# *GLENVIEW HIGHLANDS PROJECT NOISE AND VIBRATION ASSESSMENT*

## *San Bruno, California*

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## INTRODUCTION

In April 2021, an Initial Study/Mitigated Negative Declaration was prepared for the Glenview Highlands Project located in the northeast corner of the San Bruno Avenue West and Glenview Drive intersection in San Bruno, California.[1] The project site consists of three parcels totaling 3.28 acres, and the northern parcel is currently developed with a parking lot, a vacant church, and a vacant single-family residence. The approved project consisted of 29 single-family residences. The current project proposed to increase the density of residential development on the site to allow for the construction of 58 multi-family residences.

This report evaluates the project's potential to result in significant impacts with respect to applicable California Environmental Quality Act (CEQA) guidelines. The report is divided into three sections: 1) the Setting Section provides a brief description of the fundamentals of environmental noise and groundborne vibration, summarizes applicable regulatory criteria, and discusses ambient noise conditions in the project vicinity; 2) the Plan Consistency Analysis section discusses noise and land use compatibility utilizing policies in the City's General Plan; and 3) the Impacts and Mitigation Measures Section describes the significance criteria used to evaluate project impacts, provides a discussion of each project impact, and presents mitigation measures, where necessary, to mitigate project impacts to a less-than-significant level.

## SETTING

### Fundamentals of Environmental Noise

Noise may be defined as unwanted sound. Noise is usually objectionable because it is disturbing or annoying. The objectionable nature of sound could be caused by its *pitch* or its *loudness*. *Pitch* is the height or depth of a tone or sound, depending on the relative rapidity (*frequency*) of the vibrations by which it is produced. Higher pitched signals sound louder to humans than sounds with a lower pitch. *Loudness* is the intensity of sound waves combined with the reception characteristics of the ear. Intensity may be compared with the height of an ocean wave in that it is a measure of the amplitude of the sound wave.

In addition to the concepts of pitch and loudness, there are several noise measurement scales which are used to describe noise in a particular location. A *decibel (dB)* is a unit of measurement which indicates the relative amplitude of a sound. The zero on the decibel scale is based on the lowest sound level that the healthy, unimpaired human ear can detect. Sound levels in decibels are calculated on a logarithmic basis. An increase of 10 decibels represents a ten-fold increase in acoustic energy, while 20 decibels is 100 times more intense, 30 decibels is 1,000 times more intense, etc. There is a relationship between the subjective noisiness or loudness of a sound and its intensity. Each 10 decibel increase in sound level is perceived as approximately a doubling of loudness over a fairly wide range of intensities. Technical terms are defined in Table 1.

There are several methods of characterizing sound. The most common in California is the *A-weighted sound level (dBA).* This scale gives greater weight to the frequencies of sound to which

[1] Raney Planning & Management, Inc., "Glenview Terrace Project Initial Study/Mitigated Negative Declaration," April 2021.

the human ear is most sensitive. Representative outdoor and indoor noise levels in units of dBA are shown in Table 2. Because sound levels can vary markedly over a short period of time, a method for describing either the average character of the sound or the statistical behavior of the variations must be utilized. Most commonly, environmental sounds are described in terms of an average level that has the same acoustical energy as the summation of all the time-varying events. This *energy-equivalent sound/noise descriptor* is called $L_{eq}$. The most common averaging period is hourly, but $L_{eq}$ can describe any series of noise events of arbitrary duration.

The scientific instrument used to measure noise is the sound level meter. Sound level meters can accurately measure environmental noise levels to within plus or minus 1 dBA. Various computer models are used to predict environmental noise levels from sources, such as roadways and airports. The accuracy of the predicted models depends upon the distance the receptor is from the noise source. Close to the noise source, the models are accurate to within about plus or minus 1 to 2 dBA.

Since the sensitivity to noise increases during the evening and at night -- because excessive noise interferes with the ability to sleep -- 24-hour descriptors have been developed that incorporate artificial noise penalties added to quiet-time noise events. The *Community Noise Equivalent Level* (*CNEL*) is a measure of the cumulative noise exposure in a community, with a 5 dB penalty added to evening (7:00 pm - 10:00 pm) and a 10 dB addition to nocturnal (10:00 pm - 7:00 am) noise levels. The *Day/Night Average Sound Level* (*DNL* or $L_{dn}$) is essentially the same as CNEL, with the exception that the evening time period is dropped and all occurrences during this three-hour period are grouped into the daytime period.

**Effects of Noise**

*Sleep and Speech Interference*

The thresholds for speech interference indoors are about 45 dBA if the noise is steady and above 55 dBA if the noise is fluctuating. Outdoors the thresholds are about 15 dBA higher. Steady noises of sufficient intensity (above 35 dBA) and fluctuating noise levels above about 45 dBA have been shown to affect sleep. Interior residential standards for multi-family dwellings are set by the State of California at 45 dBA $L_{dn}$. Typically, the highest steady traffic noise level during the daytime is about equal to the $L_{dn}$ and nighttime levels are 10 dBA lower. The standard is designed for sleep and speech protection and most jurisdictions apply the same criterion for all residential uses. Typical structural attenuation is 12 to 17 dBA with open windows. With closed windows in good condition, the noise attenuation factor is around 20 dBA for an older structure and 25 dBA for a newer dwelling. Sleep and speech interference is therefore possible when exterior noise levels are about 57 to 62 dBA $L_{dn}$ with open windows and 65 to 70 dBA $L_{dn}$ if the windows are closed. Levels of 55 to 60 dBA are common along collector streets and secondary arterials, while 65 to 70 dBA is a typical value for a primary/major arterial. Levels of 75 to 80 dBA are normal noise levels at the first row of development outside a freeway right-of-way. In order to achieve an acceptable interior noise environment, bedrooms facing secondary roadways need to be able to have their windows closed, those facing major roadways and freeways typically need special glass windows.

*Annoyance*

Attitude surveys are used for measuring the annoyance felt in a community for noises intruding into homes or affecting outdoor activity areas. In these surveys, it was determined that the causes for annoyance include interference with speech, radio and television, house vibrations, and interference with sleep and rest. The $L_{dn}$ as a measure of noise has been found to provide a valid correlation of noise level and the percentage of people annoyed. People have been asked to judge the annoyance caused by aircraft noise and ground transportation noise. There continues to be disagreement about the relative annoyance of these different sources. When measuring the percentage of the population highly annoyed, the threshold for ground vehicle noise is about 50 dBA $L_{dn}$. At a $L_{dn}$ of about 60 dBA, approximately 12 percent of the population is highly annoyed. When the $L_{dn}$ increases to 70 dBA, the percentage of the population highly annoyed increases to about 25 to 30 percent of the population. There is, therefore, an increase of about 2 percent per dBA between a $L_{dn}$ of 60 to 70 dBA. Between a $L_{dn}$ of 70 to 80 dBA, each decibel increase increases by about 3 percent the percentage of the population highly annoyed. People appear to respond more adversely to aircraft noise. When the $L_{dn}$ is 60 dBA, approximately 30 to 35 percent of the population is believed to be highly annoyed. Each decibel increase to 70 dBA adds about 3 percentage points to the number of people highly annoyed. Above 70 dBA, each decibel increase results in about a 4 percent increase in the percentage of the population highly annoyed.

**TABLE 1 Definition of Acoustical Terms Used in this Report**

| Term | Definition |
|---|---|
| Decibel, dB | A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure. The reference pressure for air is 20 micro Pascals. |
| Sound Pressure Level | Sound pressure is the sound force per unit area, usually expressed in micro Pascals (or 20 micro Newtons per square meter), where 1 Pascal is the pressure resulting from a force of 1 Newton exerted over an area of 1 square meter. The sound pressure level is expressed in decibels as 20 times the logarithm to the base 10 of the ratio between the pressures exerted by the sound to a reference sound pressure (e. g., 20 micro Pascals). Sound pressure level is the quantity that is directly measured by a sound level meter. |
| Frequency, Hz | The number of complete pressure fluctuations per second above and below atmospheric pressure. Normal human hearing is between 20 Hz and 20,000 Hz. Infrasonic sound are below 20 Hz and Ultrasonic sounds are above 20,000 Hz. |
| A-Weighted Sound Level, dBA | The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise. |
| Equivalent Noise Level, $L_{eq}$ | The average A-weighted noise level during the measurement period. |
| $L_{max}$, $L_{min}$ | The maximum and minimum A-weighted noise level during the measurement period. |
| $L_{01}$, $L_{10}$, $L_{50}$, $L_{90}$ | The A-weighted noise levels that are exceeded 1%, 10%, 50%, and 90% of the time during the measurement period. |
| Day/Night Noise Level, $L_{dn}$ or DNL | The average A-weighted noise level during a 24-hour day, obtained after addition of 10 decibels to levels measured in the night between 10:00 pm and 7:00 am. |
| Community Noise Equivalent Level, CNEL | The average A-weighted noise level during a 24-hour day, obtained after addition of 5 decibels in the evening from 7:00 pm to 10:00 pm and after addition of 10 decibels to sound levels measured in the night between 10:00 pm and 7:00 am. |
| Ambient Noise Level | The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location. |
| Intrusive | That noise which intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level. |

Source: Handbook of Acoustical Measurements and Noise Control, Harris, 1998.

