

F. NOISE AND VIBRATION

Section 4.F, Noise and Vibration, describes the existing noise environment in the project area, evaluates the potential construction-related and operational noise and vibration impacts associated with implementation of the Proposed Project, assesses the noise compatibility of proposed uses with the existing and future noise environment, and identifies mitigation measures to avoid or reduce potential adverse impacts. This section summarizes the information provided in the *Pier 70 Mixed-Use District Project, Noise Technical Memorandum*.¹

ENVIRONMENTAL SETTING

SOUND FUNDAMENTALS

Sound is characterized by various parameters that describe the rate of oscillation (frequency) of sound waves, the distance between successive troughs or crests in the wave, the speed that it travels, and the pressure level or energy content of a given sound. The sound pressure level has become the most common descriptor used to characterize the loudness of an ambient sound, and the decibel (dB) scale is used to quantify sound intensity. Because sound can vary in intensity by over one million times within the range of human hearing, a logarithmic loudness scale is used to keep sound intensity numbers at a convenient and manageable level. Since the human ear is not equally sensitive to all sound frequencies within the entire spectrum, human response is factored into sound descriptions in a process called “A-weighting,” expressed as “dBA.” The dBA, or A-weighted decibel, refers to a scale of noise measurement that approximates the range of sensitivity of the human ear to sounds of different frequencies. On this scale, the normal range of human hearing extends from about 0 dBA to about 140 dBA. Except in carefully controlled laboratory experiments, a change of only 1 dBA in sound level cannot be perceived. Outside of the laboratory, a 3-dBA change is considered a perceptible difference. A 10-dBA increase in the level of a continuous noise represents a perceived doubling of loudness.²

Noise Descriptors

Noise is generally defined as sound that is loud, disagreeable, unexpected or unwanted. Sound is mechanical energy transmitted in the form of a wave by a disturbance or vibration that causes pressure variation in air detectable by the human ear. Variations in noise exposure over time are typically expressed in terms of a steady-state energy level (called L_{eq}) that represents the

¹ Orion Environmental Associates, *Pier 70 Mixed-Use District Project, Noise Technical Memorandum*, December 2016.

² California Department of Transportation (Caltrans), *Technical Noise Supplement (TeNS) to the Traffic Noise Analysis Protocol* pp. 2-44 to 2-45, September 2013. Available online at http://www.dot.ca.gov/hq/env/noise/pub/TeNS_Sept_2013B.pdf. Accessed April 14, 2015.

acoustical energy of a given measurement, or alternatively as a statistical description of what sound level is exceeded over some fraction (10, 50 or 90 percent) of a given observation period (i.e., L_{10} , L_{50} , L_{90}). L_{eq} (24) is the steady-state acoustical energy level measured over a 24-hour period. L_{max} is the maximum, instantaneous noise level registered during a measurement period. Because residential receptors are more sensitive to unwanted noise intrusion during the evening and at night, State law requires for planning purposes that an artificial dBA increment be added to evening and nighttime noise levels to form a 24-hour noise descriptor called the Community Noise Equivalent Level (CNEL). CNEL adds a 5-dBA penalty during the evening (7:00 p.m. to 10:00 p.m.) and a 10-dBA penalty at night (10:00 p.m. to 7:00 a.m.). Another 24-hour noise descriptor, called the day-night noise level (L_{dn}), is similar to CNEL. Both CNEL and L_{dn} add a 10-dBA penalty to all nighttime noise levels between 10:00 p.m. and 7:00 a.m., but L_{dn} does not add the evening 5-dBA penalty between 7:00 p.m. and 10:00 p.m. In practice, L_{dn} and CNEL usually differ by less than 1 dBA at any given location from transportation noise sources.³ Table 4.F.1: Representative Environmental Noise Levels, presents representative noise sources and their corresponding noise levels in dBA at varying distances from the noise sources.

Noise from Multiple Sources

Since sound pressure levels in decibels are based on a logarithmic scale, they cannot be added or subtracted in the usual arithmetical way. Adding a new noise source to an existing noise source, both producing noise at the same level, will not double the noise level. Table 4.F.2: Rules for Combining Sound Levels by “Decibel Addition,” demonstrates the result of adding noise from multiple sources.

If the difference between two noise sources is 10 dBA or more, the higher noise source will dominate and the resultant noise level will be equal to the noise level of the higher noise source. In general, if the difference between two noise sources is 0 to 1 dBA, the resultant noise level will be 3 dBA higher than the higher noise source, or both sources if they are equal. If the difference between two noise sources is 2 to 3 dBA, the resultant noise level will be 2 dBA above the higher noise source. If the difference between two noise sources is 4 to 10 dBA, the resultant noise level will be 1 dBA higher than the higher noise source.

³ Ibid. pp. 2-48.

Table 4.F.1: Representative Environmental Noise Levels

| Common Outdoor Activities | Noise Level (dBA) | Common Indoor Activities |
|--------------------------------------|-------------------|---|
| | 110 | Rock Band |
| Jet Fly-over at 100 feet | | |
| | 100 | |
| Gas Lawnmower at 3 feet | | |
| | 90 | |
| Diesel Truck going 50 mph at 50 feet | | Food Blender at 3 feet |
| | 80 | Garbage Disposal at 3 feet |
| Noise Urban Area during Daytime | | |
| Gas Lawnmower at 100 feet | 70 | Vacuum Cleaner at 10 feet |
| Commercial Area | | Normal Speech at 3 feet |
| Heavy Traffic at 300 feet | 60 | |
| | | Large Business Office |
| Quiet Urban Area during Daytime | 50 | Dishwasher in Next Room |
| | | |
| Quiet Urban Area during Nighttime | 40 | Theater, Large Conference Room (background) |
| Quiet Suburban Area during Nighttime | | |
| | 30 | Library |
| Quiet Rural Area during Nighttime | | Bedroom at Night, Concert Hall (background) |
| | 20 | |
| | | Broadcast/Recording Studio |
| | 10 | |
| | | |
| | 0 | |

Source: California Department of Transportation, Technical Noise Supplement to the Traffic Noise Analysis Protocol, p. 2-20, September 2013

Table 4.F.2: Rules for Combining Sound Levels by “Decibel Addition”¹

| When two decibel values differ by | Add the following amount to the higher decibel value | Example |
|-----------------------------------|--|-----------------------|
| 0 to 1 dB | 3 dB | 60 dB + 61 dB = 64 dB |
| 2 to 3 dB | 2 dB | 60 dB + 63 dB = 65 dB |
| 4 to 9 dB | 1 dB | 60 dB + 69 dB = 70 dB |
| 10 dB or more | 0 dB | 60 dB + 75 dB = 75 dB |

Note:

¹ This methodology provides an estimate of the resulting sound level and is accurate to ± 1 decibel.

Source: Orion Environmental Associates, 2016

Attenuation of Noise

A receptor’s distance from a noise source affects how noise levels attenuate (decrease). Transportation noise sources tend to be arranged linearly such that roadway traffic attenuates at a rate of 3.0 dBA to 4.5 dBA per doubling of distance from the source, depending on the intervening surface (paved or vegetated, respectively). Point sources of noise, such as stationary equipment or construction equipment, typically attenuate at a rate of 6.0 dBA to 7.5 dBA per doubling of distance from the source.⁴ For example, a sound level of 80 dBA at 50 feet from the noise source will be reduced to 74 dBA at 100 feet, 68 dBA at 200 feet, and so on. Noise levels can also be attenuated by “shielding” or providing a barrier between the source and the receptor. With respect to interior noise levels, noise attenuation effectiveness depends on whether windows are closed or open. Based on the U.S. Environmental Protection Agency’s (USEPA) national average, closed windows reduce noise levels by approximately 25 dBA, while open windows reduce noise levels by about 15 dBA.⁵

Health Effects of Environmental Noise

The World Health Organization (WHO) is perhaps the best source of current knowledge regarding health impacts of noise. According to WHO, sleep disturbance can occur when continuous indoor noise levels exceed 30 dBA (L_{eq}) or when intermittent interior noise levels reach or exceed 45 dBA (L_{max}), particularly if background noise is low. With a bedroom

⁴ The 1.5-dBA variation in attenuation rate (6 dBA vs. 7.5 dBA) can result from ground-absorption effects, which occur as sound travels over soft surfaces such as soft earth or vegetation (7.5 dBA attenuation rate) versus hard ground such as pavement or very hard-packed earth (6 dBA rate) (U.S. Housing and Urban Development, *The Noise Guidebook*, 1985, p. 24. Available online at <https://www.hudexchange.info/onecpd/assets/File/Noise-Guidebook-Chapter-4.pdf>. Accessed April 14, 2015.

⁵ U.S. EPA, *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety*, Appendix B, Table B-4, p. B-6, March 1974.

window slightly open (a reduction from outside to inside of 15 dB), the WHO criteria would suggest exterior continuous (ambient) nighttime noise levels should be 45 dBA (L_{eq}) or below, and short-term events should not generate noise in excess of 60 dBA (L_{max}). WHO also notes that maintaining noise levels within the recommended levels during the first part of the night is believed to be effective for the ability to fall asleep.⁶

Other potential health effects of noise identified by WHO include decreased performance on complex cognitive tasks, such as reading, attention, problem solving, and memorization; physiological effects such as hypertension and heart disease (after many years of constant exposure, often by workers, to high noise levels); and hearing impairment (again, generally after long-term occupational exposure, or shorter-term exposure to very high noise levels, for example, exposure several times a year to a concert with noise levels at 100 dBA). Noise can also disrupt speech intelligibility at relatively low levels; for example, in a classroom setting, a noise level as low as 35 dBA can disrupt clear understanding. Finally, noise can cause annoyance and can trigger emotional reactions like anger, depression, and anxiety. WHO reports that during daytime hours, few people are seriously annoyed by activities with noise levels below 55 dBA, or moderately annoyed by activities with noise levels below 50 dBA.

