was retained by Worley Parsons to conduct a noise survey and create a noise propagation model of the Los Angeles Department of Water and Power (LADWP) Scattergood Generating Station (SGS) in Los Angeles, California.

The generating station will undergo a repowering project in several phases to replace aging equipment. Environmental noise is a concern as the facility must meet local regulatory noise criteria. This report contains the results of environmental noise measurements of the existing facility under partial operation and noise propagation modeling for the purpose of determining the existing facility environmental noise level as well as the expected future noise levels upon the installation of new generating equipment and decommissioning of some existing equipment. Two re-power scenarios are investigated using noise emission data for the proposed General Electric and Siemens turbines respectively.

The report also interprets the local noise ordinances for property surrounding the site to determine the permissible sound contribution from the SGS Re-Power Project. The existing sound level at reception points surrounding the facility was found to be between L_{eq} 55 dBA and L_{eq} 60 dBA during the lowest daytime and nighttime periods during SGS operation at part load. Based on these measurements the permissible maximum noise levels including background ambient and noise contribution from SGS Re-Power Project generating equipment were calculated to be between L_{eq} 62 dBA and L_{eq} 68.6 dBA, depending on location.

Two scenarios involving Siemens and GE turbines were evaluated and neither required mitigation to meet the local and state noise regulations.

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TABLES AND FIGURES

1. INTRODUCTION

1.1 Project Background

ATCO Noise Management was retained by Worley Parsons to conduct an ambient noise survey and noise assessment for the Los Angeles Department of Water and Power (LADWP) Scattergood Generating Station (SGS) in El Segundo, CA. The generating station will undergo a re-powering project in several phases to replace aging equipment. Environmental noise is a concern for the project as the facility must meet local regulatory noise criteria. The project is subject to local noise ordinances which use the existing ambient noise level to set the permissible noise limit. Equipment currently operating at the generating station can be considered part of the pre-existing ambient noise level as it will be de-commissioned. This report contains the results of environmental noise measurements of the existing facility under partial operation and noise propagation modeling for the purpose of determining the existing facility environmental noise level as well as the future sound level for two alternate re-power equipment scenarios and the noise control requirements necessary to meet the established permissible noise limits.

1.2 Objectives

The objective of this study is to provide a basis for the noise limits applicable to the Scattergood SGS Re-Power project and to determine potential noise abatement measures necessary to comply with the noise limits for two re-power equipment scenarios. In order to achieve this objective ambient noise survey data and noise propagation modeling will be used to assess the existing ambient noise level during full load facility operation. These levels will be applied with ordinance criteria in order to assess the permissible noise limits for the re-power project at locations surrounding the facility. Noise propagation modeling will be used to determine the existing facility full load noise contribution and the expected noise contribution for re-power generating equipment.

1.3 Site Description

Scattergood Generating Station is located at 12700 Vista Del Mar, Playa Del Rey, CA 90293. The facility is located adjacent to Dockweiler Beach (to the west), a Chevron refinery (to the south), Hyperion Treatment Plant (to the north), and a residential neighborhood (to the east). The terrain is a hillside rising from west to east from sea level to approximately 125' elevation. Sources of sound in the environment include traffic noise; noise from the SGS and other surrounding industrial facilities; aircraft taking off and landing at Los Angeles International Airport, which is located approximately 1 mile north of the facility; and other urban sounds. The unpaved surfaces surrounding the facility are mainly sand covered with low-lying cactuses which form a fire barricade on the facility setback. The predominant wind direction is from the west. An aerial photo of the facility and surrounding area is shown in Figure 1.

The existing facility is comprised of three gas fired boilers and steam turbine generators. Units 1 and 2 are functionally identical and share the north buildings and north exhaust stack. Units 1 and 2 have a rated capacity of 179MW each. Unit 3 is located in the south buildings and exhausts to the south exhaust stack adjacent to Units 1 and 2. Unit 3 has a rated capacity of 460MW.

Ancillary noise generating equipment on the site includes a once through cooling pump station on Dockweiler Beach, transformers located on the west side of the Steam Turbine Generator (STG) buildings, a switchyard on the hillside east of the STG buildings, a pipe rack and metering station on the east hillside, and two wet cooling towers on the west side of the switchyard.

Figure 1: Aerial View

1.4 Noise Criteria

The SGS Re-Power project should adhere to the regulatory noise criteria for the surrounding receptors. Although the SGS is located in the City of Los Angeles, receiving property is the State of California as well as the City of Los Angeles and City of El Segundo. Since the surrounding land uses vary, several different permissible noise limits are applicable at various points around the project site. Of primary concern for the project is the permissible continuous sound level limit which must be achieved at neighboring properties. Restrictions on intermittent, impulsive, and tonal sounds are also addressed by the ordinances. The relevant sections of each ordinance are included below as well as a diagram showing the area governed by each ordinance in Figure 2. Definitions for the sound level terminology used below and throughout the report are included in APPENDIX A: SOUND LEVEL TERMINOLOGY.

City of El Segundo

Document: El Segundo, California City Code; Title 7; Chapter 2: Noise and Vibration

Applicable Noise Limit: *"No Person shall, at any location within the City, create any noise, nor shall any person allow the creation of any noise within the person's control on public or private property (hereinafter "noise source"), which causes the noise level when measured on any other property (hereinafter "receptor property"), to exceed the applicable noise standard, except as set forth in subsection C1 of this Section.*

A. *Residential Property: Five (5) dBA above the ambient noise level*

B. *Commercial Property: Eight (8) dBA above the ambient noise level"*

This statement implies that overall noise level including ambient noise and facility noise contribution may not exceed the stated limit.

Noise Descriptors Used for Assessment: Based on the language of the ordinance the lowest hourly equivalent continuous sound level **(**$L_{eq\ 1hr}$, dBA) is the descriptor selected to evaluate the ambient noise level for the purpose of determining the applicable noise limit.

City of Los Angeles

Document: Los Angeles Municipal Code; Chapter XI: Noise Regulation

Applicable Noise Limit: Sound level limits for industrial land uses are not specified by the ordinance.

Noise Descriptors Used for Assessment: The ordinance specifies that the lowest 15-minute 90% percentile sound level **(**$L_{90\ 15mins}$, dBA) is the descriptor used to assess the ambient noise level where applicable.

State of California

Document: Sate of California General Plan Guidelines-2003, Appendix C

Applicable Noise Limit: The **w**ater recreation land use category indicates a day-night equivalent (L_{dn})under 75 dBA is "normally acceptable".

Noise Descriptors Used for Assessment: The document specifies acceptable noise levels in terms of L_{dn}. The L_{dn} is a 24-hour averaging metric which includes a 10 dB penalty for noise generation during nighttime hours (10 pm – 7 am). For a continuously operating stationary sound source, the L_{dn} is equivalent to the hourly equivalent sound level ($L_{eq\ 1hr}$, dBA) + 6.4 dB. Therefore, the maximum hourly equivalent sound level on state owned property is 68.6 dBA ($L_{eq\ 1hr}$, dBA).

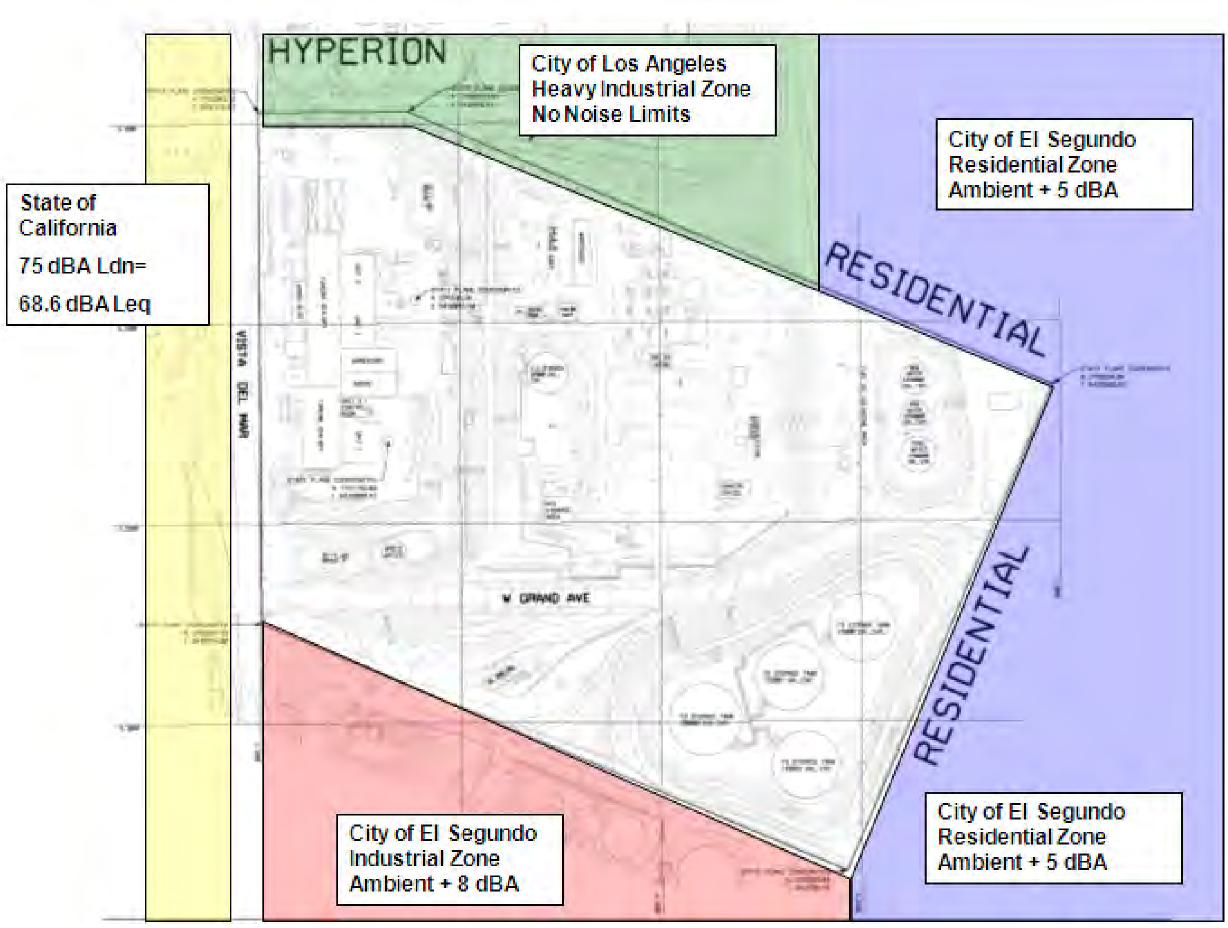

Figure 2: Noise Ordinance Jurisdiction

2. AMBIENT NOISE SURVEY

A noise survey was conducted at the facility in order to document the existing ambient noise level including operational noise from SGS. Four locations were selected in the direction of nearby points of reception for residential and noise sensitive areas. Noise measurements were collected over a 48-hour period from 10AM Aug 10 2010 to 10AM Aug 12 2010. Short duration attended measurements were also collected around operating equipment for the purpose of calculating the sound power level of the existing noise generating equipment for noise propagation modeling.