**TABLE 2 Typical Noise Levels in the Environment**

| Common Outdoor Activities | Noise Level (dBA) | Common Indoor Activities |
|---|---|---|
| | 110 dBA | Rock band |
| Jet fly-over at 1,000 feet | | |
| | 100 dBA | |
| Gas lawn mower at 3 feet | | |
| | 90 dBA | |
| Diesel truck at 50 feet at 50 mph | | Food blender at 3 feet |
| | 80 dBA | Garbage disposal at 3 feet |
| Noisy urban area, daytime | | |
| Gas lawn mower, 100 feet | 70 dBA | Vacuum cleaner at 10 feet |
| Commercial area | | Normal speech at 3 feet |
| Heavy traffic at 300 feet | 60 dBA | |
| | | Large business office |
| Quiet urban daytime | 50 dBA | Dishwasher in next room |
| Quiet urban nighttime | 40 dBA | Theater, large conference room |
| Quiet suburban nighttime | | |
| | 30 dBA | Library |
| Quiet rural nighttime | | Bedroom at night, concert hall (background) |
| | 20 dBA | |
| | | Broadcast/recording studio |
| | 10 dBA | |
| | 0 dBA | |

Source: Technical Noise Supplement (TeNS), California Department of Transportation, September 2013.

**Fundamentals of Groundborne Vibration**

Ground vibration consists of rapidly fluctuating motions or waves with an average motion of zero. Several different methods are typically used to quantify vibration amplitude. One method is the Peak Particle Velocity (PPV). The PPV is defined as the maximum instantaneous positive or negative peak of the vibration wave. In this report, a PPV descriptor with units of mm/sec or in/sec is used to evaluate construction generated vibration for building damage and human complaints. Table 3 displays the reactions of people and the effects on buildings that continuous or frequent intermittent vibration levels produce. The guidelines in Table 3 represent syntheses of vibration criteria for human response and potential damage to buildings resulting from construction vibration.

Construction activities can cause vibration that varies in intensity depending on several factors. The use of pile driving and vibratory compaction equipment typically generates the highest construction related groundborne vibration levels. Because of the impulsive nature of such activities, the use of the PPV descriptor has been routinely used to measure and assess groundborne vibration and almost exclusively to assess the potential of vibration to cause damage and the degree of annoyance for humans.

The two primary concerns with construction-induced vibration, the potential to damage a structure and the potential to interfere with the enjoyment of life, are evaluated against different vibration limits. Human perception to vibration varies with the individual and is a function of physical setting and the type of vibration. Persons exposed to elevated ambient vibration levels, such as people in an urban environment, may tolerate a higher vibration level.

Structural damage can be classified as cosmetic only, such as paint flaking or minimal extension of cracks in building surfaces; minor, including limited surface cracking; or major, that may threaten the structural integrity of the building. Safe vibration limits that can be applied to assess the potential for damaging a structure vary by researcher. The damage criteria presented in Table 3 include several categories for ancient, fragile, and historic structures, the types of structures most at risk to damage. Most buildings are included within the categories ranging from “Historic and some old buildings” to “Modern industrial/commercial buildings”. Construction-induced vibration that can be detrimental to the building is very rare and has only been observed in instances where the structure is at a high state of disrepair and the construction activity occurs immediately adjacent to the structure.

The annoyance levels shown in Table 3 should be interpreted with care since vibration may be found to be annoying at lower levels than those shown, depending on the level of activity or the sensitivity of the individual. To sensitive individuals, vibrations approaching the threshold of perception can be annoying. Low-level vibrations frequently cause irritating secondary vibration, such as a slight rattling of windows, doors, or stacked dishes. The rattling sound can give rise to exaggerated vibration complaints, even though there is very little risk of actual structural damage.

**TABLE 3 Reaction of People and Damage to Buildings from Continuous or Frequent Intermittent Vibration Levels**

| Velocity Level, PPV (in/sec) | Human Reaction | Effect on Buildings |
|---|---|---|
| 0.01 | Barely perceptible | No effect |
| 0.04 | Distinctly perceptible | Vibration unlikely to cause damage of any type to any structure |
| 0.08 | Distinctly perceptible to strongly perceptible | Recommended upper level of the vibration to which ruins and ancient monuments should be subjected |
| 0.1 | Strongly perceptible | Threshold at which there is a risk of damage to fragile buildings with no risk of damage to most buildings |
| 0.25 | Strongly perceptible to severe | Threshold at which there is a risk of damage to historic and some old buildings. |
| 0.3 | Strongly perceptible to severe | Threshold at which there is a risk of damage to older residential structures |
| 0.5 | Severe - Vibrations considered unpleasant | Threshold at which there is a risk of damage to new residential and modern commercial/industrial structures |

Source: Transportation and Construction Vibration Guidance Manual, California Department of Transportation, April 2020.

## Regulatory Background – Noise

This section describes the relevant guidelines, policies, and standards established by State Agencies, San Mateo County, and the City of San Bruno. The State CEQA Guidelines, Appendix G, are used to assess the potential significance of impacts pursuant to local General Plan policies or the applicable standards of other agencies. A summary of the applicable regulatory criteria is provided below.

### State of California

***State CEQA Guidelines.*** The California Environmental Quality Act (CEQA) contains guidelines to evaluate the significance of effects of environmental noise attributable to a proposed project. Under CEQA, noise impacts would be considered significant if the project would result in:

(a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;

(b) Generation of excessive groundborne vibration or groundborne noise levels;

(c) For a project located within the vicinity of a private airstrip or 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, if the project would expose people residing or working in the project area to excessive noise levels.

***2022 California Building Code, Title 24, Part 2.*** The current version of the California Building Code (CBC) requires interior noise levels in multi-family residential units attributable to exterior environmental noise sources to be limited to a level not exceeding 45 dBA DNL/CNEL in any habitable room.

**San Mateo County**

***Comprehensive Airport Land Use Compatibility Plan for the Environs of San Francisco International Airport, November 2012.*** Noise compatibility policies established in this document were designed to protect the public health, safety, and welfare by minimizing the exposure of residents and occupants of future noise-sensitive development to excessive noise and to protect the public interest in providing for the orderly development of SFO by ensuring that new development in the Airport environs complies with all requirements necessary to ensure compatibility with aircraft noise in the area. The intent is to avoid the introduction of new incompatible land uses into the Airport's "noise impact area" so that the Airport will continue to be in compliance with the State Noise Standards for airports (California Code of Regulations, Title 21, Sections 5012 and 5014).[2] The following noise compatibility policies (NP) shall apply to the ALUCP and are applicable to this project:

*NP-1: Noise Compatibility Zones.* For the purposes of this ALUCP, the projected 2020 CNEL noise contour map from the Draft Environmental Assessment for the Proposed Runway Safety Area Program shall define the boundaries within which noise compatibility policies described in this Section shall apply.[3] Exhibit IV-5 depicts the noise compatibility zones. More detail is provided on Exhibit IV-6. The zones are defined by the CNEL 65, 70 and 75 dB contours.

*NP-2: Airport Noise/Land Use Compatibility Criteria.* The compatibility of proposed land uses located in the Airport noise compatibility zones shall be determined according to the noise/land use compatibility criteria shown in Table IV-1. The criteria indicate the maximum acceptable airport noise levels, described in terms of Community Noise Equivalent Level (CNEL), for the indicated land uses. The compatibility criteria indicate whether a proposed land use is "compatible," "conditionally compatible," or "not compatible" within each zone, designated by the identified CNEL ranges.

- "Compatible" means that the proposed land use is compatible with the CNEL level indicated in the table and may be permitted without any special requirements related to the attenuation of aircraft noise.

- "Conditionally compatible" means that the proposed land use is compatible if the conditions described in Table IV-1 are met.

- "Not compatible" means that the proposed land use is incompatible with aircraft noise at the indicated CNEL level.

2 In 2002, the San Mateo County Board of Supervisors declared that the Airport had eliminated its "noise impact area," as defined under state law -- California Code of Regulations, Title 21, Sections 5012 and 5014.

3 URS Corporation and BridgeNet International. Draft Environmental Assessment, Proposed Runway Safety Area Program, San Francisco International Airport, June 2011.

*NP-3: Grant of Avigation Easement.* Any action that would either permit or result in the development or construction of a land use considered to be conditionally compatible with aircraft noise of CNEL 65 dB or greater shall be subject to this easement requirement. The determination of conditional compatibility shall be based on the criteria presented in Table IV-1 "Noise/Land Use Compatibility Criteria."

The San Mateo County Airport Land Use Commission (the C/CAG Board) deems it necessary to: (1) ensure the unimpeded use of airspace in the vicinity of SFO; (2) to ensure that new noise-sensitive land uses within the CNEL 65 dB contour are made compatible with aircraft noise, in accordance with California Code of Regulations, Title 21, Section 5014; and (3) to provide notice to owners of real property near the Airport of the proximity to SFO and of the potential impacts that could occur on the property from airport/aircraft operations. Thus, C/CAG shall condition its approval of proposed development upon the owner of the subject property granting an avigation easement to the City and County of San Francisco, as the proprietor of SFO. The local government with the ultimate permitting and approval authority over the proposed development shall ensure that this condition is implemented prior to final approval of the proposed development. If the approval action for the proposed development includes construction of a building(s) and/or other structures, the local permitting authority shall require the grant of an avigation easement to the City and County of San Francisco prior to issuance of a building permit(s) for the proposed building or structure. If the proposed development is not built, then, upon notice by the local permitting authority, SFO shall record a notice of termination of the avigation easement.

