2.11 NOISE

Issues (and Supporting Information Sources):	*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporation*	*Less Than Significant Impact*	*No Impact*
NOISE—Would the proposed project result in:				
a) 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?	☐	☐	☒	☐
b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?	☐	☐	☒	☐
c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☐	☒
d) 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, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒
f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒

SETTING

BACKGROUND INFORMATION ON NOISE

Noise is defined as unwanted sound. Sound, traveling in the form of waves from a source, exerts a sound pressure level (referred to as sound level) which is measured in decibels, with zero dB corresponding roughly to the threshold of human hearing and 120 to 140 dB corresponding to the threshold of pain. Pressure waves traveling through air exert a force registered by the human ear as sound.

The typical human ear is not equally sensitive to all frequencies of the audible sound spectrum (20 to 20,000 cycles/second [Hz]. As a consequence, when assessing potential noise impacts, sound is measured using an electronic filter that de-emphasizes the frequencies below 1,000 Hz and above 5,000 Hz in a manner corresponding to the human ear's decreased sensitivity to low and extremely high frequencies instead of the frequency mid-range. This method of frequency weighting is referred to as A-weighting and is expressed in units of A-weighted decibels. Frequency A-weighting follows an international standard method of frequency de-emphasis and is typically applied to community noise measurements. In practice, the level of a sound source is

measured using a sound level meter that includes an electrical filter corresponding to the A-weighting curve. Some representative noise sources and their corresponding A-weighted noise levels are shown in **Figure 2.11-1**. All of the noise levels reported herein are A-weighted unless otherwise stated.

Noise Exposure and Community Noise

An individual's noise exposure is a measure of noise over a period of time. A noise level is a measure of noise at a given instant in time. The noise levels presented in Figure 2.11-1 are representative of measured noise at a given instant in time, however, they rarely persist consistently over a long period of time. Rather, community noise varies continuously over a period of time with respect to the contributing sound sources of the community noise environment. Community noise is primarily the product of many distant noise sources, which constitute a relatively stable background noise exposure, with the individual contributors unidentifiable. The background noise level changes throughout a typical day, but does so gradually, corresponding with the addition and subtraction of distant noise sources such as traffic and continually changing atmospheric conditions. What makes community noise constantly variable throughout a day, besides the slowly changing background noise, is the addition of short duration single event noise sources such as aircraft flyovers, vehicle passbys, sirens, etc., which are readily identifiable to the individual. These successive additions of sound to the community noise environment vary the community noise level from instant to instant, requiring the measurement of noise exposure over a period of time to legitimately characterize a community noise environment and evaluate cumulative noise impacts. This time-varying characteristic of environmental noise is described using statistical noise descriptors. The most frequently used noise descriptors are summarized below:

Leq: the equivalent sound level is used to describe noise over a specified period of time, typically one hour, in terms of a single numerical value. The Leq is the constant sound level that would contain the same acoustic energy as the varying sound level, during the same time period (i.e., the average noise exposure level for the given time period).