Vehicle traffic and continuous sources of machinery and mechanical noise contribute to ambient noise levels. Short-term noise sources, such as large vehicle audible warnings, the crashing of material being loaded or unloaded, car doors slamming, and engines revving, contribute very little to 24-hour noise levels but are capable of causing sleep disturbance and severe annoyance. The importance of noise to receptors depends on both time and context. For example, long-term high noise levels from large traffic volumes can make conversation at a normal voice level difficult or impossible, while short-term peak noise levels at night can disturb sleep.

Vibration and Groundborne Noise

Vibration is an oscillatory motion through a solid medium in which the motion's amplitude can be described in terms of displacement, velocity, or acceleration. Typically, groundborne vibration generated by man-made activities attenuates rapidly with distance from the source of the vibration. Vibration is typically measured by peak particle velocity (PPV) in inches per second (in/sec). With the exception of long-term occupational exposure, vibration levels rarely affect human health. Instead, most people consider vibration to be an annoyance that can affect concentration or disturb sleep. People may tolerate infrequent, short-duration vibration levels, but human annoyance to vibration becomes more pronounced if the vibration is continuous or occurs frequently. High levels of vibration can damage fragile buildings or interfere with

⁶ World Health Organization, *Guidelines for Community Noise*, Chapter 3, p. 46, April 1999. Available online at <http://www.who.int/docstore/peh/noise/guidelines2.html>. Accessed November 18, 2015.

sensitive equipment. Depending on the age of the structure and type of vibration (transient, continuous, or frequent intermittent sources), vibration levels as low as 0.5 to 2.0 in/sec PPV can damage a structure.⁷

Typical sources of groundborne vibration in San Francisco are large-scale construction projects that involve pile driving or underground tunneling. Vibration is also caused by operation of transit vehicles in the subway system under Market Street, including Muni Metro light rail vehicles and heavy rail Bay Area Rapid Transit (BART) trains. In general, such vibration is only an issue when sensitive receptors are located in close proximity. Since rubber tires provide vibration isolation, rubber tire vehicles such as Muni buses, trucks, and automobiles rarely create substantial groundborne vibration effects unless there is a discontinuity or bump in the road that causes the vibration.⁸

EXISTING CONDITIONS

Noise

The Pier 70 Mixed-Use District project site is bounded by Illinois Street to the west, 20th Street to the north, San Francisco Bay to the east, and 22nd Street to the south. The project site is located in an urban area where noise from nearby industrial uses (including the BAE Systems Ship Repair facility to the north, the American Industrial Center [AIC] to the west, and PG&E Potrero Substation to the south) and vehicular traffic (automobiles, trucks, and buses on the I-280 freeway and other streets in the vicinity) dominate the existing ambient noise environment. In addition, intermittent sources of noise that contribute to ambient noise levels include distant commuter train traffic (Caltrain) approximately 0.25 mile to the west and nearby light rail trains (Third Street line) approximately 365 feet west of the Proposed Project's western boundary. More distant intermittent noise sources include activities such as concerts and sporting events at AT&T Ballpark, which is located 1.25 miles north of the site. Principal noise sources in the immediate project vicinity are described as follows:

- **BAE Systems Ship Repair Facility.** The BAE Systems Ship Repair facility is located to the north of the project site. The short-term measurements at the ship repair docks reveal that the general noise character of the ship repair work is discontinuous and episodic, but also generally broadband and without substantial tonality. The lack of strong tonality results in the noise being perceived as less annoying than a similar noise level from a tonal source, such as a transformer or chiller. The fire pump at the western end of the

⁷ California Department of Transportation (Caltrans), *Transportation and Construction Vibration Guidance Manual*, September 2013, Table 9, p. 23. Available online at <http://www.dot.ca.gov/hq/env/noise/publications.htm>. Accessed on December 16, 2016.

⁸ Federal Transit Administration (FTA), 2006, *Transit Noise and Vibration Impact Assessment*, DTA-VA-90-1003-06, p. 10-6, May 2006, U.S. Department of Transportation. Available online at http://www.fta.dot.gov/12347_2233.html. Accessed April 14, 2015.

dock runs continuously and has substantial tonality; however, the pump was not audible over the ambient conditions at any of the long-term measurement locations and, in fact, is barely detectable in the short-term measurement made nearby at the western end of the ship repair docks.

In the waterfront vicinity where there are no other buildings to block the line-of-sight from Dry Dock 2, more high-frequency energy from activities, such as water blasting or painting, is present and audible. Another mildly tonal source is the Aggreko generators located between Dry Dock 2 and Dock 4 East. These generators contribute substantial noise at the northern, central, and eastern portions of the 28-Acre Site. However, BAE has upgraded the electrical infrastructure at the shipyard, and these generators now operate only if a ship cannot connect to a line power or during a power outage.

- **American Industrial Center (AIC).** The AIC is located west of the Illinois Parcels on the west side of Illinois Street. AIC is located on Third Street between 20th and 23rd streets, and extends to Illinois Street. The facility comprises about 900,000 square feet of commercial, industrial, and related supporting uses. Currently, approximately 300 tenants engaged in various commercial and industrial activities lease space in the AIC. The facility houses breweries, commercial kitchens and bakeries, garment manufacturing businesses, warehouses, and distribution centers. On average, there are typically 2,500 to 3,000 people on the site at a given time.⁹ AIC loading docks are located on Illinois Street, and noise from loading activities could cause noise disturbance along the western Illinois Parcels boundary, across Illinois Street.
- **PG&E Potrero Substation.** There is a PG&E substation located south of the Illinois Parcels (south of the project site), and it contains large transformers and related electrical equipment that are not enclosed. Transformer noise can be disturbing, because transformers generate tonal noise (i.e., noise with simple or pure tones or “hum” components). Field observations indicate that transformer noise is audible, but heavy equipment and traffic noise on local streets dominate the ambient noise environment in this area. This type of noise source could be annoying during the nighttime hours, if audible at future residences.
- **Nearby Sporting or Special Events.** Residents living along Illinois Street are and will be subject to short-term, intermittent increases in traffic noise before and after events held at the existing AT&T Park and proposed Warrior’s arena. Since these increases only occur for a short time before and after a game, they do not substantially increase ambient noise levels. Even so, these short-term, intermittent increases are likely noticeable to residents living adjacent to Illinois Street.

Groundborne Noise and Vibration

Groundborne noise refers to a condition where noise is experienced inside a building or structure as a result of vibrations produced outside of the building and transmitted as ground vibration between the source and receiver. Groundborne noise can be a problem in situations where the primary

⁹ Charles J. Higley, Farella Braun + Martel, LLP, *Pier 70 Mixed-Use District – EIR Scoping Comments*, June 5, 2015.

airborne noise path is blocked, such as in the case of a subway tunnel passing near homes or other noise-sensitive structures. There are no known sources of existing groundborne noise or vibration in the vicinity of the project site. Distant Caltrain traffic (approximately 0.25 mile to the west of the project site) and nearby light rail train operations (Third Street line, approximately 365 feet west of the Proposed Project's western boundary) both operate at the surface and generate airborne noise and surface vibration. Given their distance and surface location, these two sources are not considered to be substantial sources of groundborne noise or vibration for the 28-Acre Site or Illinois Parcels. There is no machinery or activities in the adjacent BAE site that would generate vibration on the 28-Acre Site or Illinois Parcels.¹⁰