The avigation easement to be used in fulfilling this condition is presented in Appendix G.

*NP-4: Residential Uses Within CNEL 70 dB Contour.* As described in Table IV-1, residential uses are not compatible in areas exposed to noise above CNEL 70 dB and typically should not be allowed in these high noise areas.

> *NP-4.1: Situations Where Residential Use Is Conditionally Compatible.* Residential uses are considered conditionally compatible in areas exposed to noise above CNEL 70 dB only if the proposed use is on a lot of record zoned exclusively for residential use as of the effective date of the ALUCP. In such a case, the residential use must be sound-insulated to achieve an indoor noise level of CNEL 45 dB or less from exterior sources. The property owner also shall grant an avigation easement to the City and County of San Francisco in accordance with Policy NP-3 prior to issuance of a building permit for the proposed building or structure.

## Table IV-1 Noise/Land Use Compatibility Criteria

| | COMMUNITY NOISE EQUIVALENT LEVEL (CNEL) | | | |
|---|---|---|---|---|
| **LAND USE** | **BELOW 65 dB** | **65-70 dB** | **70-75 dB** | **75 dB AND OVER** |
| **Residential** | | | | |
| Residential, single family detached | Y | C | N *(a)* | N |
| Residential, multi-family and single family attached | Y | C | N *(a)* | N |
| Transient lodgings | Y | C | C | N |
| **Public/Institutional** | | | | |
| Public and Private Schools | Y | C | N | N |
| Hospitals and nursing homes | Y | C | N | N |
| Places of public assembly, including places of worship | Y | C | N | N |
| Auditoriums, and concert halls | Y | C | C | N |
| Libraries | Y | C | C | N |
| Outdoor music shells, amphitheaters | Y | N | N | N |
| **Recreational** | | | | |
| Outdoor sports arenas and spectator sports | Y | Y | Y | N |
| Nature exhibits and zoos | Y | Y | N | N |
| Amusements, parks, resorts and camps | Y | Y | Y | N |
| Golf courses, riding stables, and water recreation | Y | Y | Y | Y |
| **Commercial** | | | | |
| Offices, business and professional, general retail | Y | Y | Y | Y |
| Wholesale; retail building materials, hardware, farm equipment | Y | Y | Y | Y |
| **Industrial and Production** | | | | |
| Manufacturing | Y | Y | Y | Y |
| Utilities | Y | Y | Y | Y |
| Agriculture and forestry | Y | Y *(b)* | Y *(c)* | Y *(c)* |
| Mining and fishing, resource production and extraction | Y | Y | Y | Y |

Notes:

CNEL = Community Noise Equivalent Level, in A-weighted decibels.

Y (Yes) = Land use and related structures compatible without restrictions.

C (conditionally compatible) = Land use and related structures are permitted, provided that sound insulation is provided to reduce interior noise levels from exterior sources to CNEL 45 dB or lower and that an avigation easement is granted to the City and County of San Francisco as operator of SFO. See Policy NP-3.

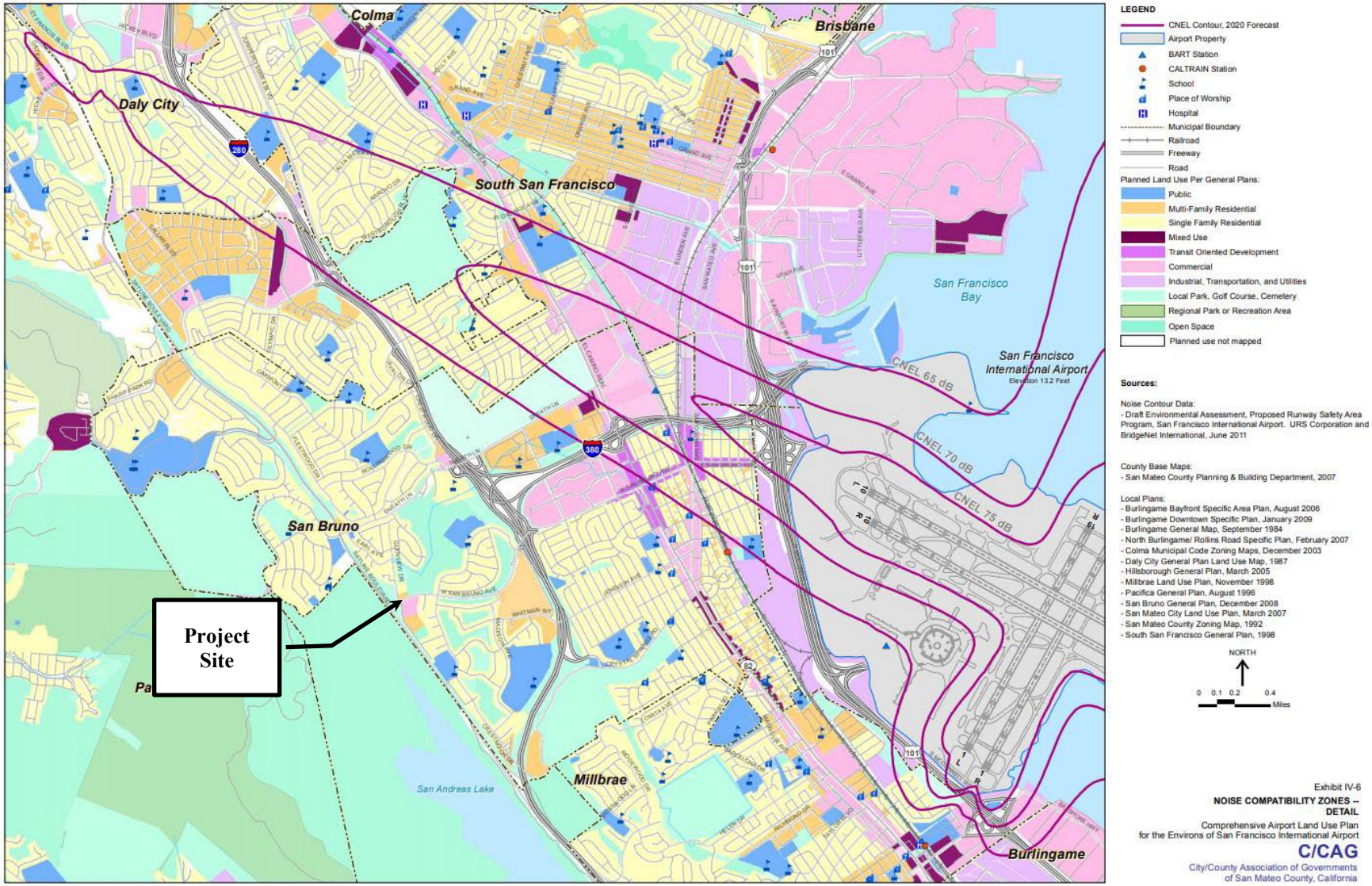
N (No) = Land use and related structures are not compatible..

*(a)* Use is conditionally compatible only on an existing lot of record zoned only for residential use as of the effective date of the ALUCP. Use must be sound-insulated to achieve an indoor noise level of CNEL 45 dB or less from exterior sources. The property owners shall grant an avigation easement to the City and County of San Francisco prior to issuance of a building permit for the proposed building or structure. If the proposed development is not built, then, upon notice by the local permitting authority, SFO shall record a notice of termination of the avigation easement.

*(b)* Residential buildings must be sound-insulated to achieve an indoor noise level of CNEL 45 dB or less from exterior sources.

*(c)* Accessory dwelling units are not compatible.

SOURCES: Jacobs Consultancy Team 2010. Based on State of California General Plan Guidelines for noise elements of general plans; California Code of Regulations, Title 21, Division 2.5, Chapter 6, Section 5006; and 14 CFR Part 150, Appendix A, Table 1.
PREPARED BY; Ricondo & Associates, Inc., June 2012.




Source: Comprehensive Airport Land Use Compatibility Plan for the Environs of San Francisco International Airport, November 2012, accessed via https://ccag.ca.gov/wp-content/uploads/2014/10/Consolidated_CCAG_ALUCP_November-20121.pdf June 2021.

**City of San Bruno**

***City of San Bruno General Plan.*** The City of San Bruno's General Plan includes a Noise section within the Health and Safety Element which provides guidelines to achieve the goal of maintaining an acceptable community noise level. The following general plan policies are applicable to the project:

HS-32 Encourage developers to mitigate ambient noise levels adjacent to major noise sources by incorporating acoustical site planning into their projects. Utilize the City's Building Code to implement mitigation measures, such as:

- Incorporating buffers and/or landscaped berms along high-noise roadways or railways;
- Incorporating traffic calming measures and alternative intersection design within and/or adjacent to the project;
- Using reduced-noise pavement (rubberized asphalt); and
- Incorporating state-of-the-art structural sound attenuation measures.

