4.7 NOISE

The project applicant contracted with Bollard & Brennan, Inc. to prepare an environmental noise analysis for the Phase II Project, which is included as Appendix C. The environmental noise analysis was reviewed by EDAW for consistency with industry-accepted noise analysis standards. Based on this review, the environmental noise analysis was deemed to adequately characterize the existing noise environment surrounding the project site and the anticipated noise levels associated with project implementation. The information included in the environmental noise analysis and supplemental noise data developed by EDAW provide the basis for the analysis included in this section.

4.7.1 EXISTING CONDITIONS

Every day people are subjected to a multitude of sounds in the urban environment. Many of these sounds are by-products of desirable and necessary day-to-day activities. The average annoyance produced by a sound depends on its loudness, duration, time of day, impulse character, pure tone content, variability, season of the year, and community. Individual annoyance is even more complicated and variable. These unwanted sounds are generally referred to as noise.

NOISE SCALES

Since the human ear is not equally sensitive to sound at all frequencies, a specific frequency-dependent rating scale has been devised to relate noise to human sensitivity. An A-weighted decibel (dBA) scale performs this compensation by discriminating against frequencies in a manner approximating the sensitivity of the human ear. The basis for compensation is the faintest sound audible to the average ear at the frequency of maximum sensitivity. This A-weighted dB scale has been chosen by most authorities for purposes of environmental noise regulation.

Typical sounds range from 40 dBA (very quiet) to 100 dBA (very loud). Conversation is roughly 60 dBA at 3 feet. As background noise levels exceed 60 dBA, speech clarity becomes increasingly difficult. Noise becomes physically discomforting at 110 dBA. Additional units of measurement have been developed to evaluate the long-term characteristics of sound. The equivalent continuous noise level (L_{eq}) is a single-number representation of the fluctuating sound level in decibels over a specified period of time. It is a sound-energy average of the fluctuating level. The "eq" of L_{eq} stands for "equivalent." The L_{eq} of a time-varying sound is equivalent or equal to the level of a constant unchanging sound.

The Day-Night Average Noise Level (L_{dn}) and the Community Noise Equivalent Level (CNEL) are the noise and land use compatibility criteria most widely used in the State of California and applied by federal agencies. The Noise Element of the Solano County General Plan identifies CNEL as the noise measurement standard for the County.

These measurements represent an average of all measured noise levels obtained over a specified period of time. The L_{dn} scale represents a time weighted 24-hour average noise level based on the A-weighted decibel. Time weighting refers to the fact that noise that occurs during certain sensitive time periods is weighted—that is, the late evening and early morning hours (between 10 p.m. and 7 a.m.) receive a 10 dB weighting. The CNEL scale includes an additional 5 dB adjustment to sounds occurring in the evening (7 p.m. to 10 p.m.) in addition to the 10 dB adjustment to sounds occurring in the late evening and early morning hours (between 10 p.m. and 7 a.m.). L_{dn} and CNEL are generally considered to be equivalent descriptors of the community noise environment and within 1 dB of each other. The State of California has adopted the CNEL as its noise metric for airport noise and vehicular noise. Typical noise levels for different types of noise sources within communities are depicted in Exhibit 4.7-1.