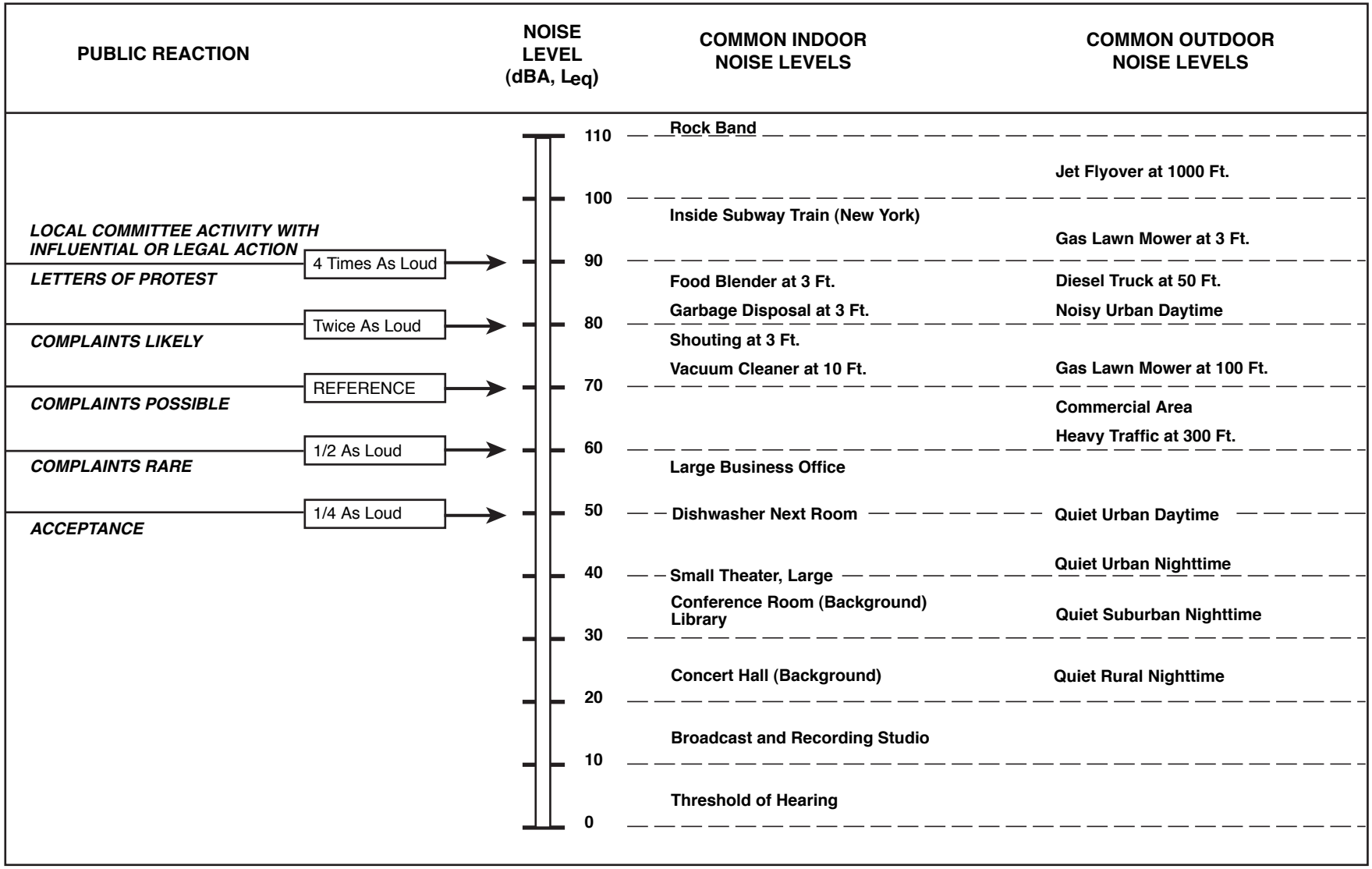
Lmax: the instantaneous maximum noise level for a specified period of time.

L10: the noise level that is equaled or exceeded 10 percent of the specified time period. The L10 is often considered the maximum noise level averaged over the specified time period.

L90: the noise level that is equaled or exceeded 90 percent of the specified time period. The L90 is often considered the background noise level averaged over the specified time period.

DNL (or Ldn): 24-hour day and night A-weighed noise exposure level which accounts for the greater sensitivity of most people to nighttime noise by weighting noise levels at night ("penalizing" nighttime noises). Noise between 10:00 p.m. and 7:00 a.m. is weighted (penalized) by adding 10 dBA to take into account the greater annoyance of nighttime noise.

CNEL: similar to the DNL, the Community Noise Equivalent Level adds a 5 dBA "penalty" for the evening hours between 7:00 p.m. and 10:00 p.m. in addition to a 10 dBA penalty between the hours of 10:00 p.m. and 7:00 a.m.