HS-33 Prevent the placement of new noise-sensitive uses unless adequate mitigation is provided. Establish insulation requirements as mitigation measures for all development, per the standards in Table 7-1.

HS-34 Discourage noise-sensitive uses such as hospitals, schools, and rest homes from locating in areas with high noise levels. Conversely, discourage new uses likely to produce high levels of noise from locating in areas where noise-sensitive uses would be impacted.

HS-35 Require developers to comply with relevant noise insulation standards contained in Title 24 of the California Code of Regulations (Part 2, Appendix Chapter 12A).

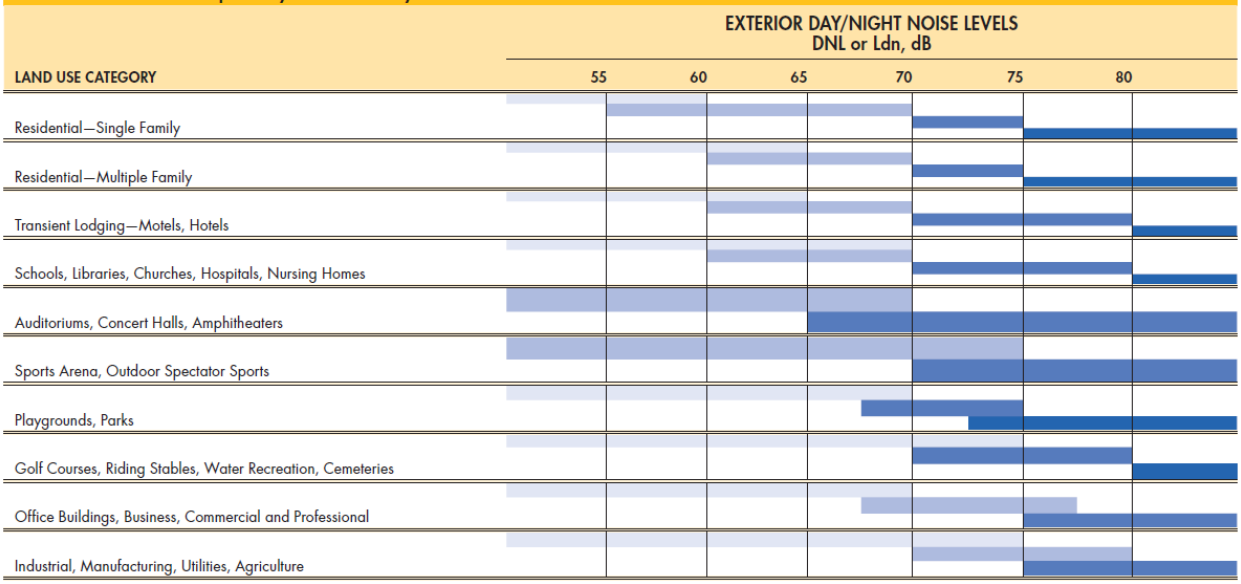
HS-38 Require developers to mitigate noise exposure to sensitive receptors from construction activities. Mitigation may include a combination of techniques that reduce noise generated at the source, increase the noise insulation at the receptor, or increase the noise attenuation rate as noise travels from the source to the receptor.

**TABLE 7-1: San Mateo County Comprehensive Airport Land Use Plan Noise/Land Use Compatibility Standards**

| LAND USE | GENERAL LAND USE CRITERIA, CNELA | | |
|---|---|---|---|
| | **COMPATIBLE** *No special noise insulation requirements for new construction* | **CONDITIONALLY COMPATIBLE** *New development should be undertaken only after analysis and including needed noise insulation features in design* | **INCOMPATIBLE** *New construction should not be undertaken unless related to airport activities or services. Special noise insulation features should be included in construction* |
| RESIDENTIAL: single- and multi-family, mobile homes, schools, libraries, churches, hospitals, nursing homes, and auditoriums | Less than 65 | 65 to 70 | More than 70 |
| COMMERCIAL: retail, restaurants, office buildings, hotels, motels, movie theaters, sports arenas, playgrounds, cemeteries, and golf courses | Less than 70 | 70 to 80 | More than 80 |
| INDUSTRIAL: manufacturing, transportation, communications, and utilities | Less than 75 | 75 to 85 | More than 85 |
| OPEN SPACE: agriculture, mining, fishing | Less than 75 | NA | More than 75 |

*Source: San Mateo County Airport Land Use Commission, San Mateo County Comprehensive Airport Land Use Plan, December 1996.*

**TABLE 7-2: Land Use Compatibility For Community Noise Environments**




INTERPRETATION

| | |
|---|---|
| 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. |
| 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 not be undertaken. |

***City of San Bruno Municipal Code.*** San Bruno's Noise Ordinance is contained in Title 6 of the San Bruno Municipal Code. The ordinance places limits on noise levels in residential zones, limits construction activity noise levels and hours near residential zones, establishes machinery noise level limits, and addresses amplified sounds. The following ordinances are applicable to the project:

> 6.16.030 Ambient noise level limits. Where the ambient noise level is less than designated in this section, the respective noise level in this section shall govern.
>
> Sound Level A, decibels
>
> Residential zone, time ten p.m. to seven a.m., forty-five decibels; seven a.m. to ten p.m., sixty decibels. (Ord. 1354 § 1; prior code § 16-4.3)
>
> 6.16.050 Noise levels exceeding ambient base level. Any noise level exceeding the zone ambient base level at the property plane of any property, or exceeding the zone ambient base level on any adjacent residential area zone line or at any place of other property (or, if a condominium or apartment house, within any adjoining apartment) by more than ten decibels shall be deemed to be prima facie evidence of a violation of the provisions of this chapter. However, during the period of seven a.m. to ten p.m. the ambient base level may be exceeded by twenty decibels for a period not to exceed thirty minutes during any twenty-four-hour period.

6.16.060 Machinery noise levels. No person shall operate any machinery, equipment, pump, fan, air conditioning apparatus or similar mechanical device in any manner so as to create any noise which would cause the noise level at the property plane of any property to exceed the ambient base noise level by more than ten decibels. However, during the period of seven a.m. to ten p.m. the ambient noise level may be exceeded by twenty decibels for a period not to exceed thirty minutes during any twenty-four-hour period.

6.16.070 Construction of buildings and projects. No person shall, within any residential zone, or within a radius of five hundred feet therefrom, operate equipment or perform any outside construction or repair work on any building, structure, or other project, or operate any pile driver, power shovel, pneumatic hammer, derrick, power hoist, or any other construction-type device which shall exceed, between the hours of seven a.m. and ten p.m., a noise level of eighty-five decibels as measured at one hundred feet, or exceed between the hours of ten p.m. and seven a.m. a noise level of sixty decibels as measured at one hundred feet, unless such person shall have first obtained a permit therefor from the director of public works. No permit shall be required to perform emergency work.

**Regulatory Background – Vibration**

***California Department of Transportation.*** Caltrans identifies a vibration threshold of 0.5 in/sec PPV for buildings structurally sound and designed to modern engineering standards, 0.3 in/sec PPV for buildings that are found to be structurally sound but where structural damage is a major concern, and a conservative limit of 0.25 in/sec PPV for historic and some old buildings (see Table 3).

**Existing Noise Environment**

The project site is located in the northeast corner of the San Bruno Avenue West and Glenview Drive intersection in San Bruno, California. The project site is bound to the north by existing residential uses and to the east by dense vegetation. Other surrounding land uses include a shopping center and gas station to the south, opposite San Bruno Avenue West; and a vacant lot and the Earland Glenview Park to the west, opposite Glenview Drive.

The existing noise environment at the site results primarily from traffic noise along San Bruno Avenue West and nearby Skyline Boulevard. Local traffic along Glenview Drive and aircraft associated with San Francisco International Airport also contribute to the noise environment.

A noise monitoring survey was completed by *J.C. Brennan & Associates, Inc.* between September 10, 2019, and September 11, 2019.[4] One long-term (LT-1) and two short-term (ST-1 and ST-2) noise measurements were made as part of the monitoring survey and are shown in Figure 1.

Long-term noise measurement LT-1 was in the north-central portion of the site, approximately 185 feet north of the centerline of San Bruno Avenue West and approximately 145 feet east of the centerline of Glenview Drive. Noise levels at LT-1 were dominated by traffic along San Bruno Avenue West. The average hourly $L_{eq}$ during daytime hours (7:00 a.m. and 10:00 p.m.) was 58

[4] J.C. Brennan & Associates, Inc., "Glenview Terrace Environmental Noise Assessment," March 17, 2021.

dBA and during nighttime hours (10:00 p.m. and 7:00 a.m.) was 53 dBA. The average $L_{50}$ was 54 dBA during daytime hours and 51 dBA during nighttime hours. The day-night average noise level calculated from Tuesday, September 10, 2019, to Wednesday, September 11, 2019, was 60 dBA $L_{dn}$. Appendix A provides additional noise level information and the daily trends of LT-1, which was included in the 2019 study.

Short-term noise measurements were made on Tuesday, September 10, 2019, between 11:20 a.m. and 12:10 p.m. Results of the measurements are summarized in Table 4.