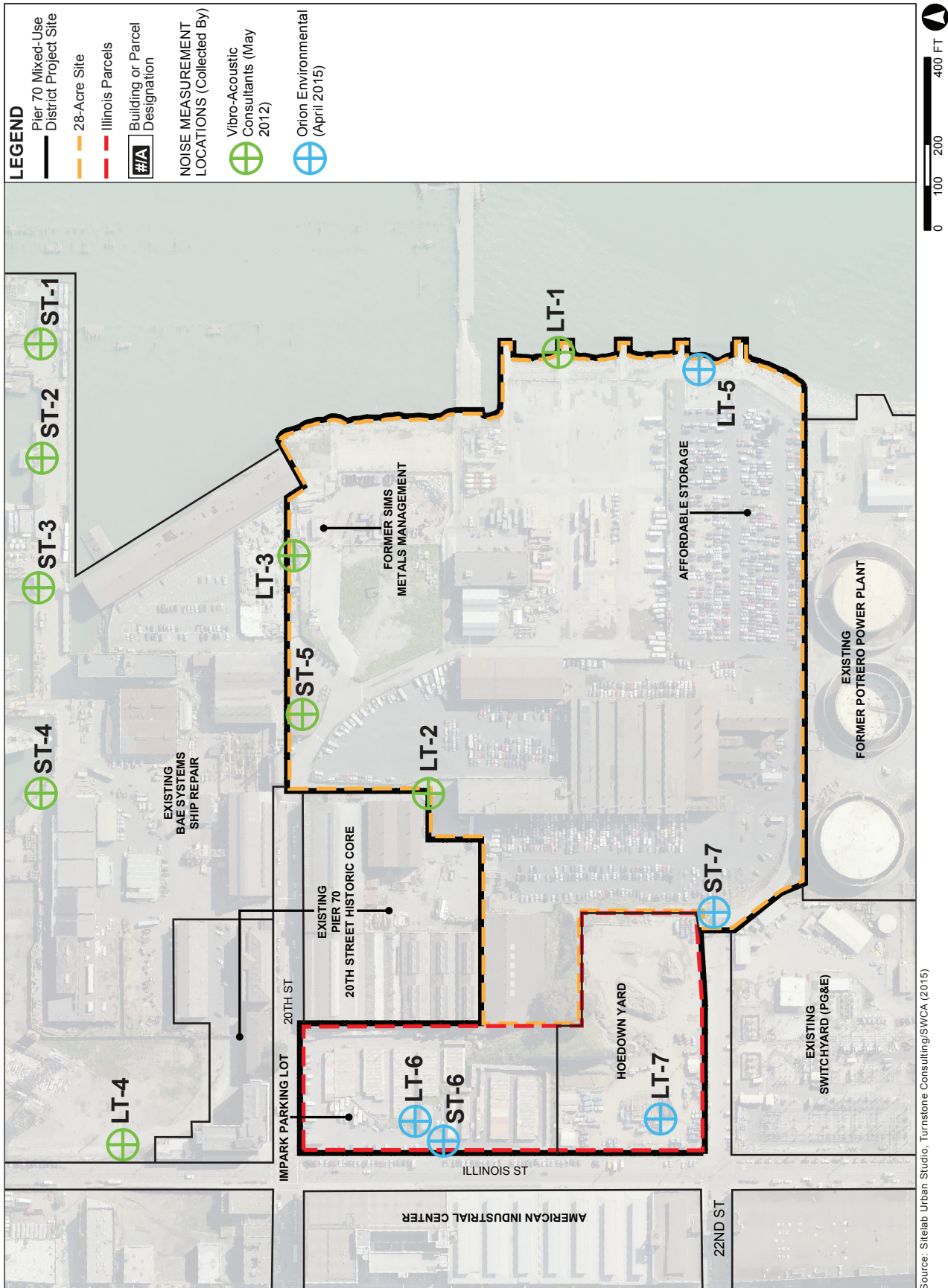
AMBIENT NOISE MEASUREMENTS

To characterize the background noise environment in the project vicinity, a total of 14 noise measurements were collected. Four long-term (96 hours) and five short-term (15 to 30 minutes) measurements were collected north of and in the northern portion of the project area over a 5-day period¹¹ in May 2012 in order to determine noise characteristics of the BAE Systems Ship Repair activities and their effect on the project site's noise environment. In addition, one long-term and two short-term measurements were collected in the southeastern, southern, and western margin of the project site for a 48-hour period in April and August 2015.¹² Measurement locations are indicated on Figure 4.F.1: Noise Measurement Locations.

¹⁰ E-mail communication dated February 2, 2016 from Dennis Deisinger, BAE Systems Ship Repair, to David Beaupre, Port of San Francisco, regarding vibration sources at the BAE site that could cause vibration in areas outside of BAE's leasehold area.

¹¹ Two long-term measurements (LT-1 and LT-2) were collected by Vibro-Acoustic Consultants (VACC) in the central and eastern portions of the 28-Acre Site, one long-term measurement (LT-3) was taken near the northeastern boundary of the 28-Acre Site, and one long-term measurement (LT-4) was collected by VACC along Illinois Street (north of the Mixed-Use District project site) from May 11 to May 16, 2012 (96 hours). Five short-term measurements (ST-1 through ST-5, 15 to 30 minutes) were also conducted by VACC during this same period in the vicinity of the BAE Systems Ship Repair facility, which are located north of the Mixed-Use District project site (see Appendix F for noise measurement data). The complete VACC report is included in Attachment 1 of the *Pier 70 Mixed-Use District Project, Noise Technical Memorandum*, San Francisco, CA, Case No. 2014-001272ENV, by Orion Environmental Associates (December 2016).

¹² Three long-term measurements (LT-5, LT-6, and LT-7) were collected at the waterfront on the 28-Acre Site and along Illinois Street on the Illinois Parcels by Orion Environmental Associates in the southern portion of the Mixed-Use District project site, while short-term measurements (ST-6 and ST-7, 15 minutes) were taken along the southern and western boundaries of the Mixed-Use District project site in April and August 2015. Short-term measurements were taken with a Metrosonics Model db 308 sound level meter, while the long-term measurement was taken with a 3M SoundPro SE/DL Type 2 sound meter.



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FIGURE 4.F.1: NOISE MEASUREMENT LOCATIONS

Noise measurement data are included in Appendix C. A summary of noise measurement data is presented in Table 4.F.3: Summary of Long-Term (LT) and Short-Term (ST) Noise Monitoring on the Project Site and Vicinity. Since BAE is one of the primary sources of noise in the project vicinity, the frequency and tonal characteristics of the shipyard noise were also measured as part of short-term measurements and included in Appendix C.

When noise measurements were taken in 2012, BAE was repairing a cruise ship. When this occurs, ship repair activities occur 24 hours per day, 7 days a week. Since maximum BAE operations occurred during this measurement period, these measurements are considered the worst-case, maximum background ambient noise level (including operation of generators). Subsequent to the 2012 measurements, BAE completed an electrical upgrade, which allows docking ships to connect to line power instead of Aggreko electric power generators. These generators are located between Dry Dock 2 and Dock 4 East and can also be located on docking ships near the exhaust stack. While this upgrade reduced 2012 noise levels in the northern margin of the project site most of the time, these generators still operate on a short-term basis during power outages and if a ship cannot connect to line power.¹³ Therefore, the 2012 measurements conservatively represent maximum noise levels generated at the BAE site.

Sims Metals Management (SMM) was also operating in 2012 but has since closed. In 2012, it operated in the northeastern portion of the project site every day of the 2012 measurement period except Sunday. Since SMM no longer operates on-site, the noise levels measured on Sunday, May 13, 2012 (when SMM was not operating) are considered to reflect the existing ambient noise environment in the project vicinity. The 0 to 2 dBA difference in L_{dn} between Sunday and average noise levels at the three long-term measurement locations in the vicinity of SMM is not considered a substantial difference.

When noise measurements were taken in 2015, there were intermittent noise sources observed during measurements. The BAE Systems Ship Repair facility typically operates during the daytime hours only, but an undocking operation occurred, which appeared to raise nighttime noise levels for a short time by 5 to 10 decibels, resulting in a minor increase in the 24-hour L_{dn} of 2 dBA.

¹³ E-mail communication with David Beaupre, Port of San Francisco, on September 8, 2015, regarding the status of the electrical upgrade project and operation of Aggreko generators at the BAE site.

Table 4.F.3: Summary of Long-Term (LT) and Short-Term (ST) Noise Monitoring on the Project Site and Vicinity (dBA)

| Measurement Location | Time Period | Average Ldn or Leq | Primary Noise Sources |
|---|--|--|--|
| LT-1: Eastern boundary of 28-Acre Site on the waterfront, south of Pier 64, between Slips 5 and 6 (minimum of 1,100 feet south of BAE Site) | Saturday, 5/12/12: Sunday, 5/13/12: Monday, 5/14/12: Tuesday, 5/15/12: Average: | 69 dBA (Ldn) 66 dBA (Ldn) ¹ 64 dBA (Ldn) 64 dBA (Ldn) 66 dBA (Ldn) | BAE ship repair activities occurred days, nights, and weekends (24/7) during measurement period and were audible above background ambient noise levels during site visit. Large trucks and buses were observed during site visit and may have operated in parking lot near the meter. |
| LT-2: Center of 28-Acre Site at north façade of Building 2 | Saturday, 5/12/12: Sunday, 5/13/12: Monday, 5/14/12: Tuesday, 5/15/12: Average: | 67 dBA (Ldn) 65 dBA (Ldn) ¹ 65 dBA (Ldn) 67 dBA (Ldn) 66 dBA (Ldn) | Ambient noise dominated by traffic in the distance and local industrial activity; BAE ship repair activities audible; and the hum tone from some lighting ballasts at the roof of Building 2 were very noisy, but did not affect noise measurement results. |
| LT-3: Northeast boundary of 28-Acre Site southeast of Building 6 (minimum of 500 feet south of BAE Site) | Saturday, 5/12/12: Sunday, 5/13/12: Monday, 5/14/12: Tuesday, 5/15/12: Average: | 62 dBA (Ldn) 60 dBA (Ldn) 61 dBA (Ldn) 63 dBA (Ldn) 62 dBA (Ldn) | Adjacent to Sims Metal Management (SMM), which was operating in 2012 but has since closed. Since SMM was closed on Sunday, 5/13/12, this level is more representative of the existing noise environment when cruise ship repair activities occur. Historic Building 6 helps block ship repair noise from this location and would continue to do so with the project. |
| LT-4: East of Illinois Street, north of project site, in tow yard just north of Building 103 | Saturday, 5/12/12: Sunday, 5/13/12: Monday, 5/14/12: Tuesday, 5/15/12: Average: | 61 dBA (Ldn) 61 dBA (Ldn) 63 dBA (Ldn) 63 dBA (Ldn) 62 dBA (Ldn) | Construction of the residential development at 820 Illinois occurred directly across Illinois Street and these activities occurred every day except Sunday. Ship repair activities were not audible at this location during the site visit. |
| LT-5: Southeastern boundary of 28-Acre Site on the waterfront, south of Pier 64 at Slip 8 | Thursday, 4/2/15: Friday, 4/3/15: Average: | 57 dBA (Ldn) 59 dBA (Ldn) 58 dBA (Ldn) | Traffic and construction activities at Affordable Storage occurred near meter. Military ship (in for repair at BAE Site) was moved from Drydock 2 to Berth 4-East around midnight. ² |