SOURCE: Caltrans Transportation Laboratory Noise Manual (1982)

Figure 2.11-1
Effects of Noise on People

Effects of Noise on People

The effects of noise on people can be placed in three categories:

- Subjective effects of annoyance and dissatisfaction;
- Interference with activities such as speech, sleep, learning; and
- Physiological effects such as hearing loss or sudden startling.

Environmental noise typically produces effects in the first two categories. Workers in industrial plants can experience noise in the last category. There is no completely satisfactory way to measure the subjective effects of noise, or the corresponding reactions of annoyance and dissatisfaction. A wide variation in individual thresholds of annoyance exists, and different tolerances to noise tend to develop based on an individual's past experiences with noise.

Thus, an important way of predicting a human reaction to a new noise environment is the way it compares to a baseline noise condition (typically the existing environment) to which one has adapted: the so called "ambient noise" level. In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise would be judged by those hearing it. With regard to increases in A-weighted noise level, the following relationships occur:

- under controlled conditions in an acoustics laboratory, the trained healthy human ear is able to discern changes in sound levels of 1 dBA;
- outside of such controlled conditions, the trained ear can detect changes of 2 dBA in normal environmental noise;
- It is widely accepted that the average healthy ear, however, can barely perceive noise level changes of 3 dBA;
- a change in level of 5 dBA is a readily perceptible increase in noise level; and
- a 10 dBA change is recognized as twice as loud as the original source (Caltrans, 1998).

These relationships occur in part because of the logarithmic nature of sound and the decibel system. Because the decibel scale is based on logarithms two noise sources do not combine in a simple linear fashion, but rather logarithmically. For example, if two identical noise sources produce noise levels of 50 dBA, the combined sound level would be 53 dBA, not 100 dBA.

Noise Attenuation

Stationary "point" sources of noise, including stationary mobile sources such as idling vehicles, attenuate (lessen) at a rate of 6 to 7.5 dBA per doubling of distance from the source, depending on environmental conditions (i.e., atmospheric conditions, ground conditions, and noise barriers). Widely distributed noises, such as a large industrial facility spread over many acres or a street with moving vehicles (a "line" source), would typically attenuate at a lower rate, approximately 3 to 4.5 dBA per doubling distance from the source (also dependent upon environmental conditions) (Caltrans, 1998). Noise from large construction sites would have characteristics of

both "point" and "line" sources, so attenuation would probably range between about 4.5 and 7.5 dBA per doubling of distance.

PROPOSED PROJECT

Noise measurements were collected at representative locations and are presented in the Proponent's Environmental Assessment (PEA) (Essex Environmental, 2003). Key noise parameters are presented in the Table 2.11-1. The San Francisco Land Use Compatibility Chart for Community Noise (San Francisco, 1999) identifies residential land uses as satisfactory when the Ldn is less than 60. In this context, satisfactory means satisfactory assuming that normal conventional construction is used in buildings. As indicated by the measurements, existing noise levels along the proposed route are at or above satisfactory noise levels for residential use. The proposed route is in a highly urban area with high noise levels, much of the noise being from vehicle traffic and buses.

TABLE 2.11-1
NOISE MEASUREMENTS ALONG PROPOSED PROJECT ROUTE

Location (Street intersections)	Noise Levels (dBA) Average (L_{eq})	Minimum (L_{eq})	Maximum (L_{eq})	Average (L_{50})	Average (L_{90})	Average (L_{dn})
Illinois and Humboldt	61.7	48.3	81.8	64.8	56.4	65.6
Cesar Chavez and Mississippi	73.8	61.21	93.4	70.8	65.3	77.8
Evans and Jennings	65.8	53.7	85.7	69.3	63.0	69.8

dBA A-weighted decibels
L_{eq} Equivalent sound level
L_{50} Sound Level at the 50th percentile
L_{90} Sound Level at the 90th percentile
L_{dn} day-night equivalent noise level

SOURCE: Essex Environmental. December 2003. PG&E Potrero to Hunters Point 115 kV Cable Project Proponent's Environmental Assessment. Chapter 12.

