11. NOISE

Would the project:	Potentially Significant Impact	Less-Than-Significant With Mitigation Incorporated	Less-Than-Significant Impact	No Impact
a. Expose persons to or generate noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	■	☐	☐
b. Expose persons to or generate excessive groundborne vibration or groundborne noise levels?	☐	☐	■	☐
c. Substantially and permanently increase ambient noise levels in the project vicinity above levels existing without the project?	☐	■	☐	☐
d. Cause a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	■	☐	☐
e. For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	■
f. For a project within the vicinity of a private airstrip, expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	■

Existing Conditions

Noise is often defined simply as unwanted sound and is measured in units known as decibels (dB).[1] The decibel notation used for sound levels describes a logarithmic relationship of acoustical energy, so that sound levels cannot be added or subtracted in the conventional arithmetic manner. For example, a doubling of acoustical energy results in a change of 3 dB, which is usually considered to be barely perceptible. A 10-fold increase in acoustical energy yields a 10 dB change, which is subjectively like a doubling of loudness. Because human sensitivity to varying frequencies differs and affects perception of sound, scientists have developed weighting systems that better reflect how humans hear. The "A-weighted sound pressure levels," denoted as dBA, correlates well with community reaction to noise.

Community noise is commonly described in terms of the "ambient" noise level, which is defined as the all-encompassing noise level associated with a given noise environment. A common statistical tool to

[1] A decibel is a logarithmic unit of sound energy intensity.

measure the ambient noise level is the average, or equivalent sound level (L_{eq}), [2] which corresponds to a steady-state sound level containing the same total energy as a time-varying signal over a given period (usually one hour). The L_{eq} is a good indicator of community response to noise. Two common noise metrics used to adjust the steady-state "average" noise levels over a 24-hour period and capture variations in sound levels over time are the Day-Night Average Level (L_{dn})[3] and the Community Noise Equivalent Level (CNEL). Each of these metrics impose a 10-decibel "penalty" (i.e., weight the 24-hour average L_{eq}) at nighttime (between 10 p.m. and 7 a.m. to acknowledge greater sensitivity to noise during these hours. The CNEL adds an additional 5-decibel penalty to the evening hours between 7 p.m. and 10 p.m.) L_{dn} and CNEL measurements are generally within 1.0 dBA of each other and are considered interchangeable. Throughout this analysis, A-weighted sound pressure levels are used to describe community noise unless otherwise indicated.

Noise levels are generally considered low when ambient levels are below 55 dBA, moderate in the 55 to 70 dBA range, and high above 70 dBA. Outdoor L_{dn} levels can vary by over 50 dBA depending on the specific type of land use. In wilderness areas, the L_{dn} noise levels average approximately 35 dBA, 50 dBA in small towns or wooded residential areas, 75 dBA in major metropolitan areas (e.g., downtown San Francisco), and 85 dBA near heavy construction machinery.

Existing Noise Levels. Noise survey data from the PEA contain averages of multiple measurements taken at various points along the project corridor and are representative of noise levels along the route. Noise measurements were also taken at the Burlingame and Millbrae Substations, where new and replacement transformers would be installed. Noise measurements were not collected at the San Mateo or Martin Substation because no long-term, noise-producing equipment, such as transformers, are proposed for those sites. Circuit breakers, which are planned for the San Mateo and Martin Substations, do emit a short-term sound but do not significantly contribute to the background noise at those locations. Therefore, noise measurements are not reported for these substations. Table B.11-1 summarizes the noise average survey results for the substations in terms of average, minimum, and maximum L_{eq}. L_{50} and L_{90} indicate the percent of time that the noise level is exceeded (e.g., L_{90} is 90 percent of the time).

Power Line. Noise measurements were taken at five sites along the route during both weekend and weekday periods in May and August 2002 by PG&E contactors for the PEA. All acoustic measurements were taken for multiple 24-hour periods and produced hourly average noise data (L_{eq}). Long-term noise measurements were obtained using calibrated microphones and integrating sound level meters/statistical data loggers. Table B.11-1 summarizes the results of these measurements, which show that the largest average L_{eq} level occurs along the power line at Guadalupe Canyon Parkway and

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[2] The Equivalent Sound Level (L_{eq}) is a single value of sound level for any desired duration, which includes all of the time-varying sound energy in the measurement period.

[3] Day-night average sound level that is equal to the 24 hour A-weighted equivalent sound level with a 10 decibel penalty applied to nighttime levels.