Measurements were conducted using Brüel & Kjaer 2250 Real Time Analyzers. The instruments were field-calibrated before and after the sound measurements. These are Type 1 precision sound level meters that meet the ANSI S1.4, Type 1 Specification. The meters have current laboratory certification. The microphones were fitted with wind screens to minimize measurement contamination from wind induced pseudo-noise. The collected data included the energy equivalent level (L_{eq}) as well as statistical exceedance levels, 1/3 octave band frequency distribution, and other relevant noise descriptors. The long term measurements were logged in 1-minute intervals, using a slow time weighting. The measurements were performed in accordance with ANSI standard S1.13-2005, "Methods for the Measurement of Sound Pressure Levels in Air", and other relevant standards.

Meteorological conditions were logged using a portable weather station located near measurement location R2. Conditions were favorable for outdoor sound measurements and were typical for the area. Logged meteorological data is included in APPENDIX B: METEOROLOGICAL CONDITIONS.

Plant operating conditions were scheduled and logged to obtain noise survey data during full load operation of units 2 and 3. Unit 1 was non-operational for the duration of the noise survey due to maintenance issues. Power output for units 2 and 3 during the noise survey period is shown in APPENDIX C: GENERATING STATION POWER OUTPUT.

2.1 Ambient Noise Survey Results

This section describes the results of the ambient noise survey during plant operation. Table 1 contains the A-weighted L_{eq}, L_{50}, and L_{90} sound level at each of the 4 measurement locations which will be used to determine the permissible noise limit for the re-power project. The values in Table 1 are the calculated lowest average value during full load plant operation for the descriptor indicated.

Measurement locations are numbered in Figure 1. Logged A-weighted equivalent continuous sound levels as well as several other sound level descriptors for the entire survey period are plotted graphically in APPENDIX D: AMBIENT SURVEY RESULTS.

Table 1: Ambient Sound Levels at Residential Area Noise Monitoring Locations

LABEL	Location	Operational Ambient Sound Levels, dBA					
		Lowest Daytime $L_{eq\ 1hr}$	Lowest Daytime $L_{50\ 1hr}$	Lowest Daytime $L_{90\ 1hr}$	Lowest Nighttime $L_{eq\ 1hr}$	Lowest Nighttime $L_{50\ 1hr}$	Lowest Nighttime $L_{90\ 1hr}$
R1	33° 55.291'N 118° 25.524'W	60	58	56	60	58	57
R2	33° 55.229'N 118° 25.472'W	57	53	51	57	54	52
R3	33° 55.145'N 118° 25.768'W	58	56	54	59	57	55
R4	33° 55.031'N 118° 25.709'W	55	54	52	57	55	51

3. NOISE PROPAGATION MODELING

This section describes the methodology of noise propagation modeling of units 1-3 at the Scattergood Generating Station. The description in this section represents the calculation of noise emission of the three existing units only and does not include modeling of future equipment.

3.1 Prediction Method

The acoustical modeling for this project was conducted with the Cadna/A computer software program from DataKustik GmbH. The outdoor noise propagation model is based on ISO 9613, *Part 1: "Calculation of the absorption of sound by the atmosphere", (1993) and Part 2: "General method of calculation", (1996).* The results presented in this section are the calculated results using measurements of the source noise emission without any additional design safety factor.

3.2 Prediction Conditions

Atmospheric conditions were based on average conditions. The ground absorption factor G was set to 0.5, which approximates the terrain. Temperature and humidity affects the atmospheric absorption of sound at all frequencies. Adverse winds can also affect measured sound levels by up to 10 dB. Wind was modeled as a light downwind condition in all directions. Temperature was modeled as 63^{o}F, Relative Humidity was modeled as 70% which represent average conditions. The number of reflections for the model was set to two. This means that two reflections from buildings and obstacles were allowed for individual sound propagation rays during sound propagation calculations. In general these conditions are conducive to noise propagation but do not represent an extreme case such as during the presence of a strong temperature inversion.

3.3 Prediction Accuracy

There are three accuracy factors that can vary when modeling:

- Between Cadna/A and ISO 9613. Cadna/A predictions are accurate to within 1 dB of the propagation standard.
- Between ISO 9613 and actual measurements. For the present site with neutral wind and atmospheric conditions, the difference between the actual outdoor noise propagation and that calculated according to the ISO 9613 standard is within 3 dB for A-weighted results and in most cases yields conservative results.
- Source level uncertainty. The source sound power level uncertainty whether derived from measurements or stated by the equipment manufacturer will be incorporated into modeling uncertainty.

3.4 Modeling Elements

Noise radiating elements are modeled based on their noise emission pattern. The elements at Scattergood Generating Station have different emission patterns. Concentrated sources, such as pumps and valves are included as point sources which radiate sound hemi-spherically over ground. Directivity patterns associated with the exhaust stacks are included also. Noise breakout through building walls is entered as area sources, which radiate sound over a much larger area. Pipes are entered as line sources which radiate sound in a cylindrical pattern. Sources are expressed by their decibel sound power level ($L_{w,}$ dB) in Octave Bands from 31.5Hz to 8000Hz.

Buildings and other obstacles are modeled as solid barrier elements. The reflective characteristic of the structure is quantified by its absorption coefficient, which is specified based on the construction material used. Terrain between the source and the receptor affects noise propagation and is modeled using topographic information from the site.

A 3D view of the sources, receivers, obstacles, and terrain entered into the noise propagation model is shown in Figure 3.

3.5 Source Sound Levels

Source sound power levels for the existing SGS are shown in Table 2 and Table 3 as they are incorporated into the noise propagation model. Sound power levels in Table 2 are for individual pieces of equipment located outdoors and are calculated using standardized acoustical engineering methods involving sound pressure measurements taken at a specific geometric boundary surface. Sound pressure levels shown in Table 3 are typically interior averages used to quantify building breakout noise; these levels are converted to overall sound power levels by the modeling software based on the area of each building wall and the transmission loss of the corresponding building material.

Source sound power levels for the SGS re-power scenarios were obtained from vendor data or measurement data from similar units compiled from past projects where available. For equipment with no prior vendor or measurement data available, a sound power level for a similar piece of equipment was used with corrections for dimensions and mechanical differences. Sound power levels used to model different re-power generating units are shown in Tables 4 – 7.

3.6 Model Assumptions

The following are assumptions used to develop the site noise prediction model:

1. Noise sources with infrequent operation are not included;
2. Equipment is assumed to be in full load steady state operation;
3. Units 1 and 2 are assumed to have nearly identical noise emission based on their mechanical similarity;
4. The combustion turbine air inlet filter house will have standard silencing resulting in a maximum sound power of 103 dBA for both GE and Siemens equipment.

5. Doors are assumed closed.

Table 2: Existing SGS Source Sound Power Levels (dB re 10^{-12} W)

Source Name	Octave Band Center Frequency, Hz									dBA
	31.5	63	125	250	500	1000	2000	4000	8000	
Unit 3 ID Fan	120	120	117	125	119	115	110	105	100	121
Cross-flow Cooler Discharge	125	115	109	105	102	96	91	86	83	103
Unit 3 Decommissioned Gas Re-Circulation Fan	113	109	110	105	104	106	113	103	98	116
Unit 3 Stack Outlet	109	107	105	105	100	87	84	80	68	100
Cross-flow Cooler Inlet	107	107	107	104	99	93	91	92	93	102
Unit 2 Main Transformer	96	103	108	105	102	99	93	89	82	104
Unit 1 & 2 Stack Outlet	106	100	104	106	100	86	79	68	56	101
Water Pumps 1 & 2	100	104	101	104	101	98	89	84	75	102
Unit 1/2 Ammonia Injection Skids	98	101	100	100	103	94	93	90	91	103
Unit 3 STG Bldg Roof Steam Vent	86	91	98	102	104	99	88	83	75	104
Unit 3 Main Transformer	87	98	105	96	95	90	87	77	70	97
Unit 3 Gas Recirculation Fan	101	100	97	94	90	91	90	82	77	96
Counter-flow Cooler Discharge	100	100	96	94	91	87	83	81	77	93
Bank E Transformer (switchyard)	97	96	97	95	96	83	73	68	65	94
Water Pump 5	91	95	93	96	96	93	88	83	72	98
Water Pumps 6 & 7	93	97	92	95	95	91	85	79	69	96
Unit 3 STG Building Roof Vents (each)	86	94	98	95	88	81	80	79	77	91
Counter-flow Cooler Inlet	94	93	95	91	87	87	89	91	91	97
Fuel Gas Valve Box	77	76	76	83	86	95	97	94	86	101
South Transformer (switchyard)	95	94	92	86	87	86	77	70	68	89
Piperack (L_w/m)	0	0	84	90	91	87	79	71	73	91

Table 3: Existing SGS Interior Sound Levels (dB re 10^{-12} W)

Source Name	Octave Band Center Frequency, Hz									dBA
	31.5	63	125	250	500	1000	2000	4000	8000	
Unit 3 STG Bldg Breakout Noise (upper)	84	93	95	94	89	87	84	84	85	93
Unit 3 STG Bldg Breakout Noise (lower)	88	92	94	90	88	86	85	84	81	92
Unit 1 & 2 Boiler Bldg Breakout Noise	91	94	88	81	78	75	72	69	63	81
Unit 1 & 2 STG Bldg Breakout Noise	78	93	88	85	82	80	76	74	69	85
Unit 1/2 FD Fan Well Breakout Noise	87	89	84	86	81	77	76	72	64	84
Unit 1_2 Bolier Bldg Breakout Noise [top]	82	90	87	77	72	67	65	64	67	77
Unit 3 Boiler Bldg Breakout Noise	84	86	83	79	76	75	73	71	66	81
Unit 3 STG Bldg MAU Louvers	78	83	84	82	80	75	69	63	58	81
Unit 3 Boiler Bldg [top] Breakout Noise	81	84	81	77	73	71	68	65	60	77
Unit 1/2 STG Bldg Roof Ventilation Louvers	76	79	75	73	78	71	68	70	65	78

Table 4: Siemens Flex 30 Package Sound Power Levels (dB re 10^{-12} W)