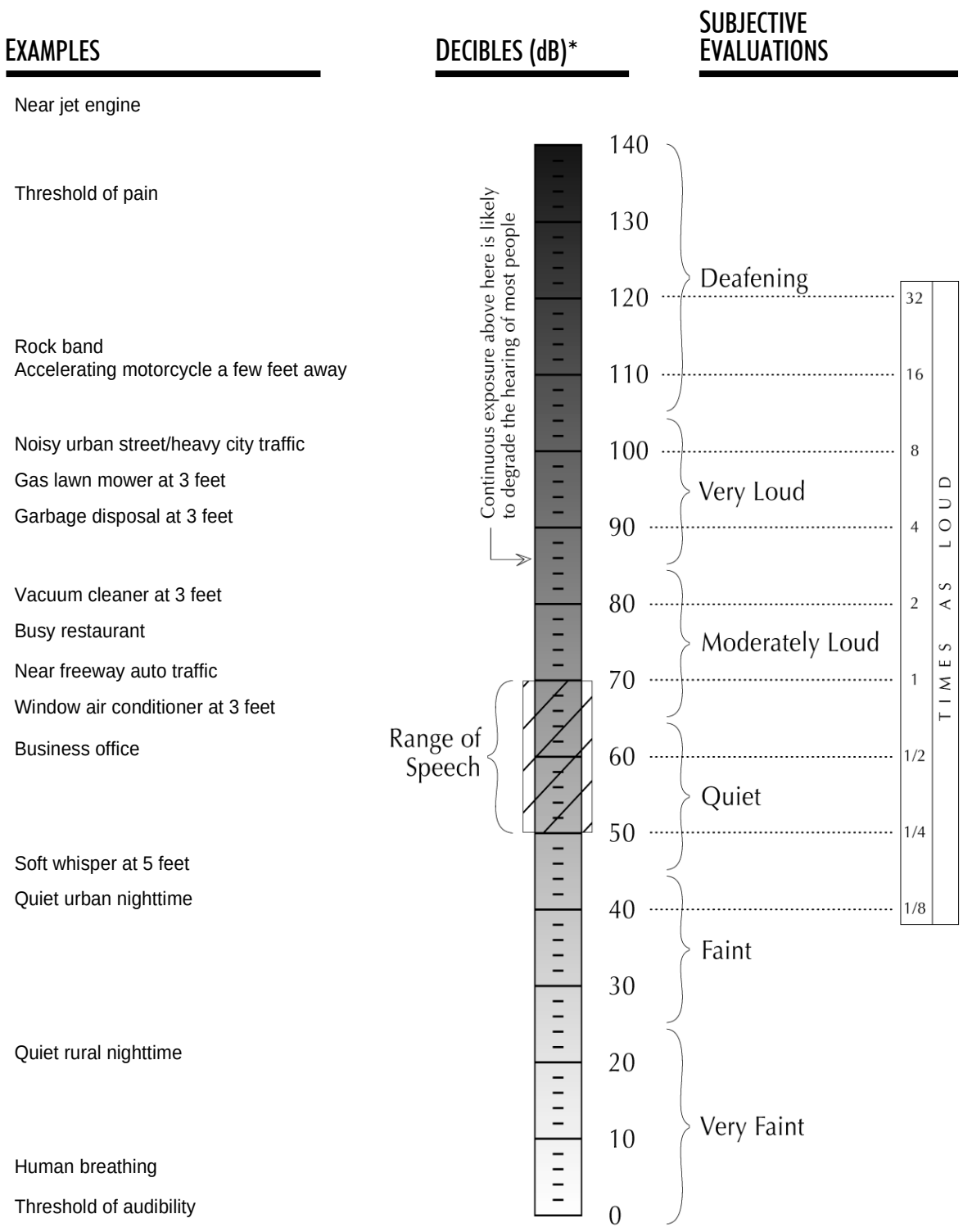
NOISE CRITERIA

Federal, state, and local governments have established noise standards and guidelines to protect citizens from potential hearing damage and various other adverse physiological and social effects associated with noise. The federal government regulates noise levels in the work place, aircraft noise, and noise emitted by certain products at the time of manufacture. The State of California regulates noise levels of motor vehicles and freeway noise affecting classrooms, sets standards for sound transmission control and occupational noise control, and identifies noise insulation standards and airport noise/land use compatibility. Local communities generally regulate land use/noise level compatibility, allowable levels on private property and levels associated with the use of certain types of sources. The applicable standards and guidelines for this project are discussed below.

State of California Standards and Guidelines

The State of California has adopted noise standards in areas of regulation not preempted by the federal government. State standards regulate noise levels of motor vehicles and freeway noise affecting classrooms, set standards for sound transmission control and occupational noise control, and identify noise insulation standards. The state has also developed land use compatibility guidelines for community noise environments.