Table B.11-1
Noise Measurement Results along the San Mateo-Martin #4 Power Line
(A-Weighted Decibels [dBA])

Location	Average (L_{eq})	Minimum (L_{eq})	Maximum (L_{eq})	Average (L_{50})	Average (L_{90})	Average (L_{dn})
Power Line						
Hill Road (San Bruno Mountain)	56	44	76	52	47	60
Guadalupe Canyon Parkway	81	80	83	81	80	84
Geneva Road	55	72	90	68	62	78
U.S. Highway 101	59	49	77	55	51	61
Rollins Road	65	57	87	61	58	69
*Substations**						
Burlingame	65	57	87	61	58	69
Millbrae	59	49	77	55	51	61

Notes: *Noise measurements were not collected at the San Mateo or Martin Substations because no long-term, noise-producing devices, such as transformers, are planned for those sites.

the lowest average L_{eq} level occurs along the power line at Geneva Road. Also notable is that all average L_{eq} levels, except along the power line at Guadalupe Canyon Parkway, are within normal average L_{eq} levels that exist in major metropolitan and suburban areas. Short-term noise measurements were obtained using a calibrated microphone and sound-level meter in conjunction with a digital audio recorder.

Substations. The data in Table B.11-1 show that average noise levels from the substations are relatively low and within normal levels experienced in suburban and major metropolitan areas in the San Francisco Bay Area.

Sensitive Receptors. Noise-sensitive receptors are facilities (e.g., residential areas, hospitals, schools, performance spaces) or activities for which excessive noise may cause annoyance or loss of business (e.g., work requiring a quiet environment for heavy telephone use). Sensitive receptors in the vicinity of the power line and the substations are noted below.

Power Line. Over the project route, sensitive receptors, mostly residences, are as close as 45 feet to the power line. However, these sensitive receptors occur where the power line right-of-way route parallels US 101. Consequently, power line noise tends to be "overshadowed" by noise from US 101. Where the line crosses San Bruno Mountain, the sensitive residential receptors are a considerable distance (approximately 500 feet) from the power lines.

Substations. The San Mateo Substation is bordered on the east by the San Francisco Bay, on the north by the Coyote Point Recreation Area and the Poplar Creek Golf Course, and on the south and west by land zoned as residential and commercial. The nearest sensitive receptors are located approximately 0.5 mile (2,640 feet) from the substation property line.

The Burlingame Substation is located on Rollins Road in an industrial and commercial section of the city. No sensitive receptors lie within 0.5 mile (2,640 feet) of the substation property line.

Sensitive receptors (residences) nearest to the Millbrae Substation are located approximately 90 feet northwest and southeast of the substation property line in a residential setting.

The Martin Substation is located in an industrial and residential setting in Brisbane. The closest sensitive receptor is a residence located 75 feet north of the substation property line.

Local Noise Policies. In the State of California, each local jurisdiction is required to prepare a Noise Element as part of its general plan to identify objectives, goals, policies, and implementation strategies to protect land uses from excessive noise levels. Land use/noise environmental guidelines define sound levels appropriate for different land use. Noise ordinances often deal with annoyance issues or construction activities. Specific noise-related plans and policies for each municipality in the project corridor are presented below.

San Mateo County. The Noise Element of the *San Mateo County General Plan* states the following policies and objectives:

- strive toward an environment for all residents of San Mateo County which is free from unnecessary, annoying, and injurious noise;
- reduce noise impacts through noise/land use compatibility and noise mitigation;
- promote protection of noise-sensitive land uses and noise reduction in quiet areas and noise impact areas;
- give priority to reducing noise at the source rather than at the receiver; and
- reduce noise at the source, the path (noise barriers and construction techniques, etc.), and the receiver (residential developments), and separate the source from the receiver.

The current *San Mateo County General Plan* does not quantify noise levels for land use types.

City of San Mateo. The Noise Sensitive Land Use Compatibility Guidelines for Community Noise Environments in the *San Mateo General Plan* establish normally acceptable sound levels for sensitive receptors (e.g., residences, schools, libraries, hospitals) at 50 to 59 dBA-L_{dn} and conditionally acceptable sound levels at 60 to 70 dBA-L_{dn}.

The Municipal Code of San Mateo, Section 10.04.010, Disturbing the Peace, states: "No person shall make in any place or suffer to made upon his premises or premises within his control, any noise, disorder or tumult, to the disturbance of the public peace within the city."

City of Burlingame. The *Burlingame General Plan* calls for "excluding and prohibiting all annoying, excessive and unnecessary noises from all sources which are subject to its regulatory, administrative and police powers" and identifies suggested outdoor noise levels for various land use categories:

- public, quasi-public, and residential land uses—60 dBA- CNEL;

- passively used open spaces—45 dBA-CNEL;
- commercial—65 dBA-CNEL; and
- industrial—75 dBA-CNEL.