Table 4.F.3 Continued

| Measurement Location | Time Period | Average Ldn or Leq | Primary Noise Sources |
|---|---|---|---|
| LT-6: North-central portion of Illinois Parcels, east of Illinois Street, about 110 feet east of the centerline at ImPark parking lot | Tuesday, 8/18/15 Thursday, 8/19/15 Average: | 64 dBA (Ldn) 64 dBA (Ldn) 64 dBA (Ldn) | Traffic on Illinois Street (including construction haul trucks); cars parking in ImPark lot; traffic/activities at AIC to the west across Illinois Street. |
| LT-7: Southwest portion of Illinois Parcels in Hoedown Yard, 110 feet from Illinois Street | Tuesday, 8/18/15 Daytime, 8/18/15 Wednesday, 8/19/15 Daytime, 8/19/15 Average: | 67 dBA (Ldn) 63 dBA (Leq) 68 dBA (Ldn) 66 dBA (Leq) 68 dBA (Ldn) | Heavy equipment at Hoedown Yard; Potrero Substation hum; traffic on Illinois and 22 nd streets; AIC activities to the west across Illinois Street. |
| ST-1: North of project site at BAE Site, at Dry Dock 2 | Thursday, 5/17/12, 11:00 a.m. to noon (15–30 minutes) | 77 dBA (Leq) | Cruise ship repair activities, including nights and weekends. |
| ST-2: North of project site at BAE Site, West of Dry Dock 2 | Thursday, 5/17/12, 11:00 a.m. to noon (15–30 minutes) | 81 dBA (Leq) | Aggreko electric power generators operating 30 feet away. |
| ST-3: North of project site at BAE Site at Dock 4 East | Thursday, 5/17/12, 11:00 a.m. to noon (15–30 minutes) | 76 dBA (Leq) | Military ship repair activities. |
| ST-4: North of project site at BAE Site at the western end of repair facilities | Thursday, 5/17/12, 11:00 a.m. to noon (15–30 minutes) | 66 dBA (Leq); 77 dBA (Leq) | Ship repair activities at west end of ship repair docks, fire pump (runs continuously). |
| ST-5: Northern boundary of 28-Acre Site adjacent to 20 th Street at southern façade of BAE Site boiler building | Thursday, 5/17/12, 11:00 a.m. to noon (15–30 minutes) | 76 dBA (Leq) ¹ | BAE Site boiler facilities. |
| ST-6: West side of Illinois Parcels, about 50 feet east of the Illinois Street centerline | Wednesday, 4/1/15 11:30 a.m. to 11:45 a.m. (15 minutes) | 64 dBA (Leq) | Traffic on Illinois Street, including construction haul trucks; heavy equipment operating to the south (in Hoedown Yard) was audible during measurement. |

Table 4.F.3 Continued

| Measurement Location | Time Period | Average Ldn or Leq | Primary Noise Sources |
|---|---|--------------------|---|
| ST-7: Southern boundary of project site, adjacent to 22 nd Street at gate, 550 feet from Illinois Street | Wednesday, 4/1/15 noon to 12:15 p.m. (15 minutes) | 58 dBA (Leq) | Heavy equipment at Hoedown Yard, Potrero Substation hum, and traffic on 22 nd Street were audible. |

Notes: Maximum BAE Site operations (24/7) occurred during measurement of LT-1 through LT-4 and therefore these measurements are considered the worst-case, maximum background ambient noise levels. No nighttime ship repair activities occurred during the LT-5 measurement period, but an undocking operation occurred around midnight on Friday, 4/3/15.

¹ During the 2012 measurement period, Sims Metals Management (SMM) operated in the northern portion of the project site every day except Sunday. Since SMM no longer operates on-site, the noise levels measured on Sunday, May 13, 2012 (when SMM was not operating) are considered to reflect the existing ambient noise environment in the project vicinity.

² E-mail communication from Gerry Roybal, Maritime Marketing Manager, Port of San Francisco, on April 15, 2015.

Sources: VACC, 2012 (LT-1 through LT-4 and ST-1 through ST-5); Orion Environmental Associates, 2015 (LT-5, LT-6, LT-7, ST-6, and ST-7)

A comparison of 2015 nighttime noise measurements collected along the western boundary of the Illinois Parcels (Location LT-6, which is 700 feet north of Potrero Substation and 110 feet from the centerline of Illinois Street, and Location LT-7, which is 200 feet from Potrero Substation and 110 feet from the centerline of Illinois Street) indicate that as much as 10 to 13 dBA (Leq) of the nighttime ambient noise levels could be attributable to noise generated by Potrero Substation.

Both short-term and long-term noise measurements taken along Illinois Street in 2012 and 2015 were affected by construction-related truck traffic traveling on Illinois Street, current activities at the PG&E Hoedown Yard (southwest corner of the Illinois Parcel), and construction of a multi-family development (820 Illinois Street) northwest of the site.

In the project vicinity, the primary sources of noise are the BAE Systems Ship Repair facility, various industrial activities (AIC Industrial Center, PG&E Hoedown Yard, and Potrero Substation facilities), new development-related construction activities along Illinois Street, traffic on local streets in the project vicinity (Illinois Street, 20th Street, and 22nd Street), and the distant I-280 freeway. Noise measurements indicate that noise levels in the project area averaged 66 dBA (L_{dn}, ranging between 60 and 70 dBA [L_{dn}]) when nighttime ship repair activities occur, and averaged 60 dBA [L_{dn}] or 6 dBA less when nighttime repair activities do not occur.¹⁴

¹⁴ LT-1 is located approximately 1,100 feet from the BAE Systems Ship Repair facility, while LT-5 is located approximately 1,400 feet from these repair facilities. When adjusted for this difference in distance (difference of 2 dB), nighttime noise levels at approximately 1,100 feet from the dry docks (LT-1) ranged from 57-61 dBA (L_{eq}) or 66 dBA (L_{dn}) with nighttime ship repair activities and 50-55 dBA (L_{eq}) or 60 dBA (L_{dn}) without nighttime ship repair activities.

Sensitive Receptors

Some land uses (and associated users) are considered more sensitive to ambient noise levels than others due to the types of activities typically involved with the land use and the amount of noise exposure (in terms of both exposure duration and insulation from noise). In general, occupants of residences, schools, daycare centers, hospitals, places of worship, and nursing homes are considered to be sensitive receptors (i.e., persons who are sensitive to noise based on their specific activities, age, health, etc.). There are industrial, commercial, and residential uses in the project site vicinity. Existing noise-sensitive receptors in the project vicinity (within 900 feet of the project site) include residences and schools, as listed below in Table 4.F.4: Sensitive Receptors in the Project Vicinity, and their locations are indicated in Figure 4.F.2: Noise-Sensitive Receptors in the Project Vicinity, p. 4.F.16. The UCSF Mission Bay Hospital (1825 Fourth Street) is located approximately 0.3 mile to the north. Also, there are additional planned residential developments in the project vicinity, which are also listed in Table 4.F.4. There are no skilled nursing facilities, churches, or public libraries in the immediate project vicinity.

REGULATORY FRAMEWORK

FEDERAL REGULATIONS

In 1972, the Noise Control Act (42 United States Code [U.S.C.] Section 4901 et seq.) was passed by Congress to promote noise environments in support of public health and welfare. It also established the USEPA Office of Noise Abatement and Control to coordinate Federal noise control activities. USEPA established guidelines for noise levels that would be considered safe for community exposure without the risk of adverse health or welfare effects. USEPA found that to prevent hearing loss over the lifetime of a receptor, the yearly average L_{eq} should not exceed 70 dBA, and the L_{dn} should not exceed 55 dBA in outdoor activity areas or 45 dBA indoors to prevent interference and annoyance.¹⁵ In 1982, USEPA phased out the office's funding as part of a shift in Federal noise control policy to transfer the primary responsibility of regulating noise to State and local governments.

Federal regulations establish noise limits for medium and heavy trucks (more than 4.5 tons, gross vehicle weight rating) under Title 40 of the Code of Federal Regulations, Part 205, Subpart B. The Federal truck passby noise standard is 80 dBA at 50 feet from the vehicle pathway centerline, under specified test procedures. These requirements are implemented through regulatory controls on truck manufacturers. There are no comparable standards for vibration, which tend to be specific to the roadway surface, the vehicle load, and other factors.

¹⁵ U.S. Environmental Protection Agency, Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety, March 1974.

Table 4.F.4. Sensitive Receptors in the Project Vicinity

| Type of Sensitive Receptor | Address | Minimum Distance from Site |
|---|---------------------------------|----------------------------|
| EXISTING SENSITIVE RECEPTORS WITHIN 900 FEET OF PROJECT SITE | | |
| North of 20th Street (Northwest of Project Site) | | |
| Dogpatch Alternative School (Site 2) | 616 20 th Street | 140 feet |
| Residential | 628 20 th Street | 190 feet |
| Potrero Kids (Daycare) | 810 Illinois Street | 350 feet |
| Residential | 820 Illinois Street | 200 feet |
| Residential | 2235 Third Street | 375 feet |
| Residential | 993 Tennessee Street | 460 feet (approx.) |
| La Piccola Scuola Italiana (School) | 728 20 th Street | 470 feet (approx.) |
| Residential | 700 Illinois Street | 770 feet |
| Residential | 755 Tennessee Street | 825 feet |
| Residential | 701 Minnesota Street | 700 feet |
| Between 20th and 22nd Streets (West of Project Site) | | |
| Dogpatch Alternative School | 2265 Third Street | 250 feet |
| Residential | 2476-2478 Third Street | 370 feet |
| Residential | 702-718 22 nd Street | 375-430 feet |
| Residential | 1080 Tennessee Street | 630 feet |
| Friends of Potrero Hill Nursery School | 1060A Tennessee Street | 630 feet |
| Residential | 808-840 22 nd Street | 690-780 feet |
| Residential | 801-976 Minnesota Street | 650-915 feet |
| South of 22nd Street (Southwest of Project Site) | | |
| Residential | 711 22 nd Street | 380 feet |
| Residential | 1100-1195 Tennessee Street | 500 feet |
| Residential | 825-829 22 nd Street | 700 feet |
| Residential | 1015 Minnesota Street | 750 feet |
| FUTURE/PLANNED RESIDENTIAL RECEPTORS WITHIN 900 FEET OF PROJECT SITE | | |
| North of 20th Street (North or Northwest of Project Site) | | |
| Residential (Mixed) | 815 Tennessee Street | 525 feet |
| Residential (Mixed) | 2177 Third Street | 700 feet |
| Residential (Mixed) | 888 Tennessee Street | 650 feet |
| South of 22nd Street (Southwest of Project Site) | | |
| Residential (Mixed) | 1201-1225 Tennessee Street | 780 feet |

Source: Google Earth (Imagery Date 4/5/2016) for parcel data (land use, address, and distance to the site); Baseline and Cumulative Projects List in Section 4.A, Introduction to Chapter 4, of this EIR, pp. 4.A.5-4.A.11