The State of California General Plan Guidelines, published by the State Office of Planning and Research (OPR), provides guidance for the acceptability of projects within specific CNEL/ L_{dn} contours. Generally, residential uses are considered to be acceptable in areas where exterior noise levels do not exceed 60 dBA CNEL/L_{dn}. Residential uses are normally unacceptable in areas exceeding 70 dBA L_{dn} and conditionally acceptable within 60 to 70 dBA L_{dn}. Schools, libraries, churches, hospitals, and nursing homes are treated as noise-sensitive land uses, requiring acoustical studies within areas exceeding 60 dBA L_{dn}. Additionally, a 45 dBA L_{dn} is prescribed as a suitable interior noise environment for noise-sensitive uses. However, the state stresses that these guidelines can be modified to reflect sensitivities of individual communities to noise.



* dB are ìaverageî values as measured on the A-scale of a sound-level meter.
From Concepts in Architectural Acoustics: M.David Egan, McGraw Hill, 1972 and U.S. Department of Housing and Urban Development, Office of Community Planning and Development ìThe Noise Guidebook.î

Source: EDAW 2003

Typical Noise Levels

EXHIBIT 4.7-1

Protrero Hills Landfill

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EDAW

Solano County General Plan

The Solano County General Plan establishes acceptable noise level criteria for transportation and non-transportation (fixed) noise sources. The Solano County General Plan Noise Element states the following noise level performance criteria for new projects that are affected by or include non-transportation noise sources, such as those attributed to commercial uses.

> The introduction of any fixed point, permanent, non-residential, noise-emitting land use (industrial, commercial, public utility, etc.) shall be prohibited if the projected noise emission level will exceed one or more of the following:
>
> a. 50 dBA CNEL as measured at the boundary of a nearby residential zone.
>
> b. 60 dBA CNEL as measured at the boundary of a nearby commercial zone, business zone (personal service, offices), or noise-sensitive industrial or manufacturing zone (research, communications, etc.).

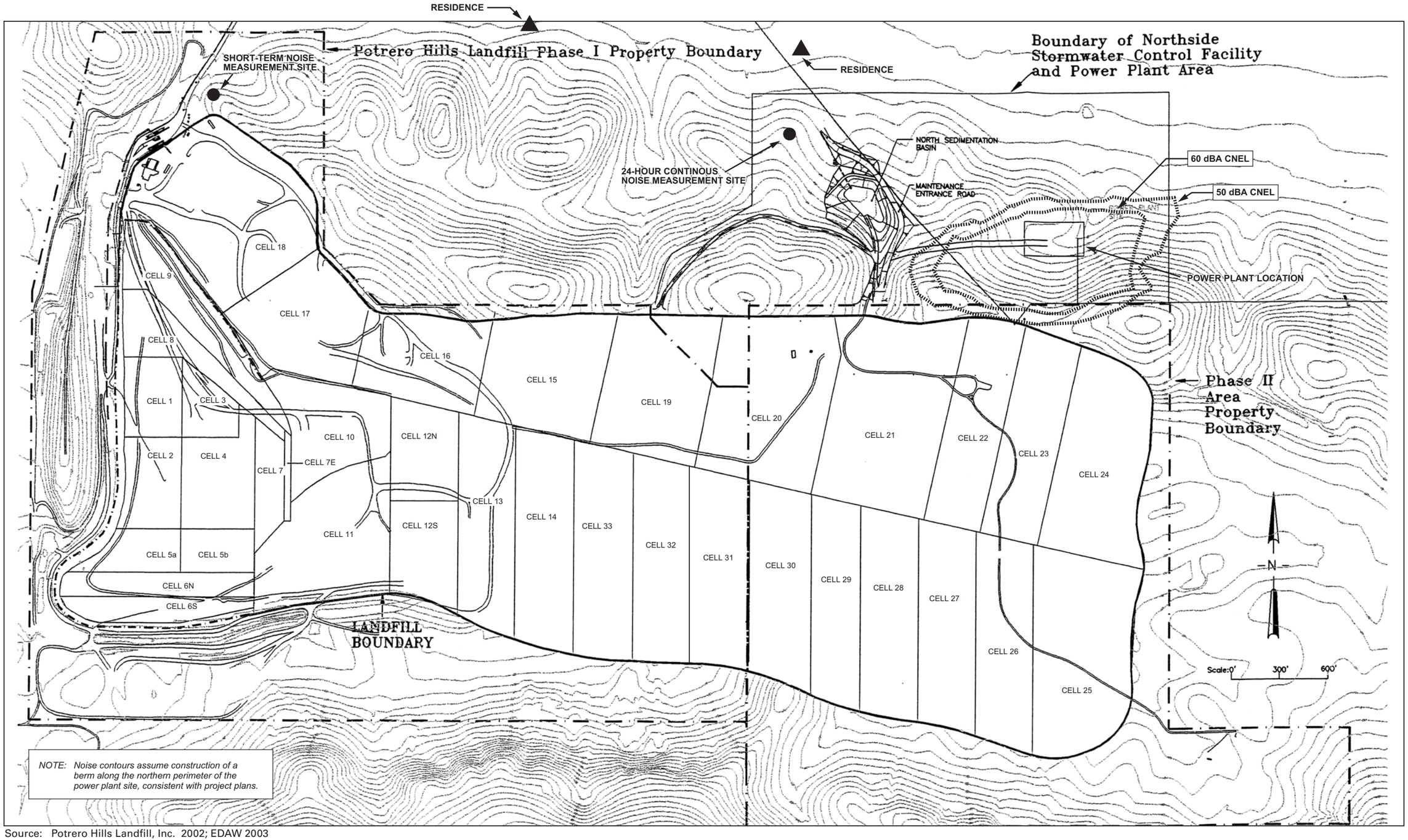
For transportation noise sources, such as roadway traffic, the Solano County General Plan establishes an exterior noise level criterion of 60 dBA CNEL and an interior noise level standard of 45 dB CNEL.