The General Noise section of the *Burlingame Code of Regulations* states: "it is unlawful for any person willfully to make or continue, or cause to be make or continued, any loud, unnecessary or unusual noise which disturbs the peace and quiet of any neighborhood or which causes discomfort or annoyance to any reasonable person of normal sensitiveness residing in the area."

City of Millbrae. The Noise Element of the *Millbrae General Plan* identifies two primary noise concerns:

- protecting the city's existing neighborhoods and commercial areas; and
- assuring that new development is done appropriately.

A Land Use Compatibility Chart for community noise environments establishes normally acceptable sound levels for sensitive receptors (e.g., residences, schools, libraries, hospitals) at 60 dBA-Ldn and conditionally acceptable at 75 dBA-Ldn. The acceptable level for industrial, manufacturing, and utilities land uses is less than 70 dBA-Ldn.

There is no noise ordinance for Millbrae. However, the city has adopted California Penal Code Section 415 "Disturbing the Peace," which prohibits any person from maliciously and willfully disturbing another person by loud and unreasonable noise.

City of San Bruno. The *San Bruno General Plan* states that noise levels for residences, schools, libraries, churches, and hospitals should be less than 65 dB-CNEL. Industrial land uses are limited to less than 75 dB-CNEL.

Section 6.16.303 Ambient Noise Levels of the San Bruno Municipal Code limits sound levels in residential zones between 10 p.m. and 7 a.m. to 45 dBA and between 7 a.m. and 10 p.m. to 60 dBA. However, during the daytime period, the ambient base level may be exceeded by 20 dBA for a period not to exceed 30 minutes during any 24-hour period. Construction-generated noise is limited to 85 dBA (measured at a distance of 100 feet from the source) between 7 a.m. and 10 p.m.

City of South San Francisco. The guiding policy of the Noise Element of the *South San Francisco General Plan* is to "protect public health and welfare by eliminating or minimizing the effects of existing noise problem and by preventing increased noise levels in the future." The plan prohibits industrial development that would result in a noise level of 60 dB-CNEL at noise-sensitive uses.

The Municipal Code of South San Francisco is more specific than the *South San Francisco General Plan* when establishing permissible noise levels. It limits noise levels in single-family or duplex residential areas to 60 dB between the hours of 7 a.m. and 10 p.m. and 50 dB between 10 p.m. and 7 a.m. However, construction activities, which are authorized by a valid city permit, are allowed on

weekdays between 8 a.m. and 8 p.m. and on Saturdays between 9 a.m. and 8 p.m. Any single piece of equipment is limited to a noise level of 90 dB at a distance of 25 feet from the source.

City of Brisbane. The Noise Element of the *Brisbane General Plan* states that the policy of the city is "to minimize the intrusion of unwarranted and intrusive noise on community life." It states further that, "the Community Noise Equivalent Level (CNEL) of 65 dB represents a noise level at which noise insulation features are generally required."

Brisbane Municipal Code 8.28.030 states: "no person shall cause, produce, suffer or allow to be produced by any machine, animal or device...in a single family residential zoning districts, any noise level more than 10 dB above the local ambient for a cumulative period of more than 15 minutes in any hour." For a multi-family residential zoning district, no noise level more than 10 dB above the local ambient 3 feet from any wall, floor or ceiling, inside any dwelling unit is allowed.

City of Daly City. The *Daly City General Plan* Noise Compatibility Guidelines define normally acceptable noise levels for single-family residential land uses at 60 dBA-CNEL. Other sensitive receptors, such as schools, libraries, churches, and hospitals, are limited to 65 dBA-CNEL for normally acceptable noise levels. The plan also states that the Engineering and Planning Divisions regulate construction through the environmental review process.

The Municipal Code of Daly City defines noise in Chapter 9.22 "Disturbing the Peace." It states that: "between the hours of 10 p.m. and 6 a.m., no person shall cause, create or permit any noise or other disturbance upon his property which may be heard by or which noise disturbs or harrasses, any other person beyond the confines of the property from which the noise, music, sound or disturbance emanates."

Significance Criteria

The significance criteria for this analysis is based on Appendix G of the CEQA Guidelines. The project is considered to have a significant impact if it would result in:

- Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;
- Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels;
- A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project;
- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project;
- For a project located within an airport land use plan or, exposure of people residing or working in the project area to excessive noise levels within two miles of a public airport or public use airport, where such a plan has not been adopted; or
- For a project within the vicinity of a private airstrip, exposure of people residing or working in the project area to excessive noise levels.