Source	Octave Band Center Frequency, Hz									dBA
	31.5	63	125	250	500	1000	2000	4000	8000	
Stack Exit (before directivity)	128	118	125	121	121	110	89	91	76	120
STG	109	109	116	112	110	110	107	104	100	115
Boiler Feed Water Pump	103	108	110	101	106	105	104	99	95	110
GT GSU Transformer	101	106	110	100	110	91	89	81	76	107
Exhaust Diffuser	120	115	108	108	105	101	97	97	79	107
HRSG T-1	120	117	108	110	100	101	94	96	81	107
HRSG T-2	120	117	108	110	100	101	94	96	81	107
SCR Ammonia Skid	104	103	95	97	100	102	98	93	91	105

Air Cooled Heat Exchanger	111	111	110	107	102	100	94	88	82	105
Inlet Duct Walls	106	103	101	92	92	101	98	96	93	105
ST GSU Transformer	98	103	107	97	107	88	86	78	73	104
ST Lube Oil Package	93	106	117	87	96	92	96	94	85	104
ST Condensate Pumps	92	106	101	99	99	98	98	93	91	104
Inlet Filter House	126	120	113	98	90	94	89	89	98	103
Lube Oil Enclosure	94	94	112	95	97	92	89	85	80	100
GT Lube Oil Fin-Fan Cooler Fan	108	111	108	98	95	91	92	80	70	99
Generator Enclosure	109	117	107	96	89	87	88	85	76	97
Rotor Air Cooler	107	111	102	96	94	89	85	83	79	96
ST Lube Oil Cooler	105	108	105	95	92	88	89	77	67	96
Air Gas Compressor Skid	96	108	95	95	93	89	87	87	82	96
HRSG S1	120	107	100	95	90	93	74	72	52	96
BFP Fin-Fan Cooler	104	107	104	94	91	87	88	76	66	95
ST Gland Steam Cooler	104	107	104	94	91	87	88	76	66	95
HRSG B-1	113	104	101	93	92	89	82	84	69	94
Steam Duct ACHE	113	96	78	82	88	88	87	86	87	94
HRSG B-2	119	113	101	96	88	79	70	69	54	93
Aux Transformer	87	87	91	88	94	86	76	71	65	93
Steam Duct ST to ACHE	111	94	76	80	86	86	85	84	85	92
GT Enclosure Air Inlet Vent	89	95	84	80	73	71	76	77	83	85
GT Enclosure Air Discharge Vent	91	96	88	84	75	74	74	73	78	83
GT Enclosure	93	94	86	77	70	74	75	67	57	80
HRSG S2	116	99	88	78	67	63	49	50	30	80

Table 5: Flex 10 Package Sound Power Levels (dB re 10^{-12} W)

Source	Octave Band Center Frequency, Hz									dBA
	31.5	63	125	250	500	1000	2000	4000	8000	
Stack Exit (before directivity)	128	118	125	121	121	110	89	91	76	120
ST Generator	107	107	114	110	108	108	105	102	98	113
Boiler Feed Water Pump	101	106	108	99	104	103	102	97	93	108
GT GSU Transformer	101	106	110	100	110	91	89	81	76	107
Exhaust Diffuser Enclosure	120	115	108	108	105	101	97	97	79	107
Lube Oil Enclosure	99	102	100	100	100	100	101	98	91	106
SCR Ammonia Skid	104	103	95	97	100	102	98	93	91	105
Air Cooled Heat Exchanger	111	111	110	107	102	100	94	88	82	105
Inlet Duct	106	103	101	92	92	101	98	96	93	105
HRSG T-1	118	115	106	108	98	99	92	94	79	104
HRSG T-2	118	115	106	108	98	99	92	94	79	104
ST GSU Transformer	98	103	107	97	107	88	86	78	73	104
ST Lube Oil Package	93	106	117	87	96	92	96	94	85	104
ST Condensate Pumps	92	106	101	99	99	98	98	93	91	104
GT Lube Oil Fin-Fan Cooler Fan	108	111	108	98	95	91	92	80	70	99
Generator Enclosure	109	117	107	96	89	87	88	85	76	97
Rotor Air Cooler	107	111	102	96	94	89	85	83	79	96
ST Lube Oil Cooler	105	108	105	95	92	88	89	77	67	96
Air Gas Compressor Skid	96	108	95	95	93	89	87	87	82	96
ST Turbine	97	95	102	94	90	89	85	84	83	95
HRSG B-1	113	104	101	93	92	89	82	84	69	94
HRSG S1	118	105	98	93	88	91	72	70	50	93

BFP Fin-Fan Cooler	102	105	102	92	89	85	86	74	64	93
ST Gland Steam Cooler	102	105	102	92	89	85	86	74	64	93
Inlet Filter House	116	110	103	88	80	84	79	79	88	93
HRSG B-2	119	113	101	96	88	79	70	69	54	93
Aux Transformer	87	87	91	88	94	86	76	71	65	93
Steam Duct ACHE	111	94	76	80	86	86	85	84	85	92
Steam Duct ST to ACHE	109	92	74	78	84	84	83	82	83	90
GT Enclosure Air Inlet Vent	89	95	84	80	73	71	76	77	83	85
GT Enclosure Air Discharge Vent	91	96	88	84	75	74	74	73	78	83
GT Enclosure	93	94	86	77	70	74	75	67	57	80
HRSG S2	114	97	86	76	65	61	47	48	28	78

Table 6: 7FA 1x1 Combined Cycle Package Sound Power Levels (dB re 10^{-12} W)

Source	Octave Band Center Frequency, Hz									dBA
	31.5	63	125	250	500	1000	2000	4000	8000	
Generator Enclosure	96	105	103	104	110	102	102	96	92	110
Boiler Feed Pump	105	103	102	100	100	101	106	99	96	109
STG Enclosure	111	117	115	110	106	102	99	91	85	109
Inlet Duct	94	98	101	99	99	99	103	96	88	107
Exhaust	105	117	107	101	94	95	96	102	96	106
Intake Scroll	93	105	98	100	98	96	103	93	87	106
Lube Oil Cooler	93	104	102	104	102	102	95	89	81	105
Coupling Vent Exhaust	99	103	101	100	102	98	100	94	85	105
Coupling Vent Intake	100	102	100	101	100	99	101	93	85	105
Stack Exhaust	102	110	109	105	102	99	94	90	86	104
ST Transformer	97	97	98	101	98	103	82	78	74	104
Enclosure	96	99	101	101	100	100	93	92	84	103
Pipe Rack	86	90	84	88	90	96	98	96	87	103
HRSG Inlet 1	108	111	103	98	97	97	95	94	84	102
HRSG Inlet 2	106	109	101	96	95	95	93	92	82	100
HRSG	111	108	101	97	95	95	91	87	78	99
ACC Fan	99	102	101	99	96	93	86	83	77	98
ACC Header	85	99	95	98	91	90	89	81	72	96
ACC Riser	85	99	95	98	91	90	89	81	72	96
HRSG	106	104	95	92	91	90	86	81	73	94
Air Inlet	106	101	93	88	83	82	80	78	72	88
Enclosure	106	101	93	88	83	82	80	78	72	88

Table 7: 7LMS100 Simple Cycle Package Sound Power Levels (dB re 10^{-12} W)

Source	Octave Band Center Frequency, Hz									dBA
	31.5	63	125	250	500	1000	2000	4000	8000	
Combustion Exhaust Stacktop Noise	126	126	126	133	128	120	120	121	114	130
VBV Silencer - Diffuser Pipe		94	85	73	98	94	98	101	84	105
Combustion Exhaust Transition	114	114	109	104	98	95.7	95.7	92.9	86.1	103
Inlet Filter Face	120	110	107	93	90	88	86	100	89	103
Turbine Enclosure Surfaces	103	103	109	103	97	94	91	90	80	101
Combustion Exhaust Stack Elbow	113	112	109	103	97	92	89	87	78	100
Generator Bonnet		94	113	101	88	90	87	85	74	100
Turbine Encl. Vent Fan Motor	100	93	97	98	92	92	94	92	86	100
Combustion Inlet Silencer & Trans	95	85	82	82	94	93	92	94	61	99
InterCooler "T"-Duct Cradle Assembly		72	76	80	88	87	91	95	82	98
Mineral Lube Oil Sump Evac System	81	91	90	90	100	88	85	79	75	98
Turbine Base Skid Surfaces	97	96	96	96	94	86	81	84	81	95
Combustion Exhaust Expansion Joint	102	102	98	92	89	86.1	87.5	85.6	84.4	94
Water Pump Skid		99	84	92	93	89	83	77	69	94
Turbine Enclosure Vent Exhaust Exit	104	106	98	97	84	85	86	83	76	93
Generator Cooling Air Exhaust	109	107	108	91	77	75	76	76	73	93
Aux. Enclosure Ventilation Discharge	80	81	87	98	87	84	86	79	70	93
Intercooler Booster Discharge 1st expjoint	101	93	93	90	91	82	69	55	38	90
Intercooler Booster Disch - 2nd Exp. Joint	101	93	93	90	91	82	69	55	38	90

Intercooler HPC Return - 3rd Exp. Joint	101	93	93	90	91	82	69	55	38	90
Intercooler HPC Return Pipe - 2nd Section	101	93	93	90	91	82	69	55	38	90
Intercooler HPC Return Pipe - 1st Section	101	93	93	90	91	82	69	55	38	90
Bearing Sump Seal Vent - Drain Discharge	103	92	91	87	83	77	81	82	82	89
INTERCOOLER - Air-Water, Shell & Tube	99	91	91	88	89	80	67	53	36	88
Intercooler Booster Disch - Short Transition	98	90	90	87	88	79	66	52	35	87
Auxiliary Starter - Fan w/ Oil Cooler	80	80	83	93	78	68	67	63	57	85
Intercooler / VBV "T" - Pipe Surface	97	88	88	86	86	77	65	50	34	85
Generator Air Inlet	105	96	92	84	73	70	69	75	82	85
Intercooler Booster Discharge Transition	95	87	87	84	85	76	63	49	32	84
Intercooler / VBV "T's"	95	87	87	84	85	76	63	49	32	84
Liquid Fuel Boost Motor & Pump	99	75	68	76	82	80	75	69	66	84
Water Injection Boost Motor & Pump	99	75	68	76	82	80	75	69	66	84
Generator Casing (sides)		77	94	79	58	59	57	54	42	79
Mineral Lube Oil AC Motor & Pump	69	79	74	65	78	64	62	55	49	76
Inlet Filter House & Unlined Ducting	96	78	60	38	49	53	52	63	45	66
Ventilation Inlet Silencer & Elbow	80	62	52	46	41	37	38	46	32	50