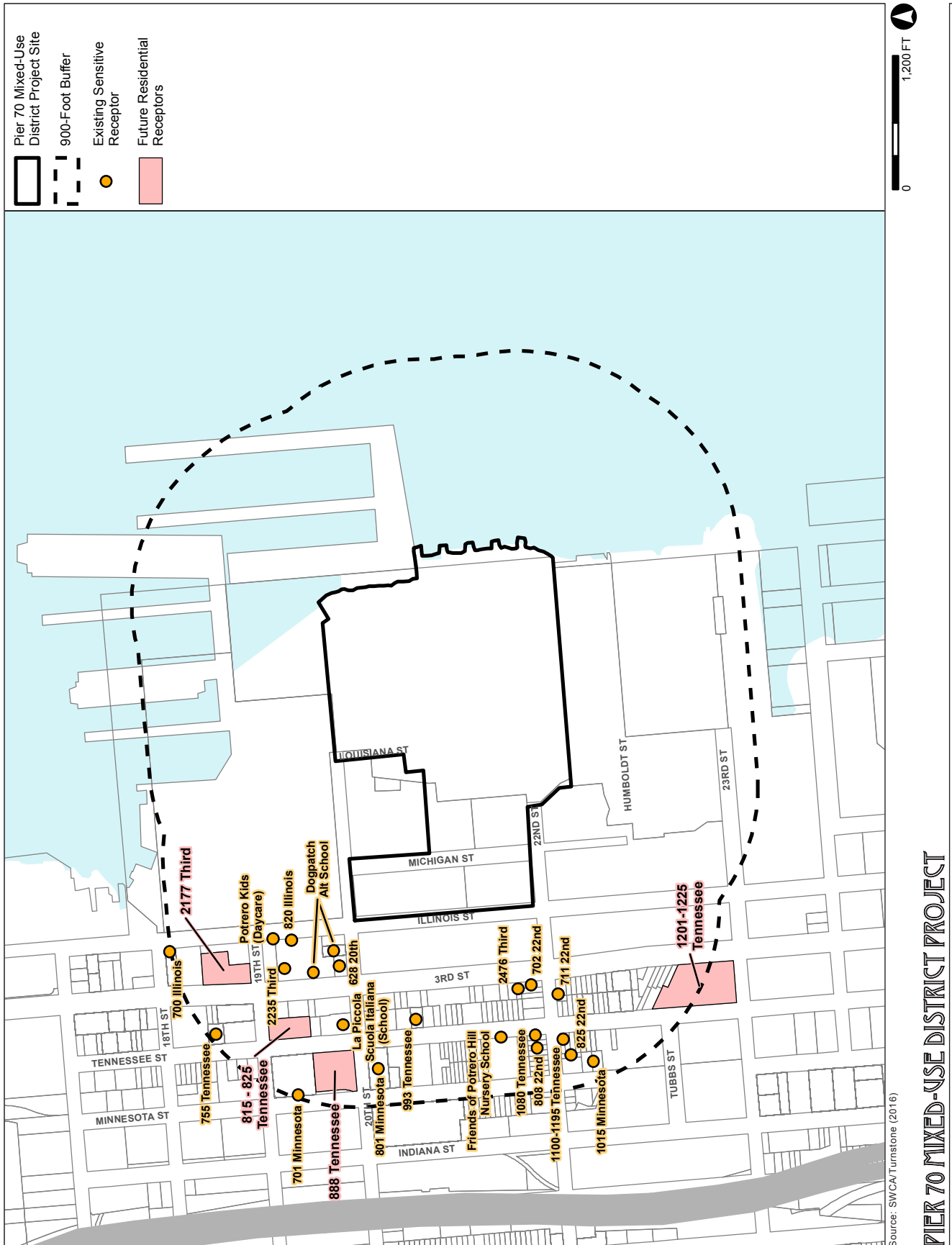


FIGURE 4.F.2: NOISE-SENSITIVE RECEPTORS IN THE PROJECT VICINITY

PIER 70 MIXED-USE DISTRICT PROJECT

STATE REGULATIONS

Noise

With respect to noise insulation standards, the 2013 California Building Code (Title 24, Part 2 of the California Code of Regulations [CCR]) requires that walls and floor/ceiling assemblies separating dwelling units from each other or from public or service areas have a Sound Transmission Class (STC) of at least 50, meaning they can reduce noise by a minimum of 50 dB.¹⁶ The Green Building Code standards (Section 1207.4, Allowable Interior Noise Levels) also specify a maximum interior noise limit of 45 dBA (L_{dn} or CNEL) in habitable rooms, and require that common interior walls and floor/ceiling assemblies meet a minimum STC rating of 50 for airborne noise.

The 2013 Green Building Standards Code (also part of the State Building Code; CCR Title 24, Part 11, and referenced below as the more commonly known “Title 24”) specifies the following insulation standards for Environmental Comfort (Section 5.507) to minimize exterior noise transmission into interior spaces for non-residential buildings:

- Section 5.507.4.1, Exterior Noise Transmission, requires wall and roof-ceiling assemblies to have an STC of at least 50 and exterior windows to have a minimum STC of 30 for any of the following building locations: (1) within the 65-dBA, L_{dn} , noise contour of a freeway, expressway, railroad, or industrial source; and (2) within the 65-dBA noise contour of an airport. Exceptions include buildings with few or no occupants and where occupants are not likely to be affected by exterior noise, such as factories, stadiums, parking structures, and storage or utility buildings. Section 5.507.4.1.1 requires non-residential buildings to be designed with exterior walls and roof-ceiling assemblies with an STC rating of 45 to provide an acceptable interior noise level of 50 dBA, L_{eq} , in occupied areas during any hour of operation.¹⁷
- 5.507.4.3, Interior Sound Transmission, requires wall and floor-ceiling assemblies separating tenant spaces and also separating tenant spaces and public places to have an STC of at least 40.
- 5.507.4.2, Interior Sound, requires wall and floor-ceiling assemblies separating tenant spaces and separating tenant spaces and public places to have an STC of at least 40.

San Francisco has adopted the Green Building Code; it is enforced by the Department of Building Inspection.

¹⁶ State Building Code Section 1207.2.

¹⁷ California Building Standards Commission and International Code Council, *Guide to the 2013 California Green Building Standards Code (Nonresidential)*, *Cal Green*, Section 5.507, *Environmental Comfort*, pp. 95-97, February 2014.

Vibration

To assess the damage potential to structures from ground vibration induced by construction equipment, various vibration criteria were reviewed and synthesized by Caltrans and they are presented in Table 4.F.5: Vibration Guidelines for Potential Damage to Structures. As indicated in this table, the threshold for continuous vibration sources is about half of the threshold for transient sources.

Table 4.F.5: Vibration Guidelines for Potential Damage to Structures

| Structure Type and Condition | Maximum Peak Particle Velocity (in/sec, PPV) | |
|--|--|--|
| | Transient Sources | Continuous/Frequent Intermittent Sources |
| Extremely fragile historic buildings, ruins, ancient monuments | 0.12 | 0.08 |
| Fragile buildings | 0.2 | 0.1 |
| Historic and some old buildings | 0.5 | 0.25 |
| Older residential structures | 0.5 | 0.3 |
| New residential structures | 1.0 | 0.5 |
| Modern industrial/commercial buildings | 2.0 | 0.5 |

Notes: Transient sources create a single, isolated vibration event, such as blasting or drop balls. Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

Source: Caltrans, *Transportation and Construction Vibration Guidance Manual*, September 2013, Table 19, p. 27. Available online at <http://www.dot.ca.gov/hq/env/noise/publications.htm>. Accessed on December 16, 2016.

People are more sensitive to vibration during the nighttime hours when sleeping than during daytime waking hours. Numerous studies have been conducted to characterize the human response to vibration. As shown in Table 4.F.6: Vibration Guidelines for Annoyance, for steady-state (continuous) vibration, human response is typically “strongly perceptible” at 0.1 in/sec PPV, “distinctly perceptible” at 0.035 in/sec PPV, and “barely perceptible” at 0.01 in/sec PPV.

LOCAL REGULATIONS AND GUIDELINES

San Francisco Police Code

In the City, regulation of noise is addressed in Article 29 of the Police Code (the Noise Ordinance or Police Code), which states the City’s policy is to prohibit unnecessary, excessive, and offensive noises from all sources subject to police power. Section 2900 makes the following declaration with regard to community noise levels: “It shall be the policy of San Francisco to maintain noise levels in areas with existing healthful and acceptable levels of noise and to reduce

Table 4.F.6: Vibration Guidelines for Annoyance

| Human Response | Maximum Peak Particle Velocity (in/sec, PPV) | |
|------------------------|--|---|
| | Transient Sources ¹ | Continuous/Frequent Intermittent Sources ² |
| Barely perceptible | 0.04 | 0.01 |
| Distinctly perceptible | 0.25 | 0.04 |
| Strongly perceptible | 0.90 | 0.10 |
| Severe | 2.00 | 0.10 |

Notes:

in/sec = inches per second; PPV = peak particle velocity

¹ Transient sources create a single, isolated vibration event, such as blasting or drop balls.

² Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

Source: Caltrans, *Transportation and Construction Vibration Guidance Manual*, September 2013, Table 20, p. 38. Available online at <http://www.dot.ca.gov/hq/env/noise/publications.htm>. Accessed on December 16, 2016.

noise levels, through all practicable means, in those areas of San Francisco where noise levels are above acceptable levels as defined by the World Health Organization's Guidelines on Community Noise.”

Sections 2907 and 2908 of Article 29 regulate construction equipment and construction work at night, while Section 2909 provides for limits on stationary-source noise from machinery and equipment. Sections 2907 and 2908 are enforced by the Department of Building Inspection, and Section 2909 is enforced by the Department of Public Health. Summaries of these and other relevant sections are presented below.