ALTERNATIVE 1

The existing noise levels along Alternative 1 are similar to the proposed project and typical of an urban setting. The Alternative 1 route is the shortest route and would have the least noise impact of the three routes.

ALTERNATIVE 2

The existing noise levels along Alternative 2 are similar to the proposed project and typical of an urban setting. The Alternative 2 route is less noise sensitive because a portion of the route is

along Cargo Way, which is less noise sensitive than the comparable portion of the proposed project that is on Evans Avenue.

ALTERNATIVE 3

The existing noise levels along Alternative 3 are similar to the proposed project and typical of an urban setting. The Alternative 3 route is the shortest route and would have the least noise impact of the three routes.

NO PROJECT ALTERNATIVE

The setting for the No Project Alternative is the same as current conditions since construction of a 2.5 mile cable project would not occur.

REGULATORY CONTEXT

General Plan of City and County of San Francisco

The San Francisco General Plan does not specifically address community noise issues as it relates to stationary sources. However, the Transportation Noise section of the Environmental Protection Element does include a table that lists acceptable noise levels with land use types. In Objective 11, "Promote Land Uses that are Compatible with Various Transportation Noise Levels," a table titled "Land Use Compatibility Chart for Community Noise" is included. In that table under Commercial Land Use, the stated noise level "Satisfactory, with no special noise insulation requirements" is a maximum 78 A-weighted decibels (dBA)-day-night equivalent noise level (L_{dn}).

San Francisco Police Code

The San Francisco Police Code, Article 29, "Regulation of Noise," states: "It is hereby declared to be the policy of the City and County to prohibit unnecessary, excessive, and offensive noise from all sources subject to its police power." Section 2901.11 defines unnecessary, excessive, or offensive noise as "…any sound or noise conflicting with the criteria, standards, or levels set forth in the Article for permissible noises. In the absence of specific maximum noise levels, a noise level which exceeds the ambient noise level by 5 dBA or more measured at the nearest property line…"

Article 29, "Regulation of Noise" of the San Francisco Police Code states in Section 2090, "Fixed Source Noise Level," that for property zoned M-2 (the area in which the project is located) "...it is unlawful for any person to operate any fixed machinery or equipment, or similar mechanical device in any manner so as to create any noise which would cause the noise level measured at the Property Line by noise emissions..." to exceed 75 dBA at any time.

Section 2907, "Construction Equipment" states: "…it shall be unlawful for any person, including the City and County of San Francisco, to operate any powered construction equipment, regardless

of age or date of acquisition, if the operation of such equipment emits noise at a level in excess of 85 dBA when measured at a distance of 100 feet from such equipment or an equivalent sound level at some other convenient distance." However, Subsection (c) states: "The provisions …of this Section shall not be applicable to impact tools and equipment, provided that …such impact tools and equipment shall have intake and exhaust mufflers recommended by the manufacturers thereof and approved by the Director of Public Works as best accomplishing maximum noise attenuation, and that pavement breakers and jackhammers shall also be quipped with acoustically attenuated shields or shrouds recommended by the manufactures…"

Section 2909, "Construction Work at Night" states: " It shall be unlawful for any person, between the hours of 8 p.m. of any day and 7 a.m. of the following day to erect, construct, demolish, excavate for, alter, or repair any building or structure if the noise level created thereby is in excess of the ambient noise level by 5 dBA at the nearest *property line*, unless a special permit...has been...granted..."

IMPACTS DISCUSSION OF NOISE

METHODOLOGY AND SIGNIFICANCE CRITERIA

The analysis of the potential intensity of impacts to noise was derived from noise data from like sources in the project area. This information was compared with the construction and design criteria of the proposed project and alternatives. To determine the significance of the impacts anticipated from the proposed project, the project's effects were evaluated as provided under the revised CEQA guidelines. These guidelines are summarized in the checklist provided at the beginning of this section.

PROPOSED PROJECT

Once constructed, the operational phase of the project would have a less than significant impact on community noise levels. The only change in noise would be a minimal increase in noise in the switchyards and the noise from vehicles during regular inspection of powerlines, instrumentation and control, and support systems.