**TABLE 4 Summary of Short-Term Noise Measurements (dBA)**

| Noise Measurement Location | Date, Time | Measured Noise Level, dBA | | | Primary Noise Source |
|---|---|---|---|---|---|
| | | $L_{max}$ | $L_{(50)}$ | $L_{eq}$ | |
| ST-1: ~45 feet east of the Glenview Drive centerline | 9/10/2019 at 11:20 a.m. | 65 | 56 | 57 | Glenview Drive |
| ST-2: ~65 feet north of the San Bruno Avenue West centerline | 9/10/2019 at 11:55 a.m. | 76 | 58 | 60 | San Bruno Avenue West |

Source: J.C. Brennan & Associates, Inc., 2019.

**FIGURE 1 Aerial Image of the Project Site and Surrounding Area with Long- and Short-Term Measurement Locations Identified**


Source: Google Earth, 2023.

## PLAN CONSISTENCY ANALYSIS

### Noise and Land Use Compatibility

Table 7-2 of the City of San Bruno General Plan includes general land use criteria for compatibility with noise environments. The applicable General Plan criteria and other policies were presented in detail in the Regulatory Background section and are summarized below for the proposed project:

- The City's acceptable exterior noise level standard is 65 dBA $L_{dn}$ or less for the proposed multi-family residential land uses.

- The State of California's acceptable interior noise level standard is 45 dBA $L_{dn}$ or less for the proposed residential land uses.

The future noise environment at the site would continue to result primarily from vehicular traffic along San Bruno Avenue West and nearby Skyline Boulevard. A traffic study was completed in 2019 by *DKS Traffic Consultants*, which resulted in up to a 2 dBA $L_{dn}$ increase over existing conditions along the nearby Skyline Boulevard. This 2 dBA $L_{dn}$ increase is assumed at the project site under worst-case conditions.

*Future Exterior Noise Environment*

The site plan shows two ground-level common use outdoor areas associated with the proposed project. A park area is shown on the interior of the site, between Buildings A, C, and D. A picnic area is shown in the northeastern corner of the project site as well. Both outdoor use areas would be well-shielded from all surrounding roadways. Future exterior noise levels at the center of the park and picnic areas would be below 65 dBA $L_{dn,}$ meeting the City's normally acceptable threshold for multi-family residential uses.

*Future Interior Noise Environment*

Standard residential construction provides approximately 15 dBA of exterior-to-interior noise reduction, assuming the windows are partially open for ventilation. Standard construction with the windows closed provides approximately 20 to 25 dBA of noise reduction in interior spaces. Where exterior noise levels range from 60 to 65 dBA $L_{dn}$, the inclusion of adequate forced-air mechanical ventilation is often the method selected to reduce interior noise levels to acceptable levels by closing the windows to control noise. Where noise levels exceed 65 dBA $L_{dn}$, forced-air mechanical ventilation systems and sound-rated construction methods are normally required. Such methods or materials may include a combination of smaller window and door sizes as a percentage of the total building façade facing the noise source, sound-rated windows and doors, sound rated exterior wall assemblies, and mechanical ventilation so windows may be kept closed at the occupant's discretion.

The southern façades of Buildings A and B would face San Bruno Avenue West, with setbacks of approximately 50 feet from the centerline. At this distance, the units facing San Bruno Avenue

West would be exposed to future exterior noise levels up to 69 dBA $L_{dn}$. Assuming windows to be partially open, future interior noise levels in these units would be up to 54 dBA $L_{dn}$.

The second row of buildings (i.e., Buildings C, D, and I) would be setback by 130 to 215 feet from the centerline of San Bruno Avenue West and would be partially shielded by Buildings A and B. Additionally, the western façade of Building C would be exposed to traffic noise along Glenview Drive, with setbacks of approximately 40 feet from the centerline. At these distances, the townhomes would be exposed to future exterior noise levels ranging from below 60 to 66 dBA $L_{dn}$. Assuming windows to be partially open, future interior noise levels in these units would be up to 51 dBA $L_{dn}$.

All other buildings would be setback 240 feet or more from the centerline of San Bruno Avenue West and would be adequately shielded from the traffic noise. Additionally, these buildings would be setback from Glenview Drive by 40 to 190 feet from the centerline. These townhome units would be exposed to future exterior noise levels at or below 60 dBA $L_{dn}$. Assuming windows to be partially open, future interior noise levels in these units would be up to 45 dBA $L_{dn}$.

To meet the interior noise requirements set forth by the State of California of 45 dBA $L_{dn}$, implementation of noise insulation features would be required.

*Recommended Noise Insulation Features to Reduce Future Interior Noise Levels*

The following noise insulation features shall be incorporated into the proposed project to reduce interior noise levels to 45 dBA $L_{dn}$ or less at residential interiors:

- Provide a suitable form of forced-air mechanical ventilation, as determined by the local building official, for all residential units on the project site, so that windows can be kept closed at the occupant's discretion to control interior noise and achieve the interior noise standards.

- Preliminary calculations indicate that residential rooms located along the southern façades of Buildings A and B would require windows and doors with a minimum rating of 31 STC with adequate forced-air mechanical ventilation to meet the interior noise threshold of 45 dBA $L_{dn}$.

- Preliminary calculations indicate that residential rooms located along the western façade of Building C would require windows and doors with a minimum rating of 28 STC with adequate forced-air mechanical ventilation to meet the interior noise threshold of 45 dBA $L_{dn}$.

- Townhomes located in all other buildings would require standard construction materials with the incorporation of a suitable form of forced-air mechanical ventilation to meet the 45 dBA $L_{dn}$ threshold.

The implementation of these noise insulation features would reduce interior noise levels to 45 dBA $L_{dn}$ or less at residential uses.

## NOISE IMPACTS AND MITIGATION MEASURES

This section describes the significance criteria used to evaluate project impacts under CEQA, provides a discussion of each project impact, and presents mitigation measures, where necessary, to reduce project impacts to less-than-significant levels.

### Significance Criteria

The following criteria were used to evaluate the significance of environmental noise resulting from the project:

(a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;

(b) Generation of excessive groundborne vibration or groundborne noise levels;

(c) For a project located within the vicinity of a private airstrip or 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, if the project would expose people residing or working in the project area to excessive noise levels.

**Impact 1a:** **Temporary Construction Noise.** Existing receptors are not expected to be exposed to temporary construction noise levels exceeding the City's threshold. In accordance with Policy HS-38 of the City's General Plan, this temporary noise impact would be reduced to a **less-than-significant** level with the incorporation of construction best management practices.

The project applicant proposes the construction of nine three-story townhome buildings. The construction schedule assumed that the earliest possible start date would be early June 2024, and the development would be completed by end of September 2026 (total construction time of 28 months). Construction phases would include demolition, site preparation, grading, trenching, building construction, architectural coating, and paving. During each phase of construction, there would be a different mix of equipment operating, and noise levels would vary by phase and vary within phases, based on the amount of equipment in operation and the location at which the equipment is operating.

Noise impacts resulting from construction depend upon the noise generated by various pieces of construction equipment, the timing and duration of noise-generating activities, and the distance between construction noise sources and noise-sensitive areas. Construction noise impacts primarily result when construction activities occur during noise-sensitive times of the day (e.g., early morning, evening, or nighttime hours), the construction occurs in areas immediately adjoining noise-sensitive land uses, or when construction lasts over extended periods of time.

Based on General Plan Policy HS-38, developers are required to mitigate noise exposure to sensitive receptors resulting from construction activities. Mitigation may include reducing construction noise at the source, as the sound is being transmitted through the air, and at the receptor. Municipal Code Section 6.16.070 prohibits noise from non-emergency operation of

construction equipment from exceeding 85 dBA at a distance of 100 feet between the hours of 7:00 a.m. and 10:00 p.m. and from exceeding 60 dBA at a distance of 100 feet from 10:00 p.m. until 7:00 a.m. unless a permit is obtained from the director of public works.

Construction activities generate considerable amounts of noise, especially during earth-moving activities when heavy equipment is used. The hauling of excavated materials and construction materials would generate truck trips on local roadways, as well. For the proposed project, pile driving, which generates excessive noise levels, is not expected. The typical range of maximum instantaneous noise levels for the proposed project would be 70 to 90 dBA $L_{max}$ at a distance of 50 feet (see Table 5) from the equipment. Table 6 shows the hourly average noise level ranges, by construction phase, typical for various types of projects. Hourly average noise levels generated by construction are about 72 to 88 dBA $L_{eq}$ for residential dwellings, measured at a distance of 50 feet from the center of a busy construction site. Construction-generated noise levels drop off at a rate of about 6 dBA per doubling of the distance between the source and receptor. Shielding by buildings or terrain often results in lower construction noise levels at distant receptors.

Equipment expected to be used in each construction stage are summarized in Table 7, along with the quantity of each type of equipment and the reference noise level at 100 feet, assuming the operation of the two loudest pieces of construction equipment for each construction phase.