Section 2907(a) of the Police Code limits noise from construction equipment to 80 dBA when measured at a distance of 100 feet from such equipment, or an equivalent sound level at some other convenient distance. Exemptions to this requirement include impact tools with approved mufflers, pavement breakers, and jackhammers with approved acoustic shields, and construction equipment used in connection with emergency work. Section 2908 prohibits nighttime construction (between 8:00 p.m. and 7:00 a.m.) that generates noise exceeding the ambient noise level by 5 dBA at the nearest property line unless a special permit has been issued by the City.

Section 2909 generally prohibits fixed mechanical equipment noise and music in excess of 5 dBA more than ambient noise from residential sources, 8 dBA more than ambient noise from commercial sources, and 10 dBA more than ambient on public property at a distance of 25 feet or more. Section 2909(d) establishes maximum noise levels for fixed noise sources (e.g., mechanical equipment) of 55 dBA (7:00 a.m. to 10:00 p.m.) and 45 dBA (10:00 p.m. to 7:00

a.m.) inside any sleeping or living room in any dwelling unit located on residential property to prevent sleep disturbance, with windows open, except where building ventilation is achieved through mechanical systems that allow windows to remain closed.

The City's *Guidelines for Noise Control Ordinance Monitoring and Enforcement*, revised in December 2014, clarifies the definition of "ambient" as the L_{90} (the level of noise exceeded 90 percent of the time), and this noise descriptor is considered to be a conservative representation of the ambient under most conditions.¹⁸ Ordinance compliance is determined by measuring the L_{90} for 10 minutes, with and without the noise source at issue. Use of the L_{90} descriptor is appropriate when determining code compliance of a fixed noise source (such as mechanical equipment), but is not appropriate for other aspects of a CEQA noise impact analysis, which determines noise compatibility based on L_{dn} or CNEL, a different noise descriptor (as described above under "Sound Fundamentals," p. 4.F.1).

Use of Sound Amplifying Equipment

As discussed below under Project Features, the Proposed Project includes open space that would be programmed for various special events, some of which may include amplified sound and, therefore, may require a permit from the Entertainment Commission. Article 1, Section 47.2 of the Police Code regulates the use of any sound amplifying equipment, whether truck-mounted or otherwise, within the City and County of San Francisco and consists of the following regulations:

1. The only sounds permitted are music or human speech.
2. Hours of operation permitted shall be between 9:00 a.m. and 10:00 p.m.; operation after 10:00 p.m. is permitted only at the location of a public event or affair of general public interest or as otherwise permitted by the Entertainment Commission.
3. Except as permitted by the Entertainment Commission, sound shall not be issued within 450 feet of hospitals, schools, churches, courthouses, public libraries, or mortuaries.
4. No sound truck with its amplifying device in operation shall traverse any one block in the City and County more than four times in any one calendar day.
5. Amplified human speech and music shall not be unreasonably loud, raucous, jarring, or disturbing to persons of normal sensitiveness within the area of audibility, nor louder than permitted in Subsections (6) and (7) hereof.

¹⁸ City and County of San Francisco, San Francisco Police Code, Article 29: Regulation of Noise Guidelines for Noise Control Ordinance Monitoring and Enforcement, December 2014 Guidance (Supersedes All Previous Guidance), December 2014. Available online at <https://www.sfdph.org/dph/files/EHSdocs/ehsNoise/GuidelinesNoiseEnforcement.pdf>. Accessed April 22, 2015.

6. When the sound truck is in motion, the volume of sound shall be controlled so that it will not be audible for a distance in excess of 450 feet from its source; provided, however, that when the sound truck is stopped by traffic, the said sound amplifying equipment shall not be operated for longer than one minute at such a stop.
7. Except as permitted by the Entertainment Commission for public gatherings, in all cases where sound amplifying equipment remains at one location or when the sound truck is not in motion, the volume of sound shall be controlled so that it will not be audible for a distance in excess of 250 feet from the periphery of the attendant audience.
8. No sound amplifying equipment shall be operated unless the axis of the center of any sound reproducing equipment used shall be parallel to the direction of travel of the sound truck; provided, however, that any sound reproducing equipment may be so placed upon said sound truck as to not vary more than 15 degrees on either side of the axis of the center of the direction of travel and, provided further, that radial, nondirectional type of loudspeakers may be used on said sound trucks either alone or in conjunction with sound reproducing equipment placed within 15 degrees of the center line of the direction of travel.

San Francisco Entertainment Commission Permits

Section 90.1 of the San Francisco Administrative Code establishes the role of the San Francisco Entertainment Commission to regulate, promote and enhance the field of entertainment in San Francisco. The seven-member commission has powers to accept, review, and gather information to conduct hearings for entertainment-related permit applications and rule upon and issue, deny, condition, suspend, revoke or transfer entertainment-related permits in accordance with applicable laws and regulations. Additionally, the Entertainment Commission plans and coordinates the provision of City services for major events for which there is no recognized organizer, promoter, or sponsor.

Pursuant to Section 1060.1 of the Police Code, the Entertainment Commission has permit authority over a variety of different permit types including Place of Entertainment permits, Outdoor Amplified Sound/Loudspeaker permits, and Limited Live Performance permits. Permit hearings require the applicant to provide proof of neighborhood outreach to the Commission. Such outreach must consist of at least two of four types of outreach: (1) presentation to a neighborhood, community or residential group; (2) presentation to the leadership of a local not-for-profit that deals with community support such as housing, at risk youth, health, or mental services; (3) a petition including an appropriate number of neighbor signatures according to the applicants business address; and/or (4) presentation to a business association if no community organization or not-for-profit exists near the venue.

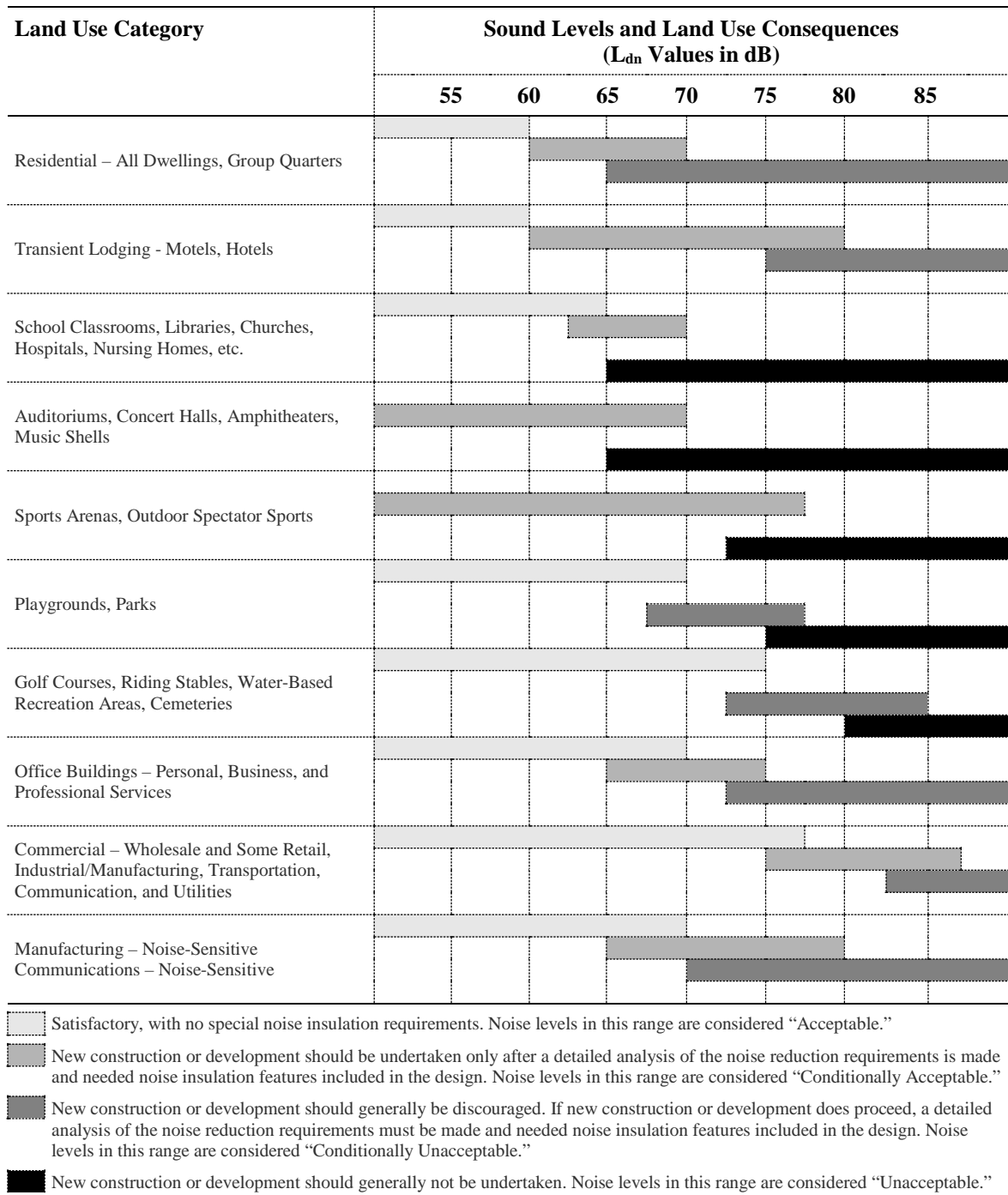
San Francisco General Plan

The Environmental Protection Element of the *San Francisco General Plan (General Plan)* contains Land Use Compatibility Guidelines for Community Noise for determining the compatibility of various land uses with different noise levels (see Figure 4.F.3: San Francisco Land Use Compatibility Chart for Community Noise). These guidelines, which are similar to State guidelines set forth by the Governor's Office of Planning and Research, indicate maximum acceptable noise levels for various land uses. Although this figure presents a range of noise levels that are considered compatible or incompatible with various land uses, the maximum "satisfactory" noise level is 60 dBA (L_{dn}) for residential and hotel uses; 65 dBA (L_{dn}) for school classrooms, libraries, churches, and hospitals; 70 dBA (L_{dn}) for playgrounds, parks, office uses, retail commercial uses, and noise-sensitive manufacturing/communications uses; and 77 dBA (L_{dn}) for other commercial uses such as wholesale, some retail, industrial/manufacturing, transportation, communications, and utilities. If these uses are proposed to be located in areas with noise levels that exceed these guidelines, a detailed analysis of noise reduction requirements is normally necessary for each building or group of buildings prior to final review and approval.