EXISTING BACKGROUND NOISE LEVELS

Ambient noise levels on and in the vicinity of the project site generally are associated with activities at the landfill, aircraft over-flights from the nearby airbase, truck traffic associated with the landfill on access roads, and distant traffic on SR 12. To quantify existing ambient noise levels on the project site and in the project vicinity, continuous hourly noise level measurements were conducted on August 5 and 6, 2002, at two locations for a 24-hour period. The noise levels were measured to determine existing background noise levels and statistical trends in noise levels throughout the day, evening, and nighttime hours.

Equipment used for all noise level measurements included Larson Davis Laboratories (LDL) Model 820 precision integrating sound level meters. The equipment was calibrated in the field with an LDL Model CA200 acoustical calibrator to ensure accuracy of the measurements.

Exhibit 4.7-2 identifies the onsite noise measurement site. The offsite noise measurement site was located approximately 1,100 feet directly north of the western residence identified on Exhibit 4.7-2. Table 4.7-1 provides a summary of the noise measurement results.



Source: Potrero Hills Landfill, Inc. 2002; EDAW 2003

Residence Locations and Noise Monitoring Information

EXHIBIT 4.7-2

Potrero Hills Landfill Expansion Project
G 2T085.01 10/03

EDAW

Table 4.7-1 Summary of Continuous Hourly Noise Measurement Results (August 5-6, 2002)						
Site	Time	Measured Noise Levels, dB				
		L_{dn}	Daytime [1] (7 a.m. - 10 p.m.)		Nighttime [2] (10 p.m. - 7a.m.)	
			L_{eq}	L_{max}	L_{eq}	L_{max}
Onsite Location	24 hours	66.6	67.1	84.0	55.5	67.3
Offsite Location	24 hours	68.4	69.6	87.7	55.1	67.1

[a] The daytime and nighttime hourly noise levels represent the average measured noise level during the period.
Source: Bollard & Brennan 2002

4.7.2 IMPACTS AND MITIGATION MEASURES

THRESHOLDS OF SIGNIFICANCE

For the purposes of this analysis, the Solano County General Plan noise performance standards, as identified in the Noise Section of the Health and Safety Element, are used to determine significance. An impact would be considered significant if project-generated noise levels would exceed one or more of the following:

- 50 dBA CNEL as measured at the boundary of a nearby residential zone.
- 60 dBA CNEL as measured at the boundary of a nearby commercial zone, business zone (personal service, offices), or noise-sensitive industrial or manufacturing zone (research, communications, etc.).
- For transportation noise sources, such as roadway traffic, the exterior noise level criterion of 60 dBA CNEL and the interior noise level standard of 45 dB CNEL shall be used.