Explanation of Noise Checklist

a. Exposure of Persons to Noise Levels in Excess of Local Standards — Less-than-Significant with Mitigation Incorporated

The proposed project would generate noise from construction activities and operations. However, as explained below, noise levels would be kept to within acceptable levels and time periods resulting in a less-than-significant impact.

Power Line Construction. Project construction activities would require the use of various noise-generating construction equipment. Equipment used to construct the project may include truck-mounted augers, flatbed trucks, boom trucks, rigging and mechanic trucks, air compressors and generators, small-wheeled cranes, pole trailers, man lifts, and crew trucks. Stringing operations would require pullers, tensioners, and wire reel trailers. Helicopters would be used to transport crews and construction materials to string the conductors.

In general, two types of noise are associated with construction activities: intermittent and continuous. Intermittent noise is noise that lasts for 30 minutes or less; continuous noise lasts for more than 30 minutes. The maximum intermittent construction noise levels for power line construction, generated by the construction of crossarm modifications, would range from approximately 80 to 88 dBA Leq at 135 feet from the source. The maximum continuous noise levels from power line reconductoring activities would range from approximately 70 to 77 dBA Leq at 135 feet.

Earth-moving equipment would be required for installation of temporary guard structures and removal of two wood poles outside the Millbrae Substation. Table B.11-2 lists typical noise levels (at 50 feet from the source) for commonly-used equipment. Table B.11-2 shows that stationary and earth-moving equipment proposed for use in the project right-of-way would produce maximum noise levels of 94 dBA at a distance of 50 feet from the source. Temporary guard structures would be installed at the Millbrae and Martin Substations, BART tracks in the West of Bayshore, and roadways. Noise impacts from earth-moving equipment at the Millbrae and Martin Substations are described below, under "Substation Construction." Noise from the installation of guard structures over US 101 would be masked by the continuous freeway noise and would be less than significant. Project-related construction noise along the BART tracks and roadways aside from US 101 would have a temporary but potentially significant impact on receptors at those locations.

Reconductoring for the proposed project would occur in 16 pull and tension sites throughout the project site and would be completed in a three-month period. Equipment at the pull and tension sites would remain at those sites for about four to five days. Typical equipment anticipated at the pull and tension sites include:

- One 5-ton line truck
- One aerial truck
- One 3-reel truck and trailer
- Three pick-up trucks
- Two truck-mounted tensioners
- One boom truck
- One mobile crane (possible for some sites)

Table B.11-2
Average Noise Levels and Abatement Potential of Construction Equipment Noise at 50 and 100 Ft. (dBA L_{eq})

Equipment	Noise Level at 50 Ft. (Before Mitigation)	With Feasible Noise Control[1] (After Mitigation)	Noise Level at 100 Ft. (Before Mitigation)	With Feasible Noise Control[1] (After Mitigation)
Earthmoving				
Front Loaders	79	75	73	69
Backhoes	85	75	79	69
Dozers	80	75	74	69
Tractors	80	75	74	69
Scrapers	88	80	82	74
Graders	85	75	79	69
Trucks	91	75	85	69
Pavers	89	80	83	74
Materials Handling				
Concrete Mixer	85	75	79	69
Concrete Pump	82	75	76	69
Crane	83	75	77	69
Derrick	88	75	82	69
Helicopters	110-113	--	104-109	--
Stationary				
Pumps	76	75	70	69
Generator	78	75	72	69
Compressors	81	75	75	69
Impact				
Pile Drivers	101	95	95	89
Rock Drills	98	80	92	74
Jack Hammers	88	75	82	69
Pneumatic Tools	86	80	80	74
Other				
Saws	78	75	72	69
Vibrators	76	75	70	69

Source: U.S. EPA, 1971.

Notes:

1 Estimated levels obtainable by selecting quieter procedures or machines and implementing noise-control features requiring no major redesign or extreme cost.

Pull and tension sites that may affect sensitive receptors are at Towers 7/60, between 8/63 and 8/64, 8/66, and 8/67, which are all in urbanized, industrial or commercial areas of South San Francisco. The Municipal Code of South San Francisco limits noise emission from construction equipment to 90 dB at 25 feet from the source. According to Table B.11-2, the maximum noise emissions from common earthmoving and material handling activities would be 91 dBA Leq at 50 feet. With common noise control features requiring no major alterations, these noise levels from trucks can be lowered to 75 dBA Leq, which would comply with the City's established standards.

Construction work for the power line would involve helicopter use and staging for access to tower locations. Helicopter noise would be greatest at helicopter staging/landing areas (roughly 110-113 dBA at 50 feet). The landing zone for this project would be located either at a local airport or on a paved area, such as a parking lot. MM BIO-3 (see Section B.4, Biological Resources) involves CPUC review of construction staging, which would include helicopter staging. Helicopter noise emitted during helicopter operation and hovering would be intermittent and short in duration. While noticeable, the intermittent and short-term nature of helicopter noise during landing and lift off would be a less-than-significant impact.