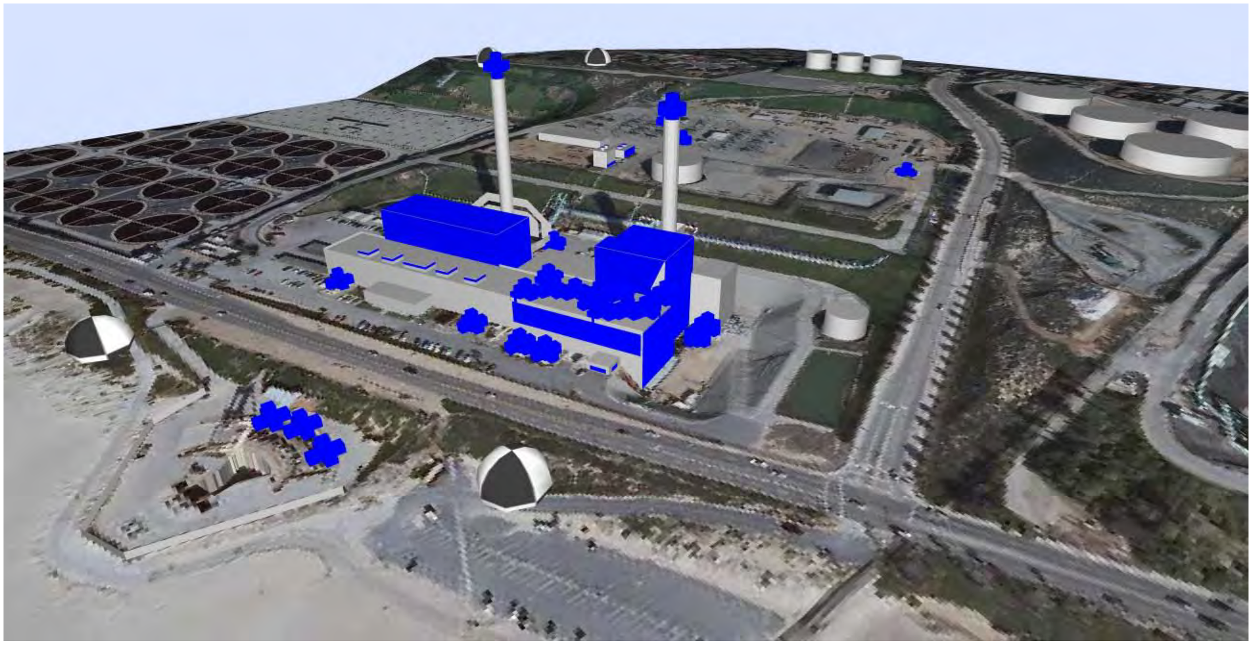

Figure 3: 3D Representation of Scattergood Generating Station in CadnaA

4. NOISE PROPAGATION MODEL RESULTS – EXISTING FACILITY

This section contains the results of the noise propagation model for Scattergood Generating Station before the Re-power Project. Noise levels specified in this section refer to the noise level contribution from the project noise sources only and should be evaluated with consideration of the background ambient sound level in the environment. The results presented are for a full load steady state operating condition including all stationary, continuous sources of sound. Sound from equipment which operates intermittently or from infrequent operating conditions is not included. Sound from vehicle traffic and maintenance projects on the site is also not included.

Figure 4 shows the characteristic noise propagation of the facility and sound levels at ambient survey receptor locations. The results indicate that the facility sound level contribution is between 51 dBA and 56 dBA at surrounding residences and the nearby beach.

Figure 4: Noise Propagation from Scattergood Generating Station

5. RE-POWER PROJECT NOISE LIMITS

Scattergood Generating Station Re-Power Project noise limits can be determined based on the ambient noise survey data, noise propagation model results and noise ordinance specifications. The project noise limits are shown in Figure 5. The sound levels indicated can be interpreted as the maximum allowable noise levels to the corresponding surrounding areas, encompassing both background ambient noise and noise from SGS equipment upon completion of each phase of the re-power project.

For the residential and industrial locations in El Segundo, the ambient survey data was used to determine the permissible noise limit. At the City of El Segundo residential area east of the facility, the maximum permissible noise level is 57 + 5 = 62 dBA L_{eq}. At the City of El Segundo industrial area south of the facility, the maximum permissible noise level is 55 + 8 = 63 dBA L_{eq}.

At the State of California Water Recreational Zone on the beach west of the facility, the maximum permissible noise limit is 75 dBA L_{dn} or 68.6 dBA L_{eq}.

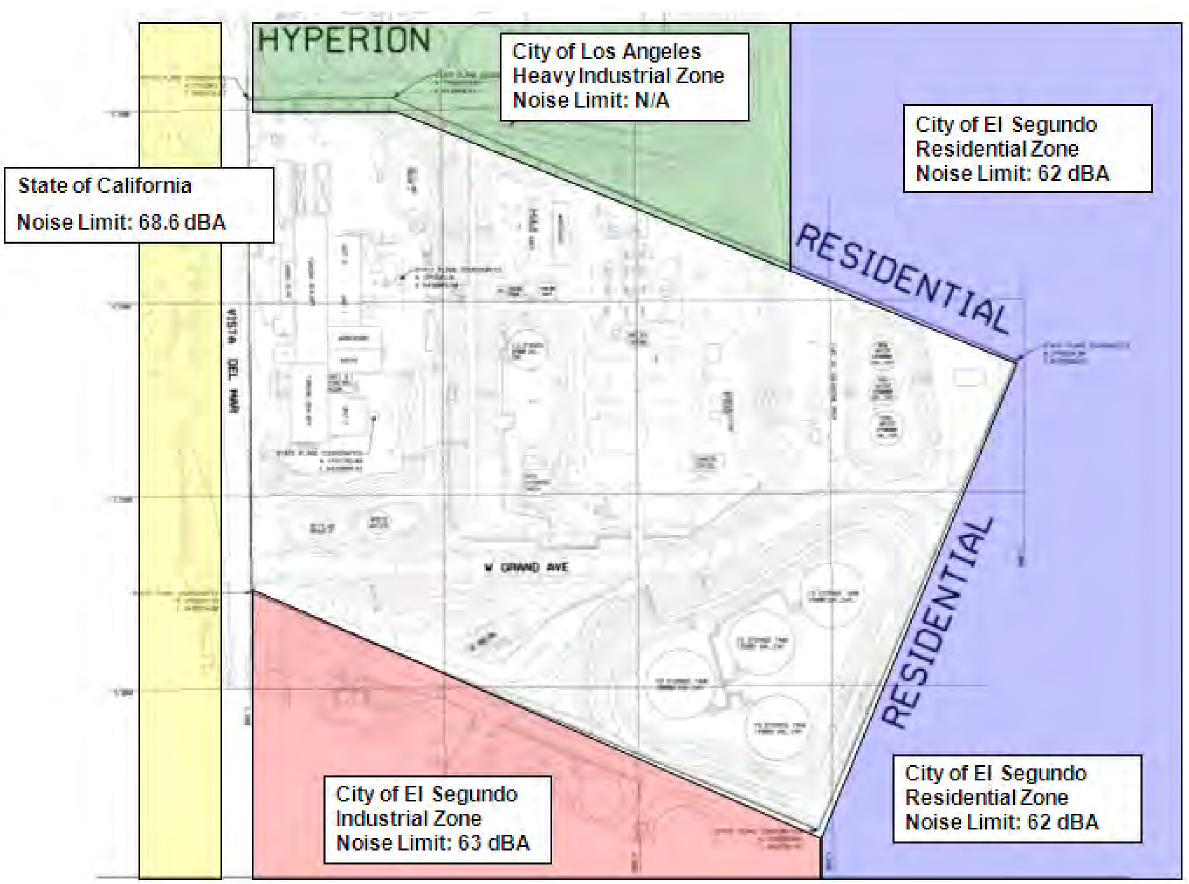

Figure 5: Scattergood Generating Station Re-Power Project Noise Limits

6. NOISE PROPAGATION MODEL RESULTS – RE-POWER PROJECT SCENARIOS

This section describes the results of noise propagation models for two re-power project scenarios for comparison to the permissible limits specified in section 5.

6.1 Re-Power Model with Siemens Turbine Generators

This scenario shows the expected noise emission from the SGS facility under the following operating conditions:

- Units 1 &2 under full load;
- New Flex 30 1x1 combined cycle turbine generator system in the north parking lot at full load
- New Flex 10 1x1 combined cycle turbine generator system on the east terrace at full load;
- Unit 3 is not operating.

This model scenario assumes a base case scenario with no noise attenuation beyond that which is inherently included in the equipment package.

The characteristic noise emission pattern produced by the SGS in this scenario is shown in Figure 6. The "noise limit" indicated on the figure includes contribution from non-facility noise sources (i.e. LAX, vehicles, etc.) whereas the noise contours are from the SGS facility only.

Calculated noise levels from the SGS facility are below the permissible maxima at the four sensitive receptors. As noise is cumulative, the calculated noise levels presented herein should be evaluated with the existing non-facility related noise levels.