Objectives and policies in the Environmental Protection Element that pertain to the Proposed Project include the following:

- Policy 9.2: Impose traffic restrictions to reduce transportation noise. Transportation noise levels vary according to the predominance of vehicle type, traffic volume, and traffic speed. Curtailing any of these variables ordinarily produces a drop in noise level. In addition to setting the speed limit, the City has the authority to restrict traffic on city streets, and it has done so on a number of streets. In addition, certain movement restraints can be applied to slow down traffic or divert it to other streets. These measures should be employed where appropriate to reduce noise.
- Policy 9.6: Discourage changes in streets which will result in greater traffic noise in noise-sensitive areas. Widening streets for additional traffic lanes or converting streets to one-way direction can induce higher traffic volume and faster speeds. Other techniques such as tow-away lanes and traffic light synchronization also facilitate heavier traffic flows. Such changes should not be undertaken on residential streets if they will produce an excessive rise in the noise level of those streets.
- Objective 10: Minimize the impact of noise on affected areas. The process of blocking excessive noise from our ears could involve extensive capital investment if undertaken on a systematic, citywide scale. Selective efforts, however, especially for new construction, are both desirable and justified.
 - Policy 10.1: Promote site planning, building orientation and design, and interior layout that will lessen noise intrusion. Because sound levels drop as distance from the source increases, building setbacks can play an important role in reducing noise for the building occupants. (Of course,

Figure 4.F.3: San Francisco Land Use Compatibility Chart for Community Noise



Source: San Francisco Planning Department, 1996. *San Francisco General Plan*, adopted on June 27, 1996. Available online at http://www.sf-planning.org/ftp/General_Plan/I6_Environmental_Protection.htm#ENV_TRA_11. Accessed March 12, 2015.

if provision of the setback eliminates livable rear yard space, the value of the setback must be weighed against the loss of the rear yard.) Buildings sited with their narrower dimensions facing the noise source and sited to shield or be shielded by other buildings also help reduce noise intrusion.

Although walls with no windows or small windows cut down on noise from exterior sources, in most cases it would not be feasible or desirable to eliminate wall openings. However, interior layout can achieve similar results by locating rooms whose use require more quiet, such as bedrooms, away from the street noise. In its role of reviewing project plans and informally offering professional advice on site development, the Department of City Planning can suggest ways to help protect the occupants from outside noise, consistent with the nature of the project and size and shape of the building site.

- Policy 10.2: Promote the incorporation of noise insulation materials in new construction. State-imposed noise insulation standards apply to all new residential structures except detached single-family dwellings. Protection against exterior noise and noise within a building is also important in many nonresidential structures. Builders should be encouraged to take into account prevailing noise levels and to include noise insulation materials as needed to provide adequate insulation.
- Policy 10.3: Construct physical barriers to reduce noise transmission from heavy traffic carriers. If designed properly, physical barriers such as walls and berms along transportation routes can in some instances effectively cut down on the noise that reaches the areas beyond. There are opportunities for a certain amount of barrier construction, especially along limited access thoroughfares and transit rights-of-way (such as BART), but it is unlikely that such barriers can be erected along existing arterial streets in the city. Barriers are least effective for those hillside areas above the noise source. Where feasible, appropriate noise barriers should be constructed.
- Objective 11: Promote land uses that are compatible with various transportation noise levels. Because transportation noise is going to remain a problem for many years to come, attention must be given to the activities close to the noise. In general, the most noise-sensitive activities or land uses should ideally be the farthest removed from the noisy transportation facilities. Conversely, those activities that are not seriously affected by high outside noise levels can be located near these facilities.

Central Waterfront Plan

- Objective 1.5: Minimize the impact of noise on affected areas and ensure general plan noise requirements are met.

Noise, or unwanted sound, is an inherent component of urban living. While environmental noise can pose a threat to mental and physical health, potential health impacts can be avoided or reduced through sound land use planning. The careful analysis and siting of new land uses can help to ensure land use compatibility, particularly in zones which allow a diverse range of land uses.

Traffic is the most important source of environmental noise in San Francisco. Commercial land uses also generate noise from mechanical ventilation and cooling systems, and through freight movement. Sound control technologies are available to both insulate sensitive uses and contain unwanted sound. The use of good urban design can help to ensure that noise does not impede access and enjoyment of public space.

- Policy 1.5.1: Reduce potential land use conflicts by providing accurate background noise-level data for planning.
- Policy 1.5.2: Reduce potential land use conflicts by carefully considering the location and design of both noise generating uses and sensitive uses in the Central Waterfront.

IMPACTS AND MITIGATION MEASURES

SIGNIFICANCE THRESHOLDS

The thresholds for determining the significance of impacts in this analysis are consistent with the environmental checklist in Appendix G of the State CEQA Guidelines, which has been modified by the San Francisco Planning Department. For the purpose of this analysis, the following applicable thresholds were used to determine whether implementing the project would result in a significant noise or vibration impact. The Proposed Project would have a significant impact related to noise and vibration if it were to:

- F.1 Result in exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;
- F.2 Result in exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels;
- F.3 Result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project; or
- F.4 Result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.
- F.5 Be located within an airport land use plan area, or, where such a plan has not been adopted, in an area within two miles of a public airport or public use airport, resulting in exposure to excessive noise levels for people residing or working in the area.
- F.6 Be located within the vicinity of a private airstrip, resulting in the exposure to excessive noise levels for people residing or working in the project area.
- F.7 Be substantially affected by existing noise levels.

The project site is not within an airport land use plan area, nor is it within 2 miles of a public airport or public use airport or in the vicinity of a private airstrip. Therefore, criteria F.5 and F.6 are not applicable, and are not discussed further in the impacts evaluation, below.

APPROACH TO ANALYSIS

Noise

Project implementation would result in operation of heavy equipment on the project site for demolition of existing structures, construction of new structures, and rehabilitation of on-site structures to be retained. Construction activities would occur intermittently on the project site over the 11-year construction duration and could expose nearby sensitive receptors to temporary increases in noise levels substantially in excess of ambient levels. Project construction would also result in temporary increases in truck traffic noise along haul routes for off-hauling excavated materials and materials deliveries. To assess potential construction noise impacts, sensitive receptors and their relative exposure were identified and described. When determining exposure to noise, consideration was given to factors such as structural barriers and distance because of their ability to attenuate noise.

Operation of on-site equipment expected to be used in project construction were estimated based on equipment noise data published by the Federal Highway Administration (FHWA) and Federal Transit Administration (FTA), as shown in Table 4.F.8: Typical Construction Noise Levels, p. 4.F.34. The sources assessed were identified by the project sponsors as likely equipment to be used during project construction. The roadway noise construction model of FHWA was then used to predict noise levels at the nearest receptors during both pile-driving activity and non-impact construction activity.

Methodology for Analysis of Construction Impacts

Construction-related noise impacts were assessed in part using FTA methodology for general quantitative noise assessment.¹⁹ This methodology calls for estimating a combined noise level from simultaneous operation of the two noisiest pieces of equipment expected to be used in each construction phase. This method applies usage factors to each piece of equipment analyzed to account for the time that the equipment is in use over the specified time period. Given the size of the project site, the minimum distance between source and receptor was based on the distance between the closest boundary to the specified receptors.

Noise ordinances regulate noise sources under the control of local jurisdictions, such as mechanical equipment and amplified sounds, as well as prescribe hours of heavy equipment operation. Time and noise limits prescribed in Article 29 of the Police Code are used in this EIR as criteria to determine the significance of project impacts under CEQA in addition to

¹⁹ U.S. Department of Transportation, Federal Transit Administration (FTA), *Transit Noise and Vibration Impact Assessment, Section 12.1.1 Quantitative Noise Assessment Methods*, May 2006, pp. 12-4 to 12-8. Available online at http://www.fta.dot.gov/12347_2233.html. Accessed on March 13, 2016.

consideration of other qualitative criteria such as the duration of noise and the proximity of sensitive receptors. Quantitative criteria that are used to determine the significance of construction-related noise increases under CEQA (including relevant sections of the San Francisco Noise Ordinance) are summarized as follows:

- **Construction Equipment Noise Thresholds.** Proposed construction activities would be required to comply with the San Francisco Noise Ordinance. Sections 2907 and 2908 of the San Francisco Noise Ordinance allows construction activities between 7:00 a.m. and 8:00 p.m., but limits noise from any individual piece of construction equipment, except impact tools approved by San Francisco Public Works, to 80 dBA at 100 feet, which is equivalent to 86 dBA at 50 feet. Construction noise impacts from non-impact equipment that comply with Section 2907(a) of the Noise Ordinance would be considered less than significant (Impact M-NO-1). If construction activities using non-impact equipment would exceed the Section 2907(a) standard, then the noise effects would be significant and mitigation measures would be required.
- **Construction Noise Thresholds at Sensitive Receptors.** The San Francisco Noise Ordinance does not identify quantitative noise limit standards for impact equipment or combined noise impacts from simultaneous operation of multiple pieces of equipment. Therefore, the significance of impact tool (including pile-driving noise) and combined noise increases from simultaneous operation of multiple pieces of construction equipment are evaluated at the closest sensitive receptors based on application of FTA guidelines, as described above (at residential uses, 90 dBA (Leq) during the day and 80 dBA during the night because they are noise-sensitive). To determine whether the project would result in a significant impact with respect to temporary daytime increases in noise levels in the project vicinity above levels existing without the project, the Planning Department considers an increase of 10 dBA over existing noise levels (“Ambient+10 dBA” threshold) due to persistent construction, which generally represents a perceived doubling of loudness, to be a substantial temporary increase in noise levels.