Nighttime reconductoring work may be required by Caltrans for sections where the power line crosses US 101. The power line crosses US 101 three times, and pull or tension sites near these locations are north of Tower 2/18 (in Burlingame) and at Towers 8/66 and 8/67 in South San Francisco. These sites are in commercial and industrial areas that would not be adversely affected by nighttime construction activity. As a result, noise generation from nighttime power line work at US 101 crossings would have a less-than-significant impact on sensitive receptors because there are none nearby.

For the above-identified noise sources related to construction and installation of the new circuits, no APMs have been proposed by PG&E to reduce noise emissions. Rather, PG&E has proposed Best Management Practices (BMPs; see Appendix C) that include measures for noise suppression during construction activities. BMPs include installation of noise control equipment and shields, directing construction traffic away from sensitive areas, and coordination with municipalities regarding construction. Implementation of the BMPs would ensure noise emissions from power line work would be less than significant. In addition, MM BIO-3 would ensure that construction staging areas, including those for helicopter access, are not located near sensitive receptors. No further mitigation would be necessary for power line work.

Substation Construction. Modification of the substations would involve use of earth-moving equipment, trucks, cranes, and pile drivers. The noise levels would vary with the type of activity and the equipment being used. Noise from all substation construction activities, except pile driving, could be as high as 75-80 dBA Leq at 50 feet from the source or 69-74 dBA Leq at 100 feet from the source. Sensitive residential receptors are found within 100 feet of the Millbrae Substation in Millbrae and the Martin Substation property fence line in Brisbane. Construction activities at these substations, which would last five to six months, would have a potentially significant impact on the nearby residents. Construction activities would vary over the course of this period, so that noise exposure would be high for nearby residents for extended periods. Implementation of the proposed BMPs, which include installation of noise control equipment and shields, directing construction traffic away from sensitive

areas, and turning off equipment rather than idling, and conformance with municipalities' regarding noise standards, would reduce noise emissions from substation activities to less-than-significant levels.

Pile drivers would be used on an intermittent basis to install a number of different circuit-related upgrades at the San Mateo Substation. Pile driving activities would last a maximum of four days over a two-week period. Noise from pile-driving activities would average approximately 72 dBA Leq at 0.45 mile (PG&E, 2003). As a result, the residential area 0.5 mile from the San Mateo Substation would be exposed to pile-driving noise levels for a short-term period, at levels expected from an arterial street. Therefore, noise impacts associated with pile driving activities would be less than significant.

Implementation of PG&E's BMPs and MMs NOI-1 and NOI-2 described below would ensure that neighboring receptors would be provided advanced notice of the construction activities and would provide means for PG&E to respond to concerns of those receptors.

MM NOI-1 PG&E or its construction contractor shall provide advance notice, between two and four weeks prior to construction, by mail to all sensitive receptors[4] and residences within 300 feet of construction. The announcement shall state specifically where and when construction will occur in the area.

MM NOI-2 PG&E shall identify and provide a public liaison person before and during construction to respond to concerns of neighboring receptors, including residents, about noise construction disturbance. Procedures for reaching the public liaison officer via telephone or in person shall be included in notices distributed to the public in accordance with MM NOI-1. PG&E shall also establish a toll-free telephone number for receiving questions or complaints during construction and develop procedures for responding to callers (procedures to be approved by the CPUC).

Operations. This section discusses noise from operation of the proposed project, including noise from individual substations and the power line itself. Table B.11-3 identifies the distance from proposed project components to the nearest sensitive receptor and the increase in noise levels (dBA) that would result from operation of the project. In each case, the contribution of operations is computed as the additive effects of the operational noise and the minimum ambient noise levels as determined from field measurements.

[4] Note: Examples of sensitive receptors include hospitals, schools, convalescent facilities, and residential areas.

Table B.11-3
Project Operational Noise Level and Distance to Nearest Sensitive Receptors

Location	Nearest Sensitive Receptors to Substation Property Line (Feet)				Contribution to Background During Operation (dBA)			
	North	South	East	West	North	South	East	West
Power Line								
Total	150	45	60	20	0	0	0	0
Substations								
San Mateo	>5,280	2,400	>5,280	>5,280	0	0	0	0
Burlingame	>3,600	2,400	>3,600	>2,400	0	0	0	0
Millbrae	90	90	>5,280	600	0	1	0	0
Martin	75	480	>5,280	870	0	0	0	0

Source: PG&E, 2002.