Federal Highway Administration's (FHWA's) Roadway Construction Noise Model (RCNM) was used to calculate the hourly average noise levels for each phase of construction, assuming the two loudest pieces of equipment would operate simultaneously, as recommended by the FTA for construction noise evaluations. This construction noise model includes representative sound levels for the most common types of construction equipment and the approximate usage factors of such equipment that were developed based on an extensive database of information gathered during the construction of the Central Artery/Tunnel Project in Boston, Massachusetts (CA/T Project or "Big Dig"). The usage factors represent the percentage of time that the equipment would be operating at full power. Table 7 also summarizes the construction noise levels for the two loudest pieces of equipment propagated to the surrounding receiving land uses.

To assess construction noise impacts at the receiving property lines of existing noise-sensitive receptors, the worst-case hourly average noise level, which is calculated by combining all pieces of equipment per phase, was propagated from the geometrical center of the project site to the nearest property lines of the surrounding land uses. These noise level estimates are shown in Table 8. Noise levels in Table 8 do not assume reductions due to intervening buildings or existing barriers.

**TABLE 5 Construction Equipment 50-Foot Noise Emission Limits**

| Equipment Category | $L_{max}$ Level (dBA)[1,2] | Impact/Continuous |
|---|---|---|
| Arc Welder | 73 | Continuous |
| Auger Drill Rig | 85 | Continuous |
| Backhoe | 80 | Continuous |
| Bar Bender | 80 | Continuous |
| Boring Jack Power Unit | 80 | Continuous |
| Chain Saw | 85 | Continuous |
| Compressor[3] | 70 | Continuous |
| Compressor (other) | 80 | Continuous |
| Concrete Mixer | 85 | Continuous |
| Concrete Pump | 82 | Continuous |
| Concrete Saw | 90 | Continuous |
| Concrete Vibrator | 80 | Continuous |
| Crane | 85 | Continuous |
| Dozer | 85 | Continuous |
| Excavator | 85 | Continuous |
| Front End Loader | 80 | Continuous |
| Generator | 82 | Continuous |
| Generator (25 KVA or less) | 70 | Continuous |
| Gradall | 85 | Continuous |
| Grader | 85 | Continuous |
| Grinder Saw | 85 | Continuous |
| Horizontal Boring Hydro Jack | 80 | Continuous |
| Hydra Break Ram | 90 | Impact |
| Impact Pile Driver | 105 | Impact |
| Insitu Soil Sampling Rig | 84 | Continuous |
| Jackhammer | 85 | Impact |
| Mounted Impact Hammer (hoe ram) | 90 | Impact |
| Paver | 85 | Continuous |
| Pneumatic Tools | 85 | Continuous |
| Pumps | 77 | Continuous |
| Rock Drill | 85 | Continuous |
| Scraper | 85 | Continuous |
| Slurry Trenching Machine | 82 | Continuous |
| Soil Mix Drill Rig | 80 | Continuous |
| Street Sweeper | 80 | Continuous |
| Tractor | 84 | Continuous |
| Truck (dump, delivery) | 84 | Continuous |
| Vacuum Excavator Truck (vac-truck) | 85 | Continuous |
| Vibratory Compactor | 80 | Continuous |
| Vibratory Pile Driver | 95 | Continuous |
| All other equipment with engines larger than 5 HP | 85 | Continuous |

Notes:

[1] Measured at 50 feet from the construction equipment, with a "slow" (1 sec.) time constant.

[2] Noise limits apply to total noise emitted from equipment and associated components operating at full power while engaged in its intended operation.

[3] Portable Air Compressor rated at 75 cfm or greater and that operates at greater than 50 psi.

**TABLE 6 Typical Ranges of Construction Noise Levels at 50 Feet, $L_{eq}$ (dBA)**

| | Domestic Housing | | Office Building, Hotel, Hospital, School, Public Works | | Industrial Parking Garage, Religious Amusement & Recreations, Store, Service Station | | Public Works Roads & Highways, Sewers, and Trenches | |
|---|---|---|---|---|---|---|---|---|
| | I | II | I | II | I | II | I | II |
| Ground Clearing | 83 | 83 | 84 | 84 | 84 | 83 | 84 | 84 |
| Excavation | 88 | 75 | 89 | 79 | 89 | 71 | 88 | 78 |
| Foundations | 81 | 81 | 78 | 78 | 77 | 77 | 88 | 88 |
| Erection | 81 | 65 | 87 | 75 | 84 | 72 | 79 | 78 |
| Finishing | 88 | 72 | 89 | 75 | 89 | 74 | 84 | 84 |

**I** - All pertinent equipment present at site.
**II** - Minimum required equipment present at site.

Source: U.S.E.P.A., Legal Compilation on Noise, Vol. 1, p. 2-104, 1973.

**TABLE 7 Estimated Construction Noise Levels for the Proposed Project Building at a Distance of 100 feet**

| Phase of Construction | Total Workdays | Construction Equipment (Quantity) | Estimated Construction Noise Level at 100 feet, dBA $L_{eq}$ |
|---|---|---|---|
| Demolition | 21 | Excavator (2)[a]<br>Tractor/Loader/Backhoe (1)[a] | 76 |
| Site Preparation | 6 | Grader (1)[a]<br>Tractor/Loader/Backhoe (1)[a] | 78 |
| Grading/Excavation | 65 | Grader (1)[a]<br>Rubber-Tired Dozer (1)<br>Tractor/Loader/Backhoe (3)[a] | 78 |
| Trenching/Foundation | 130 | Tractor/Loader/Backhoe (2)[a]<br>Excavator (2)[a] | 76 |
| Building – Exterior | 301 | Forklift (1)[a]<br>Generator Set (1)[a] | 72 |
| Building – Interior/ Architectural Coating | 300 | Air Compressor (3)[a]<br>Aerial Lift (1)[a] | 69 |
| Paving | 19 | Paver (1)[a]<br>Roller (3)<br>Tractor/Loader/Backhoe (1)[a] | 75 |

[a] Denotes two loudest pieces of construction equipment per phase.

**TABLE 8 Estimated Construction Noise Levels at Nearby Land Uses**

| Phase of Construction | Calculated Hourly Average Noise Levels, $L_{eq}$ (dBA) | | | |
|---|---|---|---|---|
| | North Res. (265ft) | East Res. (975ft) | South Comm. (290ft) | SE Res. (575ft) |
| Demolition | 68 | 57 | 68 | 62 |
| Site Preparation | 69 | 58 | 68 | 62 |
| Grading/Excavation | 72 | 61 | 72 | 66 |
| Trenching/Foundation | 70 | 59 | 69 | 64 |
| Building –Exterior | 64 | 52 | 63 | 57 |
| Building – Interior/ Architectural Coating | 64 | 53 | 64 | 58 |
| Paving | 68 | 57 | 67 | 62 |

Construction noise levels are anticipated to comply with the City of San Bruno's Municipal Code threshold of 85 dBA at 100 feet during daytime hours on typical construction days.

Reasonable regulation of the hours of construction, as well as regulation of the arrival and operation of heavy equipment and the delivery of construction material, are necessary to protect the health and safety of persons, promote the general welfare of the community, and maintain the quality of life. With the incorporation of construction best management practices as a project condition of approval, in compliance with Policy HS-38 of the City's General Plan, construction

noise exposure at sensitive receptors would be reduced as much as possible. Therefore, this would be a less-than-significant impact.

*Construction Best Management Practices*

Implementation of the following construction best management practices would reduce the construction noise levels at sensitive receptors as much as possible:

- Limit construction hours to between 7:00 a.m. and 7:00 p.m., Monday through Friday.

- Equip all internal combustion engine-driven equipment with intake and exhaust mufflers that are in good condition and appropriate for the equipment.

- Unnecessary idling of internal combustion engines should be strictly prohibited.

- Locate stationary noise-generating equipment, such as air compressors or portable power generators, as far as possible from sensitive receptors as feasible. If they must be located near receptors, adequate muffling (with enclosures where feasible and appropriate) shall be used reduce noise levels at the adjacent sensitive receptors. Any enclosure openings or venting shall face away from sensitive receptors.

- Construction staging areas shall be established at locations that will create the greatest distance between the construction-related noise sources and noise-sensitive receptors nearest the project site during all project construction.

- Control noise from construction workers' radios to a point where they are not audible at existing commercial uses bordering the project site.

- Designate a "disturbance coordinator" who would be responsible for responding to any complaints about construction noise. The disturbance coordinator will determine the cause of the noise complaint (e.g., bad muffler, etc.) and will require that reasonable measures be implemented to correct the problem. Conspicuously post a telephone number for the disturbance coordinator at the construction site and include in it the notice sent to neighbors regarding the construction schedule.

Implementation of the above best management practices would reduce construction noise levels emanating from the site and minimize disruption and annoyance. With the incorporation of these measures and recognizing that noise generated by construction activities would not exceed 85 dBA at 100 feet and occur over a temporary period, overall noise exposure would be minimized at sensitive receptors in the project vicinity. This would be a less-than-significant impact.