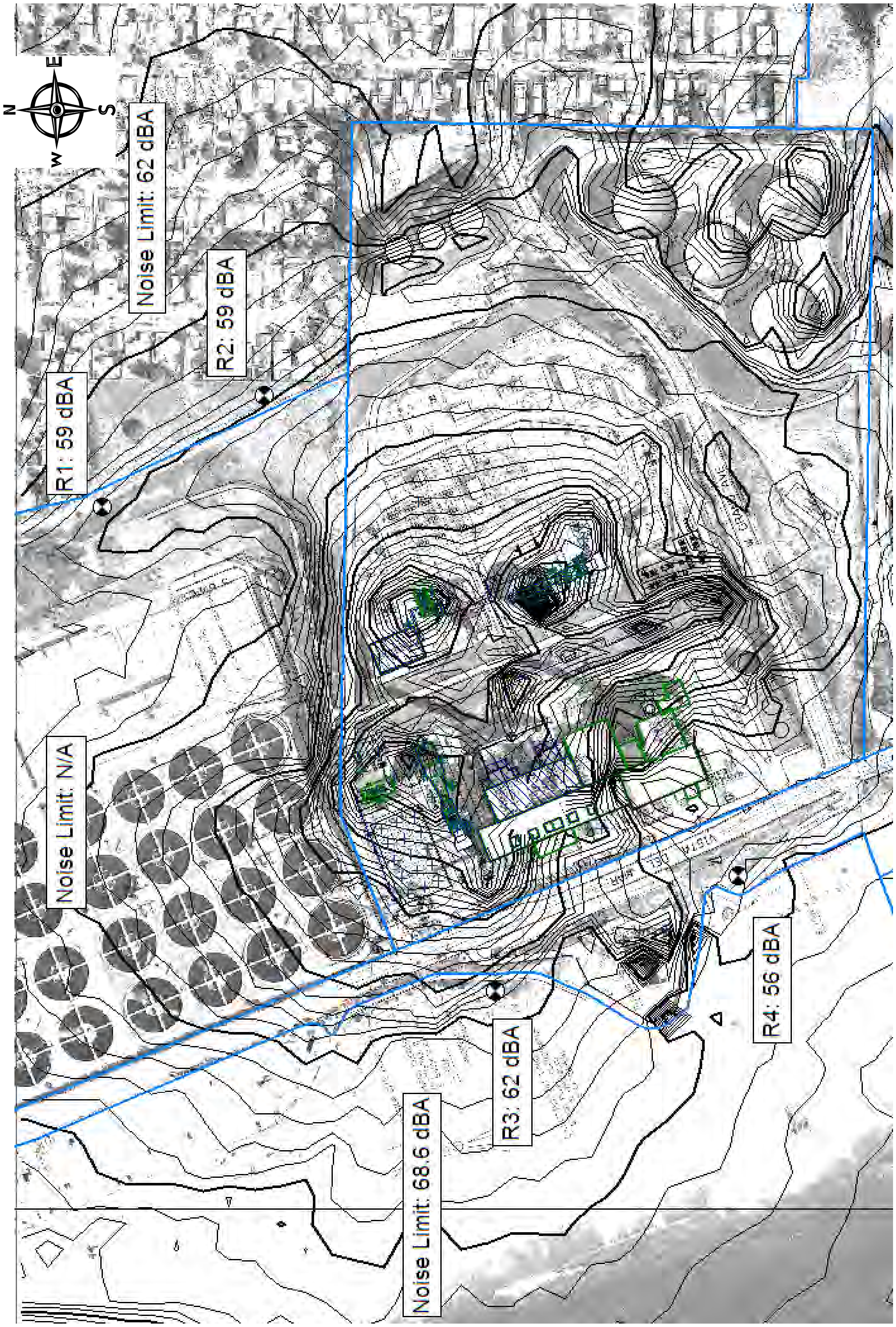

Figure 6: SGS Re-Power Model Noise Contribution Contours – Siemens Equipment - Base Case

6.2 Re-Power Model with General Electric Turbine Generators

This scenario shows the expected noise emission from the SGS facility under the following operating conditions:

- Units 1 &2 under full load;
- 7FA 1x1 combined cycle turbine generator system in the north parking lot at full load
- Two new LMS100 simple cycle turbine generator systems on the east terrace at full load;
- Unit 3 is not operating.

This model scenario assumes a base case scenario with no noise attenuation beyond that which is inherently included in the equipment package.

The characteristic noise emission pattern produced by the SGS in this scenario is shown in Figure 7 . The “noise limit” indicated on the figure includes contribution from non-plant noise sources (i.e. LAX, vehicles, etc.) whereas the noise contours are from the SGS facility only.

Calculated noise levels from the SGS facility are below the permissible maxima at the four sensitive receptors. As noise is cumulative, the calculated noise levels presented herein should be evaluated with the existing non-facility related noise levels.

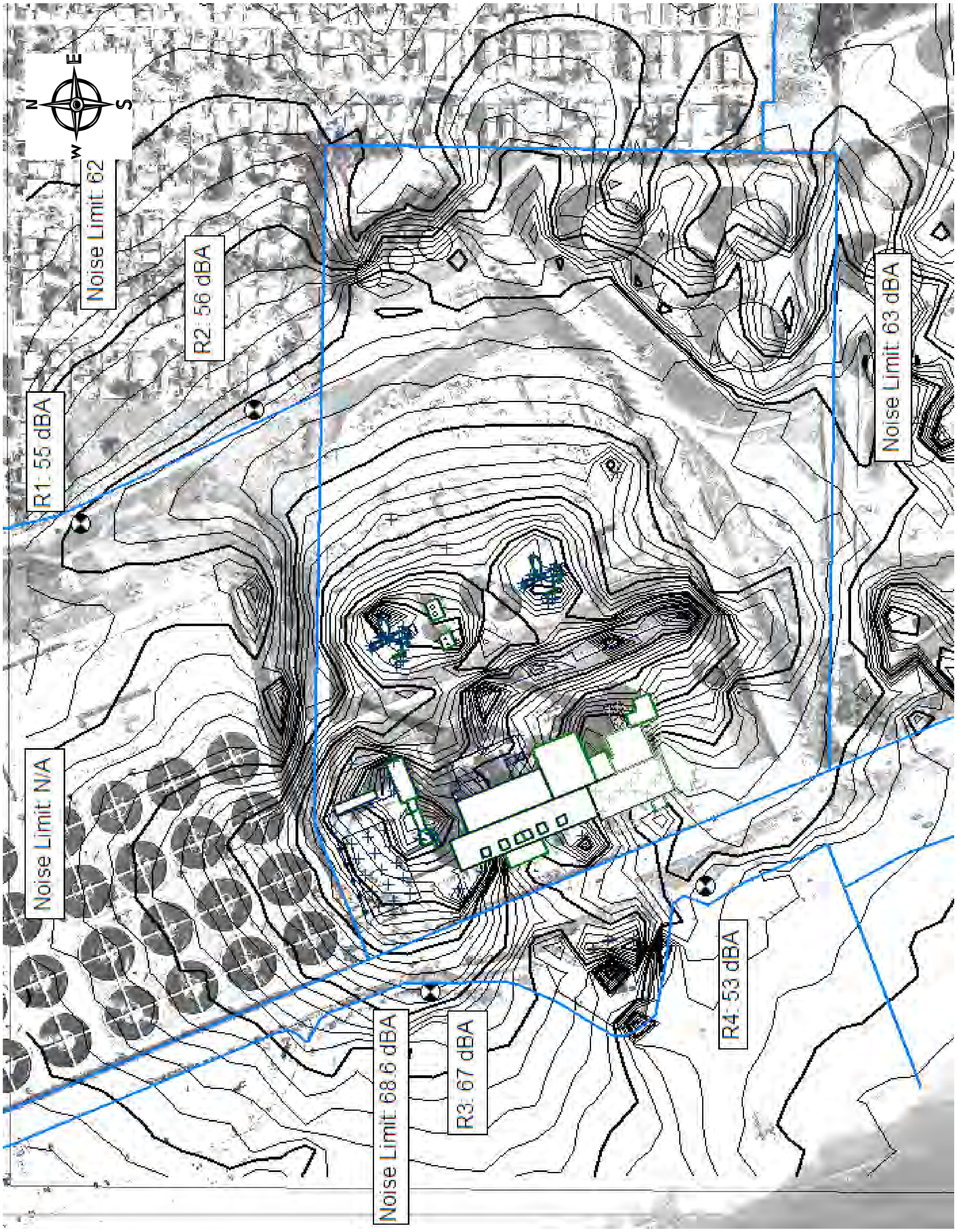

Figure 7: SGS Re-Power Model Noise Contribution Contours – General Electric Equipment - Base Case

7. CONCLUSIONS

The existing Scattergood Generating Station contributes to ambient noise levels in its vicinity. At some locations the calculated contribution from the facility is the dominant source of sound in the environment, and at other locations ambient noise from other sources is dominant. This is mainly due to the relative proximity of Los Angeles International Airport and the Hyperion Treatment Plant as well as the topography and layout of the existing facility. The ambient survey results show that the lowest hourly ambient sound level at selected receptor points in the vicinity of the facility with SGS operating at part load is between L_{eq} 55 dBA and L_{eq} 60 dBA. These sound levels were used in conjunction with the applicable local ordinance specifications to determine the permissible noise limit for the Scattergood Re-Power Project which will see the replacement of existing power generation equipment with newer generating equipment.

The model results for Siemens and GE turbines re-power scenarios show that additional noise attenuation is not required to meet the permissible noise levels at four predefined sensitive receptors. It is recommended that the noise propagation model be updated with guaranteed vendor noise data specific to this project prior to finalizing the facility design.

8. DISCLAIMER

This "Noise Study", which is reported in the preceding pages, has been prepared in response to a specific request for service from the Client to whom it is addressed. The information contained in this "Noise Study" is not intended for the use of, nor is it intended to be relied upon, by any person, firm, or corporation other than the Client to whom it is addressed, with the exception of the applicable regulating authority to whom this document may be submitted for planning permission purposes. We deny any liability whatsoever to other parties who may obtain access to the information contained in this "Noise Study" for any damages or injury suffered by such third parties arising from the use of this "Noise Study" by them without the express prior written permission from ATCO and its Client who has commissioned this "Noise Study".

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APPENDIX A: SOUND LEVEL TERMINOLOGY

Frequency - the number of cycles per unit interval of time. *Units Hz (Hertz).*

Bel (B) - a unit of measure for LEVEL or LEVEL DIFFERENCE (A.G. Bell *1847-1922*). If a quantity is increased by a factor 10^n, its level goes up by *n* bels.

Decibel (dB) - the standard unit of measure, in acoustics, for level or level difference. The decibel scale is based on the ratio $10^{1/10}$; multiplying a power-like quantity (such as sound power or mean square) by this factor increases its level by 1 decibel. If a power-like quantity is increased by a factor $10^{n/10}$, its level goes up by *n* decibels. *Unit symbol for dB.*

Sound Pressure (Pa) - the difference between the instantaneous pressure at a fixed point in a sound field, and the pressure at the same point with the sound absent. *Units Pa (Pascal).*

Sound Pressure Level (SPL, L_p) - or sound pressure-squared level, at a given point the quantity L_p defined by $L_p = 10 \text{ Log}_{10}(P_{rms}/P_{ref})^2 = 20 \text{ Log}_{10}(P_{rms}/P_{ref})$. Here P_{rms} is the ROOT MEAN SQUARE sound pressure, and P_{ref} is the reference rms sound pressure. *Units dB re (20μPa)*^{2}.

A-weighted Sound Pressure Level (SPL, L_{pA}, L_A) - the LEVEL of sound pressure signal to which A-WEIGHTING has been applied. *Units dB re (20μPa)*^{2}.

Sound Power – the rate of acoustic energy flow across a specified surface, or emitted by a specified sound source. *Units W (Watt).*

Sound Power Level (PWL, L_w) - the level of SOUND POWER expressed in decibels relative to a stated reference value. The quantity L_w is defined by $L_w = 10 \text{ Log}_{10}(W/W_{ref})$. Here W_{ref} is the reference sound power. *Units dB re 1*$_P$*W.*

A-weighting - a frequency-weighting procedure, in which the power or energy spectrum of a signal is progressively attenuated towards the high and low ends of the human audible range. Frequency components around 1 kHz - 5 kHz are hardly affected, but the attenuation is large at low frequencies (i.e., 70 dB at 10 Hz).