Power Line. When an electric field near a conductor, such as a power line, is sufficiently concentrated to ionize air close to the conductor, a partial discharge of electrical energy called a corona discharge or corona can occur. This is a commonplace phenomenon and is associated with all energized electrical devices. Audible transmission line noise is generated from corona discharge, which is experienced as a random crackling or hissing sound. Particles, such as dust or water droplets that come into contact with a conductor, tend to increase corona discharge.

The potential for noise from corona discharge is greater during wet weather. According to PG&E, the sound generated by 115 kV lines during adverse weather conditions, such as fog or rain, is generally expected to be 30 to 40 dBA Leq at 90 feet from the outer conductor. Within the San Mateo-Martin #4 conductor right-of-way, transmission line noise could be as high as 46 dBA Leq in adverse weather conditions at the closest sensitive receptor. Because these noise impacts would be within the acceptable ambient noise environment for residential areas, the reconductoring of the power line to 115 kV would produce a less-than-significant noise impact to nearby residents.

San Mateo Substation. A new 115 kV breaker would be installed at the San Mateo Substation. Although occasional noise would occur with the activation of this breaker, the noise would be momentary and would not exacerbate current noise levels in the area around the substation.

Burlingame Substation. Four single-phase 60/4 kV transformers would be removed, and two three-phase 21/4 kV as well as one 115/21 kV transformers with a manufacturer's full load noise rating of 61 dBA would be installed in the substation yard. Associated switches and circuit breakers, which cause infrequent audible noise, would also be installed and would not contribute in any measurable way to background noise.

To predict the noise impact of the transformers once they are placed in operation, the noise impacts were computer modeled using the CYMAUDI 2 noise propagation software. This model is designed to compute noise levels generated outdoors by large power apparatus, such as transformers. For these simulations, a worst-case scenario was assumed: full load, daytime transformer operation, with all

cooling fans (which produce much of the audible transformer noise) operating. The results of the computer modeled noise impacts appear in Figure B.11-1.

Noise levels at the fenceline of the Burlingame Substation are predicted to be 52 dBA Leq under the worst-case scenario. The substation is located in an industrial zone, and there are no sensitive receptors within 0.5 mile of the substation. The city's maximum noise level for industrial land use is 75 dBA CNEL. The substation noise output would comply with this guideline. Because the new transformers would be quieter than the existing transformers, there would be a reduction in noise levels after project completion. As a result, there would be no adverse noise impacts from the proposed Burlingame Substation operations.

Millbrae Substation. Addition of four single-phase 115/60 kV, 30 MVA transformers with a manufacturer's full load noise rating of 65 dBA Leq is planned for the Millbrae Substation. The transformers would be located near the southeast portion of the yard approximately 75 feet from the southernmost property line. The nearest sensitive receptors (residences) are located at the northwest and southeast of the substation property lines, approximately 90 feet from each of the property lines.

The noise impact of the additional transformers was modeled using the CYMAUDI 2 noise propagation software as described above for the Burlingame Substation. Under the worst-case scenario, the installation of additional substation transformers with an estimated noise emission of 65 dBA Leq would result in a noise level of approximately 56 dBA Leq at the sensitive receptor on Santa Paula Road, located approximately 90 feet northwest of the substation property line (see Figure B.11-2). This level is below the measured background noise levels before substation modifications. Ninety feet southeast of the substation property line on Nadina Avenue, the noise impact is predicted to be 60 dBA at the nearest receptor, a normally acceptable sound level for sensitive receptors under the *Millbrae General Plan* Land Use Compatibility Chart. As a result, there would be no discernible increase in noise levels due to the project. Noise levels would be lower at night when transformer loading is dropped.

Martin Substation. A new 115 kV breaker would be installed at the Martin Substation. Although occasional noise would occur with the activation of this breaker, the noise would be momentary and would not exacerbate current noise levels in the area around the substation.

b. Expose Sensitive Receptors to Excessive Groundborne Vibration — Less-than-Significant Impact

Tables B.11-4 through B.11-6 contain vibration criteria developed from professional and academic research for different vibration-sensitive uses. The human annoyance criteria are primarily intended for construction projects that require several days in one location. Tables B.11-4 through B.11-6 indicate the level at which a significant vibration would occur for humans and for buildings. Construction-related activities for this project would result in groundborne vibrations immediately near construction sites, primarily from heavy truck and equipment movement. Vibration levels exceeding 0.015 inch/second for an aggregate period of more than one hour per day could cause some persons to