**Mitigation Measure 1a: No further mitigation required.**

**Impact 1b: Permanent Noise Level Increase/Exceed Applicable Standards.** The proposed project would not result in a substantial permanent noise level increase at residential uses. Further, the project would not generate operational noise levels exceeding the

City's ambient base noise levels by 10 dBA or more. **This is a less-than-significant impact.**

A significant impact would result if the proposed project would result in a substantial permanent increase in noise levels at sensitive receptors in the vicinity. A substantial increase would occur if: a) the noise level increase is 5 dBA $L_{dn}$ or greater, with a future noise level of less than 60 dBA $L_{dn}$; or b) the noise level increase is 3 dBA $L_{dn}$ or greater, with a future noise level of 60 dBA $L_{dn}$ or greater. Noise-sensitive receptors surrounding the project site are exposed to existing noise levels greater than 60 dBA $L_{dn}$, according to existing noise contours shown in Figure 7.5 of the City's General Plan; therefore, a significant noise increase would occur if project-generated operations would permanently increase noise levels by 3 dBA $L_{dn}$.

Section 6.16.030 of the City's Municipal Code defines ambient zone base noise levels at residential land uses to be 60 dBA $L_{eq}$ during daytime hours between 7:00 a.m. and 10:00 p.m. and 45 dBA $L_{dn}$ during nighttime hours between 10:00 p.m. and 7:00 a.m. Sections 6.16.050 and 6.16.060 of the City's Municipal Code prohibits the generation of noise exceeding these ambient zone base levels by 10 dBA at the property plane of any property.

*Project Traffic Increase*

The traffic study completed by *DKS Traffic Consultants* in 2019 is not expected to change under the updated project conditions. Therefore, the project's contribution would be at or below 1 dBA $L_{dn}$ along all segments in the project vicinity, as stated in the 2019 noise assessment.[4] The project would not result in a permanent noise increase of 3 dBA $L_{dn}$ or more at noise-sensitive receptors in the project vicinity.

*Mechanical Equipment*

Typical residential land uses include mechanical equipment such as heating, ventilation, and air conditioning (HVAC) units. While the site plan does not show the location of the HVAC units, such units are typically located on the ground-level of each townhome near the front doors or several HVAC units clustered together at the ends of buildings. For the proposed buildings, it is assumed that up to five units could be located at the end of the buildings, and under worst-case conditions, it is assumed that each of these units would operate continuously throughout a 24-hour period. Noise levels produced by a typical residential HVAC unit would range from 53 to 63 dBA at 3 feet during operation. Five units would produce noise levels that would range from 60 to 70 dBA at 3 feet. Assuming all five units would cycle on and off continuously during daytime and nighttime hours, day-night average noise levels would be up to 76 dBA $L_{dn}$ at 3 feet.

Table 9 shows the estimated mechanical equipment noise propagated to the property lines of the surrounding land uses, assuming no attenuation from mechanical screen or intervening buildings.

**TABLE 9 Estimated Operational Noise Levels for Residential HVAC Equipment**

| Receptor | Distance from Nearest HVAC Equipment, feet | Hourly $L_{eq}$, dBA | $L_{dn}$, dBA | Noise Level Increase, dBA $L_{dn}$ |
|---|---|---|---|---|
| North Residences | 50 | Up to 46 | 52 | 1 |
| East Residences | 760 | Up to 22 | 28 | 0 |
| South Commercial | 115 | Up to 38 | 45 | 0 |
| Southeast Residences | 355 | Up to 29 | 35 | 0 |

Based on the estimated noise levels in Table 9, mechanical equipment noise levels are not expected to exceed the City's daytime ambient base noise level of 60 dBA $L_{eq}$ or nighttime ambient base noise level of 45 dBA $L_{eq}$ by more than 10 dBA at the nearest surrounding residential property lines.

*Total Combined Project-Generated Noise*

The operational noise levels produced by the proposed project combined (i.e., traffic, mechanical equipment) would not result in an increase of 3 dBA $L_{dn}$ or more at existing noise-sensitive receptors in the project vicinity. Operational noise levels due to mechanical equipment at the proposed residential development would not exceed 60 dBA $L_{eq}$ during daytime hours or 45 dBA $L_{eq}$ during nighttime hours by 10 dBA or more at receiving residential property lines. This is a less-than-significant impact.

**Mitigation Measure 1b: None required.**

**Impact 2: Exposure to Excessive Groundborne Vibration.** Construction-related vibration levels would not exceed applicable vibration thresholds at nearby sensitive land uses. **This is a less-than-significant impact.**

The construction of the project may generate perceptible vibration when heavy equipment or impact tools (e.g., jackhammers, hoe rams) are used. Construction activities would include demolition, site preparation work, foundation work, and new building framing and finishing. Pile driving equipment, which can cause excessive vibration, is not expected to occur during construction of the proposed project.

The City of San Bruno does not specify a construction vibration limit. For structural damage, the California Department of Transportation recommends a vibration limit of 0.5 in/sec PPV for new residential and modern commercial/industrial structures, 0.3 in/sec PPV for older residential structures, and a limit of 0.25 in/sec PPV for historic and some old buildings (see Table 3). The 0.3 in/sec PPV vibration limit would be applicable to properties in the immediate vicinity of the project site and the 0.25 in/sec PPV vibration limit would be applicable to the nearest historic property.

Figure 2, which is included in the City's General Plan, shows the historical resources in the City of San Bruno. From this figure, the nearest historical building is more than 1 mile east of the project's nearest boundary. At this distance, construction vibration levels would be well under the State's thresholds. Historical buildings are not discussed further in this report.

Table 10 presents typical construction equipment at a distance of 25 feet. Project construction activities, such as drilling, the use of jackhammers, rock drills and other high-power or vibratory tools, and rolling stock equipment (tracked vehicles, compactors, etc.) may generate substantial vibration in the immediate vicinity.

Vibration levels would vary depending on soil conditions, construction methods, and equipment used. Table 10 summarizes the vibration levels at each of the surrounding buildings in the project vicinity. Vibration levels are highest close to the source and then attenuate with increasing distance at the rate $\left({}^{D_{ref}}/_{D}\right)^{1.1}$, where $D$ is the distance from the source in feet and $D_{ref}$ is the reference distance of 25 feet. While construction noise levels increase based on the cumulative equipment in use simultaneously, construction vibration levels would be dependent on the location of individual pieces of equipment. That is, equipment scattered throughout the site would not generate a collective vibration level, but a vibratory roller, for instance, operating near the project site boundary would generate the worst-case vibration levels for the receptor sharing that property line. Further, construction vibration impacts are assessed based on damage to buildings on receiving land uses, not receptors at the nearest property lines. Therefore, the distances used to propagate construction vibration levels (as shown in Table 10), which are different than the distances used to propagate construction noise levels (as shown in Table 8), were estimated under the assumption that each piece of equipment from Table 10 was operating along the nearest boundary of the project site, which would represent the worst-case scenario.

As shown in Table 10, the nearest building constructed of conventional materials would be 40 feet from the north project site boundary, and construction vibration levels at this distance would be at or below 0.13 in/sec PPV when vibratory rollers are used near the boundary line. Therefore, construction vibration levels would be below the 0.3 in/sec PPV threshold.

Neither cosmetic, minor, or major damage would occur at conventional buildings surrounding the project site. At these locations, and in other surrounding areas where vibration would not be expected to cause cosmetic damage, vibration levels may still be perceptible. However, as with any type of construction, this would be anticipated and would not be considered significant, given the intermittent and short duration of the phases that have the highest potential of producing vibration (use of jackhammers and other high-power tools). By use of administrative controls, such as notifying neighbors of scheduled construction activities and scheduling construction activities with the highest potential to produce perceptible vibration during hours with the least potential to affect nearby businesses, perceptible vibration can be kept to a minimum.

In summary, the construction of the project would generate vibration levels well below 0.3 in/sec PPV at the nearest buildings surrounding the site. This would be a less-than-significant impact.