Potentially significant noise impacts of the proposed project would be from construction required for the trench. Project ground disturbance would be limited to trenching activities between the Potrero and Hunters Point switchyards, and small excavations associated with foundation construction for new structures at the switchyards. Outside of the switchyards, all ground disturbing activities would be conducted in existing paved roadways, a parking lot, and a vacant lot.

The proposed project would come within 45 feet of apartments or condominiums on 25th Street, Minnesota Street and Cesar Chavez Street. Project equipment would generate high noise levels during trenching operations. Noisy equipment would include saw-cutting and pavement-breaking machines and jackhammers (used sparingly) to break up sections of concrete that the saw-cutting and pavement-breaking machines cannot reach; as well as, portable generators, air compressors

and backhoes. Table 2.11-2 shows typical noise levels of construction equipment and noise levels achievable with feasible controls. With the exception of the pile driver (not proposed for this project) all equipment noise levels could be reduced to 85 dBA or less at 100 feet, in compliance with the San Francisco Police Code.

TABLE 2.11-2
CONSTRUCTION EQUIPMENT NOISE LEVELS AND ABATEMENT POTENTIAL

Equipment	Noise Level (dBA) @ 50 Feet	With Feasible Noise Control[a]
Earthmoving		
Front Loader	79	75
Backhoe	85	75
Dozer	80	75
Tractor	80	75
Scraper	88	80
Grader	85	75
Paver	89	80
Materials Handling		
Concrete Mixer	85	75
Concrete Pump	82	75
Crane	83	75
Stationary		
Pump	76	75
Generator	78	75
Impact		
Pile Driver	101	95
Jack Hammer	88	75
Rock Drill	98	80
Pneumatic Tools	86	80
Other		
Saw	78	75
Vibrator	76	75

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

SOURCE: U.S. Environmental Protection Agency (1971)

In addition to trenching in the existing streets, there are three areas where the project may require three bores. The project may use either horizontal boring or directional drilling. Noise levels for these methods can be higher than trenching, but would still be subject to compliance with the San Francisco Police Code.

Mitigation Measure NOI-1:

The following mitigation measures, as provided in the PEA, would reduce project impacts from temporary construction activities to less than significant levels:

- **Intake and exhaust mufflers recommended by the manufacturers will be installed on impact tools and equipment.**
- **Pavement breakers and jack hammerers will be equipped with acoustically attenuated shields or shrouds recommended by the manufacturers.**
- **Standard practices, including directing exhausts away from buildings and shielding other equipment, will be implemented when feasible.**

Because project operational impacts will be less than significant, mitigation is not required.

Both trenching and boring involve heavy equipment that can produce vibrations. There are no Federal Highway Administration (FHWA) or state standards for vibrations. Table 12-5 from the PEA identifies vibration levels as low as 0.05 inches/second as causing potential damage to historic, un-reinforced buildings. Caltrans research had found that extreme construction activities such as pavement breaking and extensive pile driving can potentially damage buildings at distances of less than 25 feet from the source. Building damage from pavement breaking and extensive pile driving can also occur within 50 to 100 feet from the source for historical buildings, buildings in poor condition, or buildings previously damaged in earthquakes (Caltrans, 2002).

Mitigation Measure NOI-2: When high levels of construction vibration (such as demolition, and pavement breaking) are expected at residences or other buildings it is recommended that a detailed "crack survey" be undertaken before the start of construction activities. The survey may be done by photographs, video tape, or visual inventory, and should include inside as well as outside locations. All existing cracks in walls, floors, driveways, etc. should be documented with sufficient detail for comparison after construction to determine whether actual vibration damage has occurred. Such surveys should occur when extreme vibration is expected to occur within 25 feet of any building and within 50-100 feet of a historical building, or building in poor condition. The applicant would be responsible for any documented damage to structures.