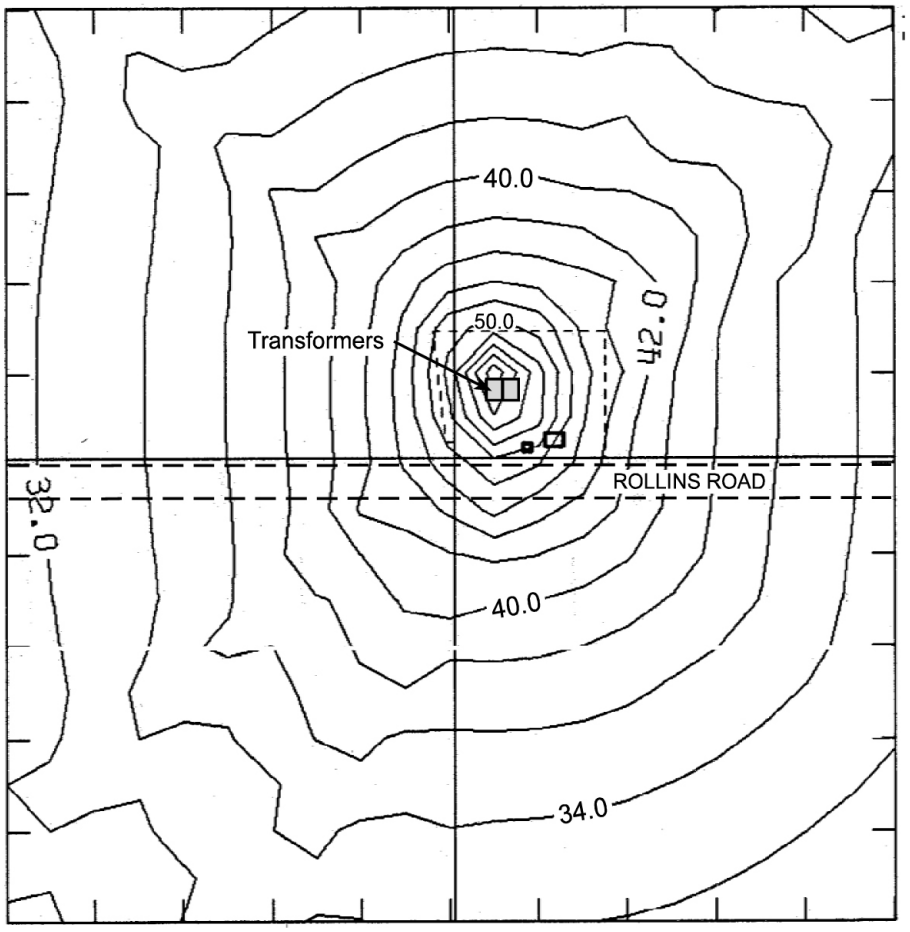

FIGURE B.11-1
Burlingame Substation Isophonic Noise dBA Distributions After Modifications (Full Load Operation with Cooling Fans On)

***Source*:** PG & E

Scale: 1" = 500'

10777-00

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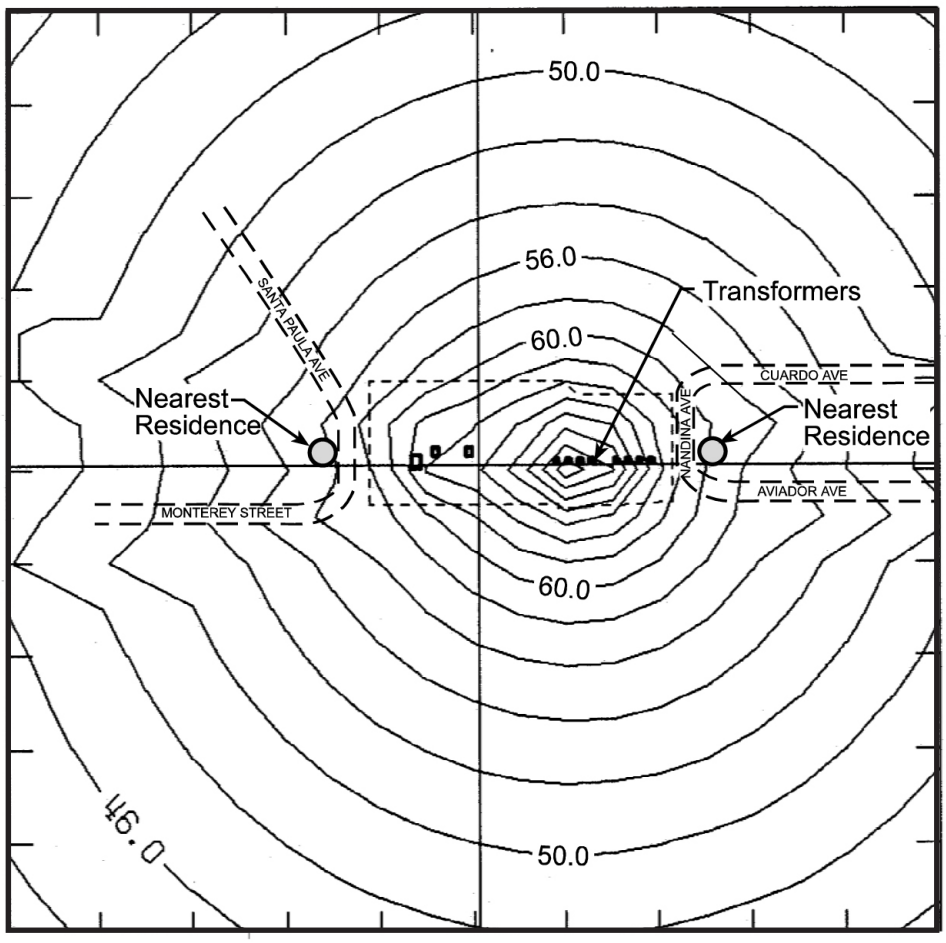