Impact **4.7-1**

Increased Noise Levels Associated with Power Plant Operations. *The predicted noise levels associated with power plant operations would not exceed the county's 50 dBA CNEL standard for residentially-zoned uses. This impact would be considered* ***less than significant****.*

The power generation facility would use two 1,100-horsepower Waukesha gas engines. The engines would be located inside a weather-proof enclosure, which would provide some noise attenuation. The enclosure is proposed to be sited below the existing ridgeline and a soil berm would be constructed along its northern boundary to minimize the facility's visibility and provide noise attenuation. To estimate the noise levels associated with power plant operations, the Environmental Noise Model (ENM) was used. The ENM is capable of projecting the locations of noise contours for multiple noise sources, accounting for natural topography, ground type, and atmospheric conditions. Inputs to the ENM were obtained from topographic maps of the area and noise level data provided by the manufacturer of the Waukesha engines. Because the noise attenuation from the enclosure is not accounted for, the

following analysis is a worst-case estimate of potential noise impacts. The noise source data used in the ENM modeling process is included in Appendix C of this document.

Based on the analysis, the 50-dB CNEL and 60-dB CNEL noise level contours are confined to the project site (Exhibit 4.7-2). Therefore, noise levels associated with the proposed power generation facility would not exceed the 50-dB CNEL noise level criterion at the nearest residentially-zoned land or the 60-dB CNEL noise level criterion at the nearest commercial zone, business zone or noise-sensitive industrial or manufacturing zone. Less-than-significant noise impacts would be anticipated with project implementation.

Mitigation Measure 4.7-1 Increased Noise Levels Associated with Power Plant Operations

No mitigation measures would be necessary.

Level of Significance after Mitigation

The project's noise impacts would be considered less than significant.

Impact **4.7-2**

Increased Noise Levels Associated with Landfill Operations. *The predicted noise levels associated with proposed landfill operations would not result in noise levels in excess of County standards for adjacent properties. Therefore, the increased noise levels associated with site operations would be considered* ***less than significant****.*

Noise generated by landfill operations would be primarily associated with the operation of onsite equipment (e.g., dozers, material handlers, and haul trucks). Landfill operations are anticipated to use similar types and number of pieces of equipment as current landfill operations. In addition, the landfill expansion activities would involve the construction of module liners and closure caps periodically throughout the life of the landfill. The U.S. Environmental Protection Agency has found that the noise associated with the types of equipment used at a landfill typically range from approximately 77 dBA to 90 dBA L_{eq} at 50 feet. Typical operating cycles may involve 2 minutes of full power, followed by 3 or 4 minutes at lower settings. Noise levels typically decrease 6 dBA with doubling of distance from the source (USEPA 1971).

The location of a ridgeline between the expansion area and adjacent agriculturally-zoned lands provides a noise screen that would reduce noise levels by approximately 20 dBA. Assuming a maximum noise level of 90 dBA L_{eq} at 50 feet and noise reductions from topographic screening, daytime hourly average noise levels at approximately 1,600 feet from the noise source would be approximately 40 dBA L_{eq}. Based on these assumptions, average daily noise levels (averaged over a 24-hour period) at this distance would be approximately 47 dBA CNEL. Residentially-zoned land is located more than a mile from the proposed expansion. Therefore, noise impacts associated with the proposed expanded site operations would be considered less than significant.

Three residences are located between 1,600 and 1,800 feet north of the proposed landfill boundary within agriculturally-zoned land. The Noise Section of the Solano County General

Plan's Health and Safety Element does not include specific noise thresholds for agriculturally-zoned land. Therefore, increased noise levels at these residences generated from expanded site operations would not conflict with the policies included in the Health and Safety Element. Also, the projected noise level of 47 dBA CNEL for adjacent properties within 1,600 feet of the expanded operations would be lower than the current typical ambient noise levels experienced in the local area, as identified in Table 4.7-1. These residences would not, therefore, experience significant increases in ambient noise levels.

Mitigation Measure 4.7-2 Increased Noise Levels Associated with Landfill Operations

No mitigation measures would be necessary.