The project construction would occur between 7 a.m. and 8 p.m., or during times set by the City and County of San Francisco in the Excavation Permit. If trenching work would cause traffic congestion, the City may require nighttime work to avoid traffic disruption.

Mitigation Measure NOI-3: If nighttime work is required, noise levels should be monitored at the nearest residential receptors and the short-term noise level at the exterior of the residential receptor should not exceed 65 dBA, Leq. No construction will take place within 100 feet of the residences on Minnesota Street at night (8 p.m. to 7 a.m.).

ALTERNATIVE 1

Implementation of Alternative 1 would result in impacts similar to the impacts resulting from the implementation of the proposed project, but the overall noise generation of construction would be less because of the shorter route. This route would have no impact on apartments and condominiums that would be affected by noise from the proposed project on Cesar Chavez Street, Minnesota Street, and 25th Street.

ALTERNATIVE 2

Implementation of Alternative 2 would result in impacts similar to the impacts resulting from the implementation of the proposed project.

ALTERNATIVE 3

Implementation of Alternative 3 would result in impacts similar to the impacts resulting from the implementation of the proposed project, but the overall noise generation of construction would be less because of the shorter route. This route would have no impact on apartments and condominiums that would be affected by noise from the proposed project on Cesar Chavez Street, Minnesota Street, and 25th Street.

NO PROJECT ALTERNATIVE

This alternative would avoid all noise impacts associated with the proposed project. Since the project site would remain in its current state, short-term construction noise, including traffic related noise, affecting adjacent sensitive receptors or surrounding land uses would not occur. In fact, impacts associated with noise would be less than the proposed project under a No Project Alternative.

CHECKLIST IMPACT CONCLUSIONS

a) The long-term operational impact of the project would not exceed 75 dBA at the property line (San Francisco Police Code Section 2090). The standard set of construction equipment used for the project would comply with Section 2907, the San Francisco Police Code for construction equipment noise (see also the discussion for impact (d) below)..

b) During construction, the project would involve temporary sources of localized groundborne vibration and groundborne noise from the operation of heavy equipment that could be perceptible at residences or other sensitive uses in the immediate vicinity of the construction (ref to land use map if applicable). However, since the duration of impact at any one location would be very limited and since the impact would occur during less sensitive daytime hours, the impact from construction-related groundborne vibration and groundborne noise would be less than significant on the residents. Mitigation Measure NOI-1 would reduce the potential impact to structures to a less than significant level.

Over the long-term (after construction), the project would not generate groundborne vibration and groundborne noise.

c) Once constructed, the operational phase of the project would have a less than significant impact on community noise levels. The only change in noise would be a minimal increase in noise in the switchyards and the noise from vehicles during regular inspection of powerlines, instrumentation and control, and support systems. These noise sources would not substantially increase ambient noise levels in the project area.

d) The project would result in substantial temporary increases in noise levels during the expected 9-month timeframe for construction. The construction noise impacts during the nine month construction period would move from one area to the next along the project route installing the powerline, so no location would experience increased noise from this project for more than one to two months. The anticipated noise levels would not be expected to exceed the limits of Article 29 (San Francisco Police Code Regulation of Noise), which limits construction noise to 85 decibels at a distance of 100 feet. The project construction would occur between 7 a.m. and 8 p.m., or during times set by the City and County of San Francisco in the Excavation Permit. If trenching work would cause traffic congestion, the City may require nighttime work to avoid traffic disruption. Mitigation Measure NOI-2 is required to mitigate potential noise impacts that could occur if nighttime construction is required. With implementation of Mitigation N-2 the impact would be less than significant for the proposed project or either alternative.

e) The nearest public airports are Metro Oakland International Airport and San Francisco International Airport. Both airports are more than five miles from the project area and do not generate excessive noise levels in the project area.

f) There are no private airstrips in the project vicinity.

REFERENCES – Noise

Caltrans, 1998. Technical Noise Supplement.

Caltrans, 2002. Transportation Related Earthborne Vibrations.

City and County of San Francisco, 1988. San Francisco Police Code, Article 29.

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