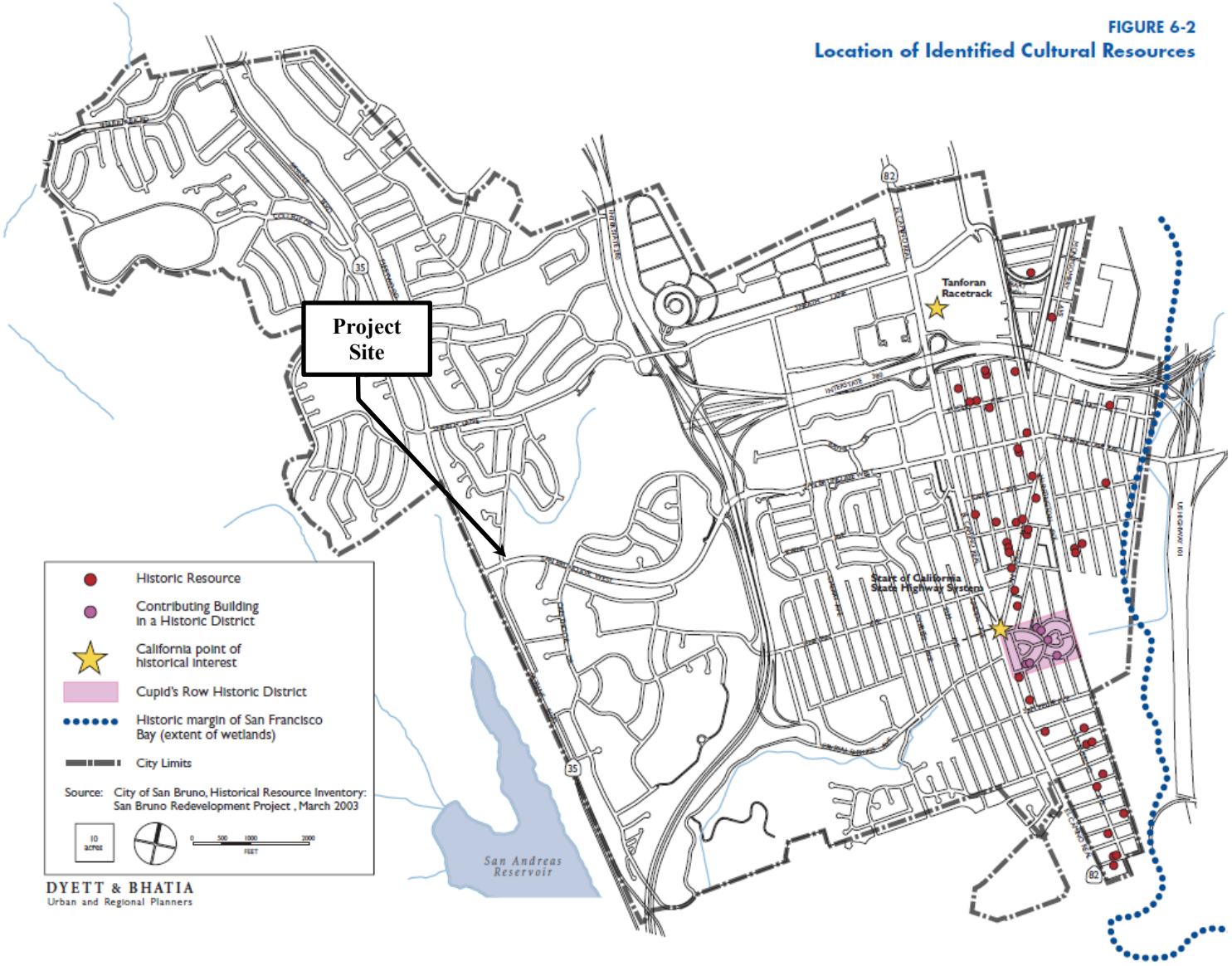
**TABLE 13 Vibration Levels for Construction Equipment at a Source Distance of 25 feet and at the Nearest Surrounding Buildings.**

| Equipment | | PPV at 25 ft. (in/sec) | Estimated Vibration Levels at Nearest Building Façades Surrounding the Project Site, in/sec PPV | | | |
|---|---|---|---|---|---|---|
| | | | North Res. (40ft) | East Res. (750ft) | South Comm. (100ft) | SE Res. (365ft) |
| Clam shovel drop | | 0.202 | 0.120 | 0.005 | 0.044 | 0.011 |
| Hydromill (slurry wall) | in soil | 0.008 | 0.005 | 0.000 | 0.002 | 0.000 |
| | in rock | 0.017 | 0.010 | 0.000 | 0.004 | 0.001 |
| Vibratory Roller | | 0.210 | 0.125 | 0.005 | 0.046 | 0.011 |
| Hoe Ram | | 0.089 | 0.053 | 0.002 | 0.019 | 0.005 |
| Large bulldozer | | 0.089 | 0.053 | 0.002 | 0.019 | 0.005 |
| Caisson drilling | | 0.089 | 0.053 | 0.002 | 0.019 | 0.005 |
| Loaded trucks | | 0.076 | 0.045 | 0.002 | 0.017 | 0.004 |
| Jackhammer | | 0.035 | 0.021 | 0.001 | 0.008 | 0.002 |
| Small bulldozer | | 0.003 | 0.002 | 0.000 | 0.001 | 0.000 |

Source: Transit Noise and Vibration Impact Assessment Manual, Federal Transit Administration, Office of Planning and Environment, U.S. Department of Transportation, September 2018, as modified by Illingworth & Rodkin, Inc., December 2023.

**Mitigation Measure 2: None required.**

**FIGURE 2 Historic Resource Map with Project Site Identified**



**Impact 3:** **Excessive Aircraft Noise.** The project site is located approximately 2.5 miles from the San Francisco International Airport. The noise environment attributable to aircraft is considered normally acceptable under the San Mateo County ALUC noise compatibility policies. This is a **less-than-significant** impact.

San Francisco International Airport is a public-use airport located approximately 2.5 miles southeast of the project site. According to the San Mateo County Airport Land Use Commission (ALUC) and the contours provided above in the Regulatory Criteria section, the project site lies outside the 65 dBA CNEL/$L_{dn}$ contour line. The proposed project would be compatible with the City's exterior noise standards for aircraft noise. This would be a less-than-significant impact.

Assuming standard construction materials with the incorporation of forced-air mechanical ventilation for aircraft noise below 65 dBA $L_{dn}$, the future interior noise levels resulting from aircraft would be below 45 dBA $L_{dn}$. Therefore, future interior noise at the proposed building would be compatible with aircraft noise. This would be a less-than-significant impact.

**Mitigation Measure 3:** **None required.**

**Cumulative Impacts**

Cumulative noise impacts would include temporary construction noise from cumulative construction projects. From the City's website,[5] there are no planned or approved projects located within 1,000 feet of the project site. Therefore, there would not be a cumulative construction impact associated with the proposed project.

For a substantial permanent cumulative noise increase to occur, two qualifications must be met: 1) if the cumulative plus project traffic volumes result in a noise level increase at sensitive receptors of 5 dBA $L_{dn}$ or greater, with a future noise level of less than 60 dBA $L_{dn}$, or of 3 dBA $L_{dn}$ or greater, with a future noise level of 60 dBA $L_{dn}$ or greater, compared to existing traffic volumes; and 2) if the cumulative plus project traffic volumes result in a 1 dBA $L_{dn}$ or more noise level increase compared to cumulative (no project) conditions, which would be considered a cumulatively considerable contribution to the overall traffic noise increase.

The 2019 traffic study completed by *DKS Traffic Consultants, Inc.* resulted in a 2 dBA or less increase in noise levels along all segments in the project vicinity when both the cumulative (no project) and cumulative plus project volumes were compared to the existing volumes. Since a noise level increase of 3 dBA $L_{dn}$ or more was not calculated along any roadway segment in the project vicinity, the first qualification for a permanent cumulative noise increase would not be met. Therefore, the project would not result in substantial cumulative traffic noise increase.

[5] https://sanbruno.ca.gov/248/Development-Activity

## APPENDIX A

**FIGURE A1 Long-Term Noise Level Data from the *J.C. Brennan & Associates, Inc.* 2019 study[4]**

**Appendix B**
2019-125 Glenview Terrace San Bruno
24hr Continuous Noise Monitoring - Site A
9/10/2019 - 9/11/2019

| Hour | Leq | Lmax | L50 | L90 |
|---|---|---|---|---|
| 12:00 | 57 | 70 | 56 | 53 |
| 13:00 | 58 | 76 | 56 | 54 |
| 14:00 | 57 | 72 | 56 | 54 |
| 15:00 | 56 | 65 | 56 | 54 |
| 16:00 | 59 | 84 | 56 | 54 |
| 17:00 | 57 | 74 | 57 | 54 |
| 18:00 | 58 | 83 | 57 | 55 |
| 19:00 | 56 | 70 | 55 | 52 |
| 20:00 | 55 | 76 | 54 | 52 |
| 21:00 | 55 | 70 | 55 | 52 |
| 22:00 | 54 | 65 | 53 | 49 |
| 23:00 | 52 | 63 | 51 | 47 |
| 0:00 | 51 | 67 | 49 | 46 |
| 1:00 | 51 | 63 | 50 | 46 |
| 2:00 | 52 | 62 | 50 | 47 |
| 3:00 | 51 | 61 | 50 | 46 |
| 4:00 | 51 | 60 | 50 | 47 |
| 5:00 | 53 | 62 | 52 | 49 |
| 6:00 | 56 | 69 | 56 | 53 |
| 7:00 | 57 | 71 | 57 | 54 |
| 8:00 | 58 | 75 | 57 | 55 |
| 9:00 | 59 | 75 | 58 | 55 |
| 10:00 | 58 | 75 | 57 | 54 |
| 11:00 | 61 | 81 | 55 | 50 |

| | Statistical Summary | | | | | |
|---|---|---|---|---|---|---|
| | Daytime (7 a.m. - 10 p.m.) | | | Nighttime (10 p.m. - 7 a.m.) | | |
| | High | Low | Average | High | Low | Average |
| Leq (Average) | 60.6 | 55.4 | 57.8 | 56.3 | 50.9 | 52.7 |
| Lmax (Maximum) | 83.7 | 65.2 | 74.4 | 69.0 | 60.2 | 63.5 |
| L50 (Median) | 57.6 | 54.3 | 56.0 | 55.6 | 49.4 | 51.2 |
| L90 (Background) | 55.1 | 50.1 | 53.4 | 52.9 | 45.5 | 47.7 |

| | |
|---|---|
| Computed Ldn, dB | 60.3 |
| % Daytime Energy | 84% |
| % Nighttime Energy | 16% |

j.c. brennan & associates
consultants in acoustics

**FIGURE A2 Long-Term Daily Trends from the *J.C. Brennan & Associates, Inc.* 2019 study[4]**