Level of Significance after Mitigation

The project's noise impacts would be considered less than significant.

Impact **4.7-3**

Increased Noise Levels Associated with Landfill Traffic and the Change in Operating Hours. *The predicted noise levels associated with landfill-generated traffic and the change in operating hours would not exceed the county's 60 dBA CNEL standard for adjacent residences. This impact would be considered* ***less than significant****.*

The proposed project would have a negligible increase in traffic volumes on the site access roads in relation to permitted conditions. The site has a permitted traffic volume limit of 500 vehicles. However, the existing permitted tonnage limits have the effect of limiting vehicle traffic at the site below the 500-vehicle limit. Peak vehicle traffic is currently estimated to be 484 vehicles per day, based on the site's tonnage limits. By revising the tonnage limits of the existing permit, the proposed project would in effect increase the peak number of vehicles that access the site on a daily basis to 500. This increase of 16 vehicles would not be expected to adversely affect traffic noise for residences near the site access roadways. However, the current 20-hour daily operation would change to a 24-hour operation Monday through Friday and remain a 20-hour operation Saturday and Sunday.

To predict traffic noise levels associated with the peak vehicles arriving at the site and the change in operating hours, the Federal Highway Administration (FHWA) Highway Traffic Noise Prediction Model (FHWA RD-77-108) was used. The FHWA model is one of the analytical methods currently favored for traffic noise prediction by most state and local agencies, including the California Department of Transportation. The model is based on the CALVENO noise emission factors for automobiles, medium trucks, and heavy trucks, with consideration given to vehicle volume, speed, roadway configuration, distance to the receiver, and the acoustical characteristics of the site.

The FHWA model was developed to predict hourly L_{eq} values for free-flowing traffic conditions and is considered to be accurate within 1.5 dB. To predict CNEL values, it is necessary to determine the day/night distribution of traffic and adjust the traffic volume input data to yield an equivalent hourly traffic volume.

The average daily traffic volume for future conditions on the landfill access road was estimated based on 1,000 one-way trips per day (500 total vehicles). Day/night traffic distribution was assumed to be 90%/10%. The FHWA model was used with the above assumptions to calculate the CNEL values for proposed expansion conditions. The results are contained in Table 4.7-2. Appendix C of this document contains the complete inputs to the FHWA model.

Based on the truck traffic noise level calculations in Table 4.7-2, any residential uses within a minimum of 111 feet from the landfill access road centerline currently are exposed to traffic noise levels in excess of 60 dB CNEL. The nearest residential use is approximately 1,600 feet from Potrero Hills Lane. Therefore, noise levels for all of the residences in the vicinity of the landfill would comply with the noise level criterion of 60 dB CNEL for transportation noise sources.

Table 4.7-2
Existing and Future Maximum Truck Traffic Noise Levels along the Potrero Hills Landfill Access Road

Roadway	CNEL at 50 feet	Distance to CNEL Contour		
		50 dB	55 dB	60 dB
Potrero Hills Lane	65 dB	515 feet	239 feet	111 feet

Source: Bollard & Brennan 2002

To verify that the FHWA model accurately predicted noise levels associated with truck traffic, Bollard & Brennan conducted noise level measurements of truck passbys along Potrero Hills Lane, on August 5, 2002. The noise level measurements were conducted at a distance of 50 feet from the roadway centerline. Exhibit 4.7-2 shows the noise measurement location.

The calculation of CNEL based on these noise level measurements was 64.4 dB at a distance of 50 feet. The FHWA model predicted that the CNEL value caused by truck traffic was 65 dB at 50 feet. Therefore, the FHWA model and the noise measurement data analysis agree within 0.6 dB CNEL.

The increase in noise levels due to increased truck traffic on Potrero Hills Lane and the change in operating hours would not exceed the 60 dB CNEL standard for transportation noise sources at the existing residences in the vicinity of the landfill. Therefore, anticipated noise impacts would be less than significant.

Mitigation Measure 4.7-3 Increased Noise Levels Associated with Landfill Traffic and the Change in Operating Hours

No mitigation measures would be necessary.

Level of Significance after Mitigation

The project's noise impacts would be considered less than significant.