Percentile Sound Levels, L_N - since the noise levels in a community vary with time in a more or less random manner, the descriptors of these time varying noise levels may be defined in statistical terms. The statistical descriptors are referred to as the percentile sound levels, L_N; with L_N defined as the level exceeded N% of the time. The descriptors often used are:

> **L_0, Highest Level** - this is the highest noise level, also known as L_{max}.
>
> **L_1, Level of Highly Intrusive Sounds** – the level exceeded 1% of the time, is a measure of the highly intrusive sounds.

$L_{10,}$ Level of Intrusive Sounds - The level exceeded 10% of the time, and is used to indicate the average level of the intrusive sounds.

$L_{50,}$ Median Level - The level exceeded 50% of the time or the median level. A useful measure of the average noise conditions on a site.

$L_{90,}$ Background Level – The level exceeded 90% of the time. It provides a good indication of the steady background noise level on a site.

L_{eq}, Equivalent Continuous Sound Level - the prime descriptor used in assessing most types of sounds heard in a community. The L_{eq} is an average of sounds measured over time. It is strongly influenced by occasional loud, intrusive noises. Because it is able to account for such noises, for example, the Leq is the best descriptor for the intermittent sound levels from construction activities.

L_{DN}, The Day-Night Sound Level, derived by applying a 10 dB "penalty" to noise levels that occur at night, between 10 p.m. and 7 a.m., thus accounting for increased sensitivity to noise during nighttime hours.

Ambient sound level - means background sound level. It is the sound level that is present in the acoustic environment of a defined area. Aircraft flyover and rail noise may be excluded in some jurisdictions.

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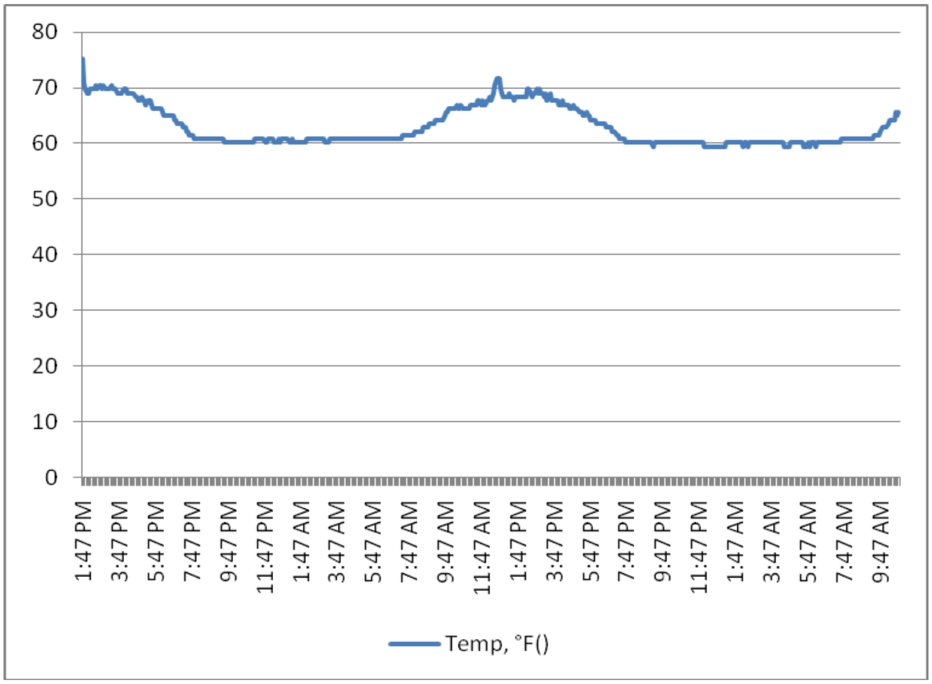
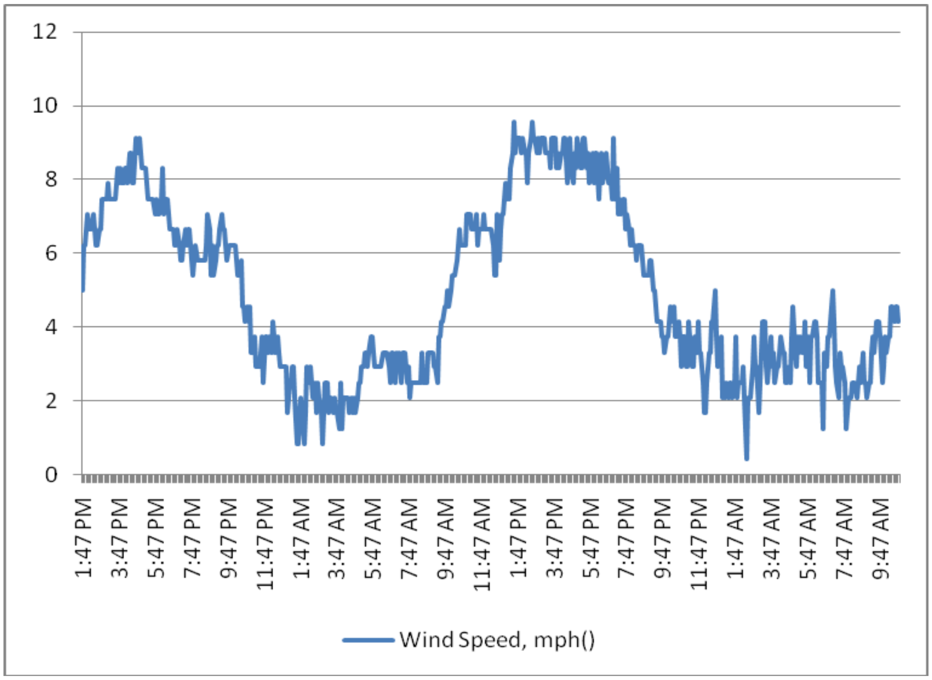
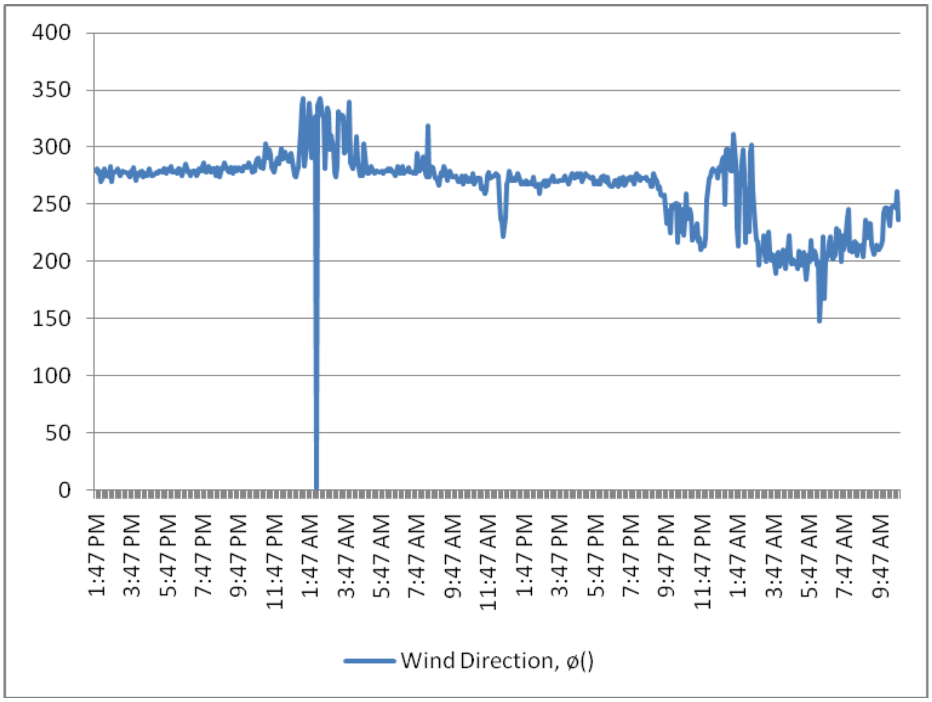
Reference: Dictionary of Acoustics, Christopher L Morfey, Institute of Sound and Vibration Research, University of Southampton, Southampton, UK –Academic Press, 2001.

APPENDIX B: METEOROLOGICAL CONDITIONS

Measured at Scattergood Generating Station Aug 10 to Aug 12 2010



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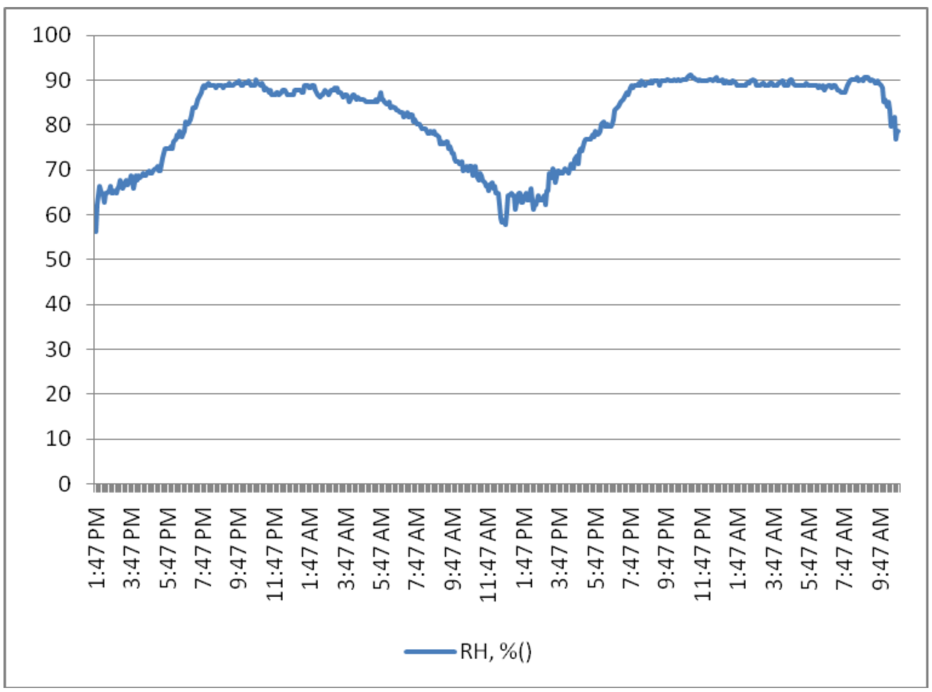
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APPENDIX C: GENERATING STATION POWER OUTPUT