FIGURE B.11-2
Millbrae Substation Isophonic Noise dBA Distributions After Modifications (Full Load Operation with Cooling Fans On)

Scale: 1" = 1000'

10777-00

***Source*:** PG & E

EIP ASSOCIATES

be annoyed. Pile-driving activities, in contrast, are highly noticeable, but PG&E has indicated that pile driving at the San Mateo Substation would last a maximum of four days. The short-term and temporary nature of this construction activity, combined with the fact that the nearest sensitive receptor is about 0.5 mile away, indicate that vibration caused by the proposed pile driving would not exceed human annoyance criteria. Therefore, impacts would be less than significant.

c. Substantial Permanent Increase in Ambient Noise — **Less-than-Significant with Mitigation Incorporated**

See 11 a. and b, above.

d. Substantial Temporary or Periodic Increase in Ambient Noise — **Less-than-Significant with Mitigation Incorporated**

See 11 a. and b, above.

e. Within Two Miles of a Public Airport — **No Impact**

Approximately 0.25 mile of the project corridor lies within the boundaries of the San Francisco International Airport Master Plan. However, the project would not expose people residing or working in the project area to excessive noise levels, as neither the corona effect nor the noise levels from the Millbrae Substation (that closest to the airport) would increase ambient noise levels. The proposed project involves upgrading the transmission line within an existing power line right-of-way and, as such, would not introduce new population or sensitive receptors into an area where aircraft noise would pose an impact.

f. Within the Vicinity of a Private Airstrip — **No Impact**

The proposed project right-of-way does not lie within the vicinity of a private airstrip. Accordingly, the San Mateo-Martin #4 conversion project would have no impact on private airstrips and would likewise not be affected by noise related to such facilities.

Table B.11-4
Vibration Criteria Human Annoyance

Vibration Type and Permissible Aggregate Duration	Vibration Limit (rms)*
Sustained (≥ 1 hour/day)	0.01 inch/second
Transient (> 1 hour/day)	0.03 inch/second
Transient (< 10 minutes/day)	0.10 inch/second

Source: Wilson, Ihrig & Associates, 1986 and 1998.
Note: *Root Mean Square

Table B.11-5
Vibration Criteria Potential Building Damage

Type of Building	Vibration Limit (ppv)*
Industrial, heavy office, modern construction	1.0 inch/second
Residential, reinforced	0.15 inch/second
Historic, unreinforced	0.05 inch/second

Source: Wilson, Ihrig & Associates, 1986 and 1998.
Note: *Positive Predictive Value

Table B.11-6
Human Response to Different Levels of Groundborne Noise and Vibration

Vibration Velocity Level	Noise Level		Human Response
	Low Frequency[1]	Mid Frequency[2]	
65 VdB	25 dBA	40 dBA	Approximate threshold of perception for many people. Low frequency sound usual inaudible, mid-frequency sound excessive for quiet sleeping areas.
75 VdB	35 dBA	50 dBA	Approximate dividing line between barely perceptible and distinctly perceptible. Many people find transit vibration at this level unacceptable. Low-frequency noise acceptable for sleeping areas, mid-frequency noise annoying in most quiet occupied areas.
85 VdB	45 dBA	60 dBA	Vibration acceptable only if there are an infrequent number of events per day. Low-frequency noise unacceptable for sleeping areas, mid-frequency noise unacceptable even for infrequent events with institutional land uses such as schools and churches.

Source: PG&E, 2002.
Notes:
1 Approximate noise level when vibration spectrum peak is near 30 Hz.
2 Approximate noise level when vibration spectrum is near 60 Hz.