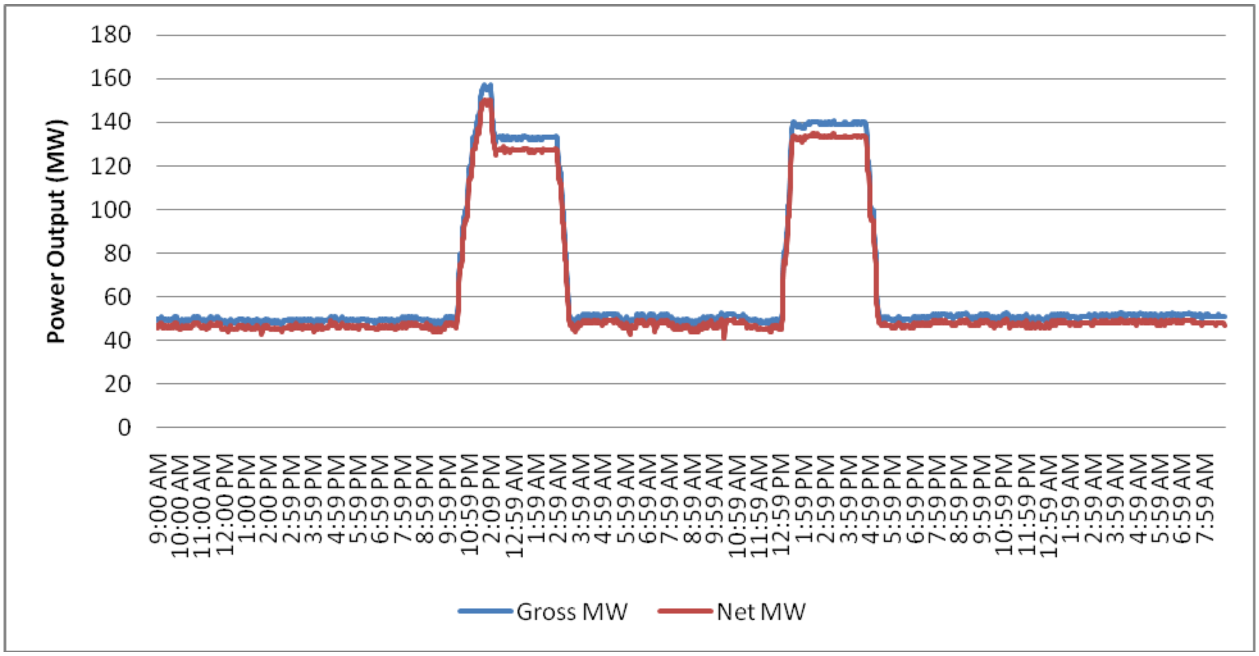

Figure 8: Unit 2 Load Data Aug 10 to Aug 12 2010

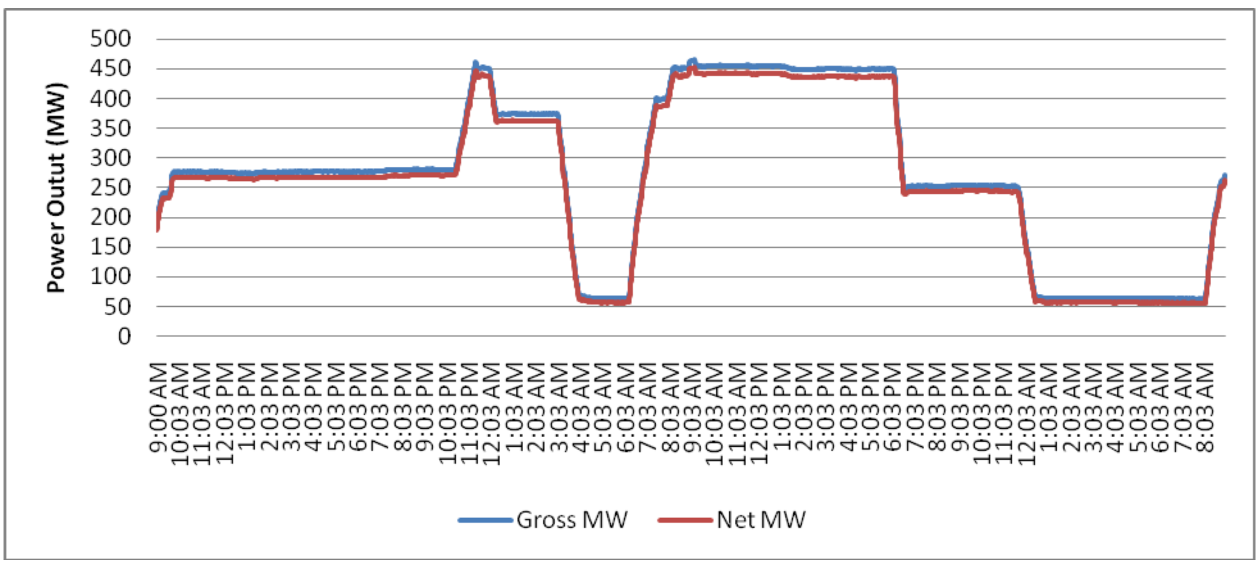

Figure 9: Unit 3 Load Data Aug 10 to Aug 12 2010

APPENDIX D: AMBIENT SURVEY RESULTS

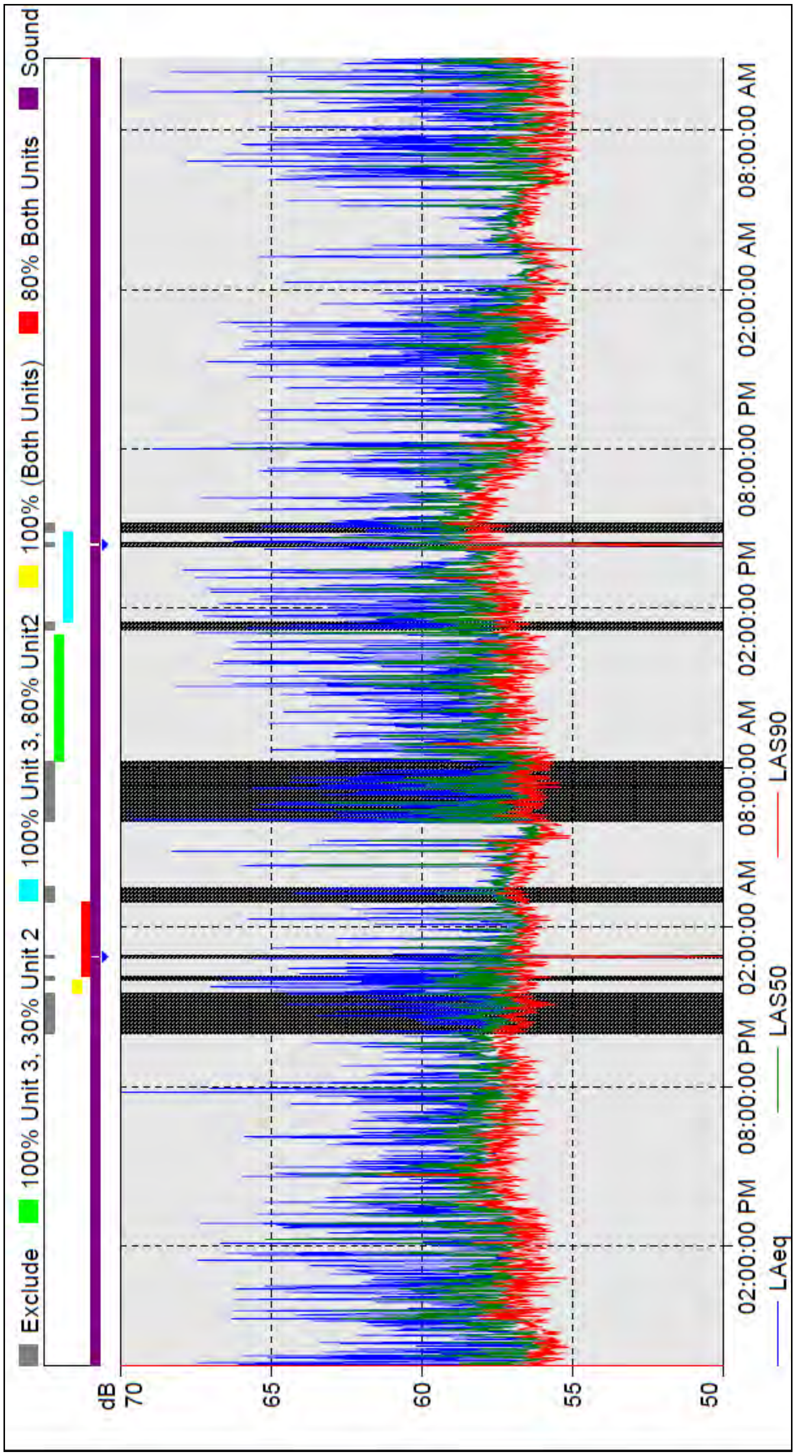

Figure 10: Ambient Survey Data at Location R1 Aug 10 to Aug 12 2010

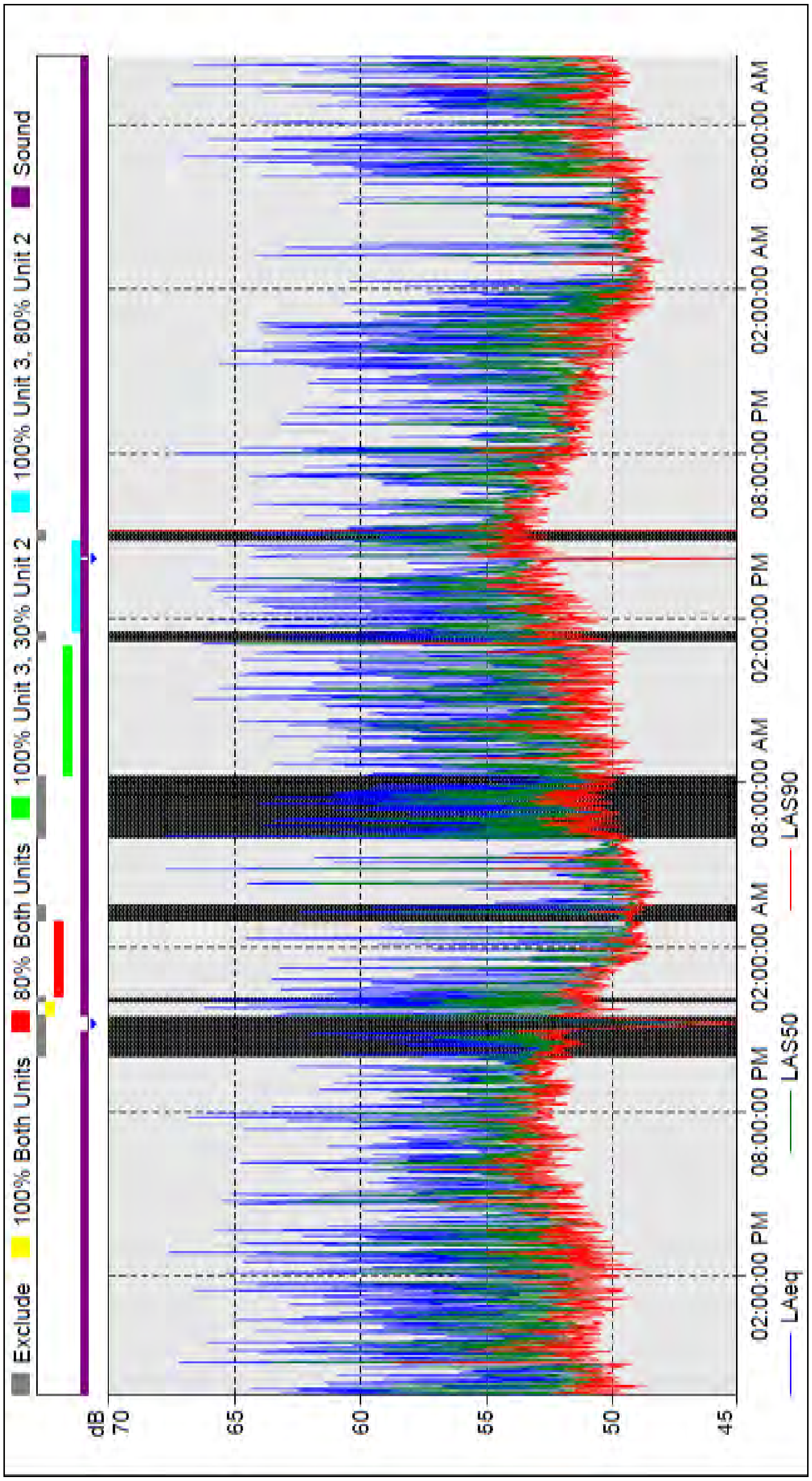

Figure 11: Ambient Survey Data at Location R2 Aug 10 to Aug 12 2010

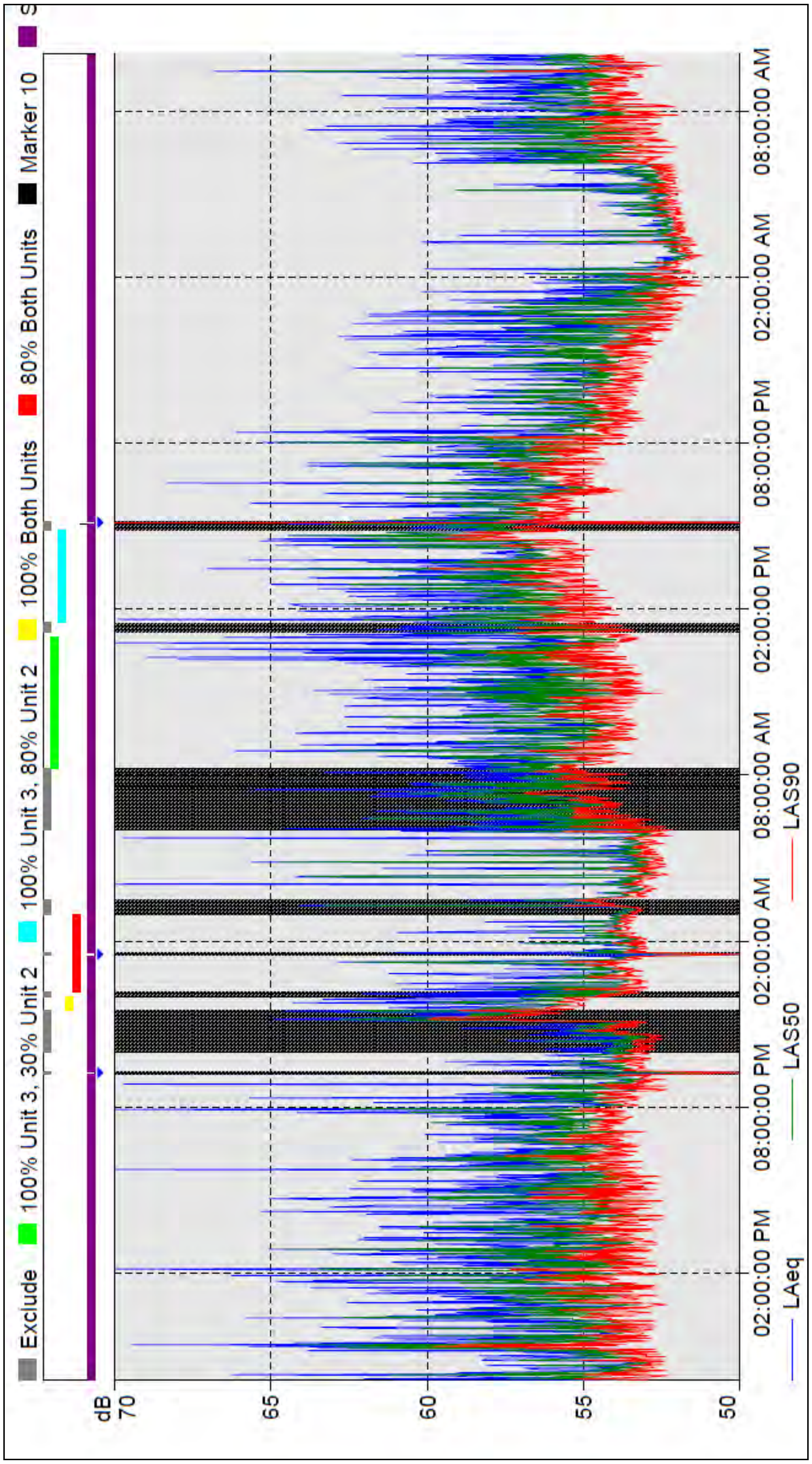

Figure 12: Ambient Survey Data at Location R3 Aug 10 to Aug 12 2010

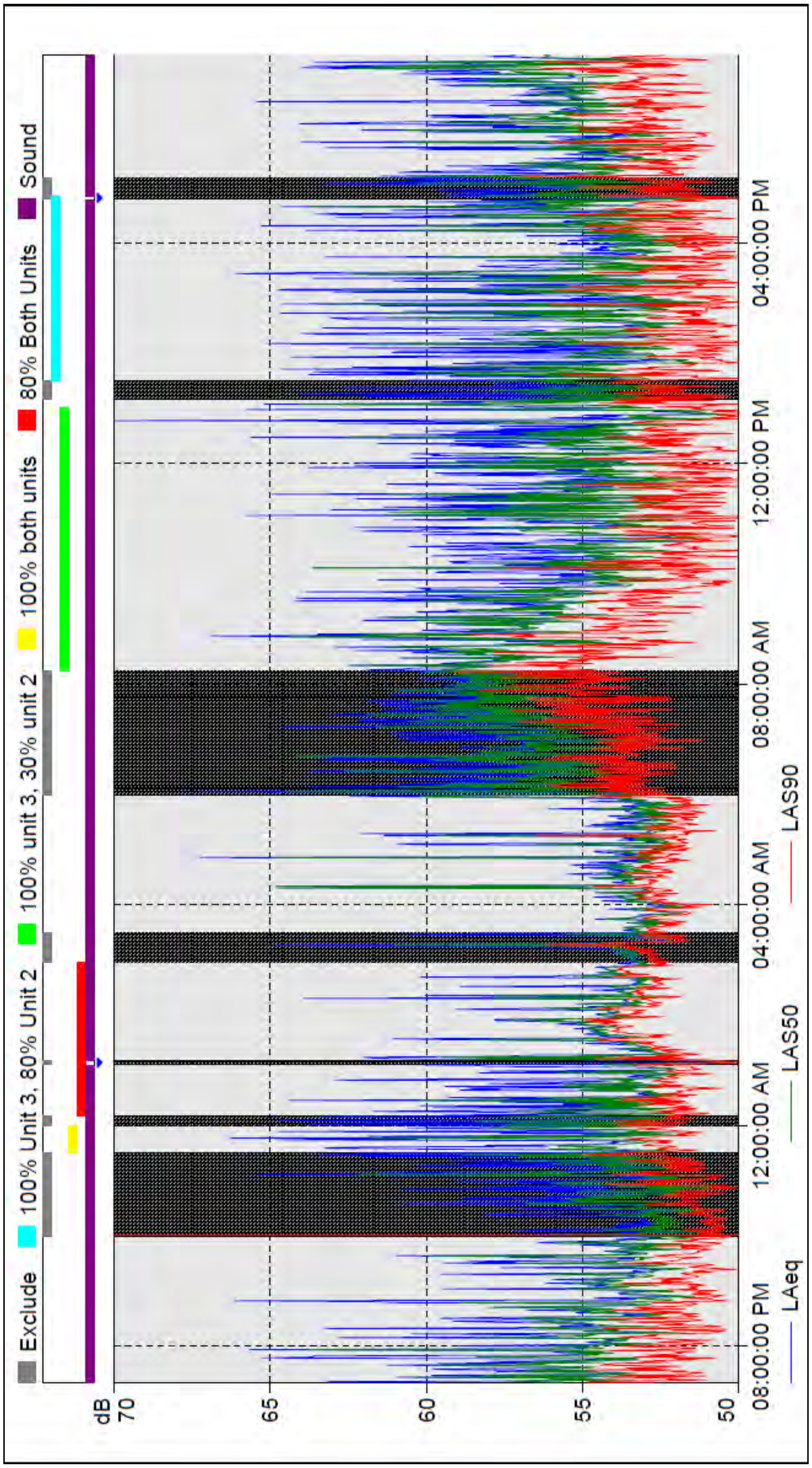

Figure 13: Ambient Survey Data at Location R4 Aug 10 to Aug 12 2010

REFERENCES

American National Standards Institute, Inc. *Quantities and Procedures for the Description and Measurement of Environmental Sound, Parts 1-3.* ANSI S12.9 1993

American National Standards Institute, Inc. *Procedures for Outdoor Measurement of Sound Pressure Level.* ANSI S12.18 1994.

Beranek, Leo L. *Noise and Vibration Control.* Washington, DC: Institute of Noise Control Engineering, 1988

Bies & Hansen. *Engineering Noise Control*. New York: Spon Press, 3rd Ed 2003

Harris, Cyril M. *Handbook of Acoustical Measurements and Noise Control.* Woodbury, NY: Acoustical Society of America, 1998

International Organization for Standardization. *Acoustics – Attenuation of Sound During Propagation Outdoors; Part 1: Calculation of the Absorption of Sound by the Atmosphere; Part 2: General Method of Calculation.* ISO 9613-1: 1993(E), ISO 9613-2: 1996(E)