Methodology for Analysis of Operational Impacts

Operation of the Proposed Project would result in permanent increases in ambient noise levels, primarily through project-related increases in traffic, addition of stationary equipment, and introduction of new uses, events, and activities on the project site. Operational noise issues evaluated in this section include: (1) noise increases resulting from the Proposed Project’s stationary and mobile noise sources (Impacts NO-4 and NO-5 respectively); and (2) compatibility of the Proposed Project’s noise-sensitive uses and existing uses in the project site vicinity with future noise levels at the project site, as defined by the San Francisco Land Use Compatibility Guidelines for Community Noise (Impact NO-6). Additionally, any operations or activities with the potential to cause sleep disturbance would also be considered a significant noise impact (Impacts NO-4 and NO-6). Traffic noise modeling was performed using the FHWA Traffic Noise (RD-77-108) Model. The significance of noise increases from operation of stationary equipment on the project site is assessed based on ordinance noise increase limits as specified below.

Traffic increases associated with the Proposed Project would result in traffic noise increases along local streets. In general, traffic noise increases of less than 3 dBA are barely perceptible to people, while a 5-dBA increase is readily noticeable.²⁰ Therefore, permanent increases in ambient noise levels of more than 5 dBA are considered to be unacceptable and a significant noise impact in any existing or resulting noise environment. However, in places where the existing or resulting noise environment is “Conditionally Acceptable,” “Conditionally Unacceptable,” or “Unacceptable” based on the San Francisco Land Use Compatibility Chart for Community Noise (Figure 4.F.3, p. 4.F.23), for sensitive noise receptors any noise increase greater than 3 dBA is considered a significant noise impact.

Traffic noise levels on 79 road segments in the Project vicinity were modeled using traffic volumes presented in the *Pier 70 Traffic Impact Study* (see Figure 4.E.1: Transportation Study Area and Study Intersections, in Section 4.E., Transportation and Circulation, p. 4.E.2).²¹ In Table 4.F.10: Summary of Existing and Existing Plus Project Traffic Noise Levels, p. 4.F.52-4.F.56, these modeled traffic noise levels were used to determine the change in traffic noise levels resulting from changes in traffic volumes. The above thresholds (more than a 5-dBA increase, or 3-dBA increase where ambient noise levels are Conditionally Acceptable, Conditionally Unacceptable, or Unacceptable for noise-sensitive receptors) were applied to determine whether the incremental noise increases is considered significant.

Noise Limits and Performance Standards Applied in Analysis

The Police Code and Green Building Code impose noise limits and are applied in this impact analysis as significance thresholds and as performance standards in mitigation measures. These performance standards will be applied to the future design of Proposed Project residential and commercial-office buildings:

- Section 2909 of the Police Code generally prohibits noise produced by fixed noise sources (any machine or device) to result in noise levels that exceed the existing ambient (L_{90}) noise level by more than 5 dBA on residential property, 8 dBA on commercial and industrial property, and 10 dBA on public property at a distance of 25 feet. These noise limits were applied in Impact NO-4 to stationary sources as a first step or initial screening review.
- Section 2909(c) of the San Francisco Police Code generally prohibits noise produced by any machine or device in excess of 10 dBA more than ambient on public property at a distance of 25 feet. This noise limit is applied to future open space uses in Impact NO-6, and is also included as a performance standard in Mitigation Measure M-NO-6, fourth bullet.

²⁰ California Department of Transportation, Division of Environmental Analysis, “Technical Noise Supplement,” November 2009; pp. 2-48 – 2-49. Available online at: http://www.dot.ca.gov/hq/env/noise/pub/tens_complete.pdf.

²¹ Fehr & Peers, Pier 70 Mixed-Use District Project Transportation Impact Study, December 2016.

- Section 2909(d) of the Police Code establishes that no fixed noise sources (e.g., mechanical equipment) may cause the noise level inside any sleeping or living room in any dwelling unit located on residential property to exceed 55 dBA (7:00 a.m. to 10:00 p.m.) and 45 dBA (10:00 p.m. to 7:00 a.m.) in order to prevent sleep disturbance, protect public health, and prevent the acoustical environment from progressive deterioration. This noise limit is applied in Impact NO-4 to stationary sources that would be located near residential uses (as a second step or more detailed review, where initial screening review of noise limits in the above Section 2909 were exceeded) and in Impact NO-6 to residential interior noise levels. The nighttime interior noise standard is also included as a performance standard in Mitigation Measures M-NO-4a and M-NO-6, second bullet.
- Title 24 of the California Building Code specifies a maximum interior noise limit of 45 dBA (L_{dn} or CNEL) for residential uses. This standard is applied in Impact NO-6 to residential development (see Tables 4.F.11: Noise Compatibility by Parcel - Maximum Residential Scenario, pp. 4.F.61-4.F.64, and 4.F.12: Noise Compatibility by Parcel - Maximum Commercial Scenario, pp. 4.F.65-4.F.68). It was also included as a performance standard in Mitigation Measure M-NO-6.
- City noise compatibility guidelines (Figure 4.F.3, p. 4.F.23) indicate the maximum noise levels considered “Acceptable” are 60 dBA (L_{dn}) for residential uses. However, where noise levels exceed 70 dBA (L_{dn}), new residential development is generally discouraged. If new construction does proceed, a detailed analysis of noise reduction requirements must be made, and needed noise insulation features must be incorporated into the design. These guidelines are applied in Impact NO-6 to all proposed sensitive uses (see Tables 4.F.11 and 4.F.12, pp. 4.F.61-4.F.64 and pp. 4.F.65-4.F.68, respectively). Tables 4.F.11 and 4.F.12 identify noise compatibility of proposed uses by parcel or building and applicable mitigation measures for each parcel (if any).

Vibration

Vibration impacts are considered significant if they would result either in levels substantial enough to result in damage to nearby structures or buildings, or in vibration levels generally accepted as an annoyance to land uses containing sensitive receptors. Groundborne noise occurs when vibrations transmitted through the ground result in secondary radiation of noise.

Construction-related groundborne noise is generally associated with underground construction activities where the airborne noise path is blocked, which is not proposed as part of this project. Therefore, this analysis is focused on groundborne vibration from construction-related activities such as the use of certain types of pile-driving and heavy equipment (Impact NO-3; Table 4.F.8, p. 4.F.34).

There are no City regulations that address vibration effects or provide numerical thresholds for determining when groundborne vibration impacts are considered significant. In the absence of City significance thresholds for vibration from construction equipment, this evaluation uses the Caltrans-identified PPV thresholds for architectural damage to buildings. For adverse human reaction, this

analysis applies the “strongly perceptible” threshold of 0.1 in/sec PPV.²² For building damage, the threshold depends on the architectural characteristics of the potentially affected structure (see Table 4.F.5, p. 4.F.18).

PROJECT FEATURES

The Proposed Project would include amendments to the *General Plan* and Planning Code, adding a new Pier 70 SUD, which would establish land use controls for the project site and incorporate the design standards and guidelines in the proposed *Pier 70 SUD Design for Development* document.

Under the proposed Pier 70 SUD, the Proposed Project would provide a mixed-use land use program. To cover a full range of potential land uses that could be developed under the Proposed Project, the EIR analyzes a maximum residential use scenario (Maximum Residential Scenario) and a maximum commercial use scenario (Maximum Commercial Scenario) for the project site, which will bracket specific maximum ranges of uses that could be developed.

Proposed land uses on each parcel in the project site under both scenarios are presented in Figure 2.7: Proposed Land Use Plan – Maximum Residential Scenario, and Figure 2.8: Proposed Land Use Plan – Maximum Commercial Scenario, in Chapter 2, Project Description, pp. 2.30 and 2.32, respectively. Table 4.F.7: Project Summary Table by Parcel, summarizes proposed uses and height limits, and also indicates whether new construction or building rehabilitation is proposed by parcel. Under both scenarios, two parcels (C1 and C2) on the project site that are designated for district-structured parking could be developed with residential/commercial uses or residential use, depending on future market demand. Specifically, Parcel C1 could be developed with residential, commercial, or parking uses, and Parcel C2 could be developed with residential or parking uses. Active or passive public rooftop open space (sports courts, play fields, urban agriculture plots, seating, and observational terrace areas) could be developed on the roof of both of these parcels under both scenarios as well if the parcels are built as district parking structures. Accessory, surface, and below-grade parking would be allowed on all parcels on the 28-Acre Site except Buildings 2, 12, and 21 and Parcel E4. These buildings would be renovated and converted into commercial, retail/arts/light industrial (RALI), or residential uses. RALI uses would be allowed on the ground-floor levels of all future buildings on Parcels A, B, C1, C2, D, E1, E2, E3, F, G, H1, H2, PKN, PKS, HDY1, and HDY2. Building 2 would allow either commercial or residential uses, with RALI allowed on the ground floor. Buildings 12 and 21 as well as Parcel E4 would allow RALI only with commercial allowed on the upper floor. On the Illinois Parcels, retail/restaurant uses would be allowed on the ground floor, while accessory parking would be allowed on all four parcels. No residential uses would be allowed on the ground floor of PKN.

²² Caltrans, *Transportation and Construction Vibration Guidance Manual*, September 2013.

Table 4.F.7: Project Summary Table by Parcel

| Project Parcel/ Building | Max Res Scenario Proposed Use | Construction Phase ¹ | Max Com Scenario Proposed Use | Construction Phase ¹ | Building Rehabilitation New | Construction |
|---|---|------------------------------------|---|------------------------------------|-----------------------------------|--------------|
| 28-Acre Site² | | | | | | |
| Parcel A | Commercial | 3 | Commercial | 2 | | X |
| Parcel B | Commercial | 4 | Commercial | 4 | | X |
| Parcel C1 ^{c3} C1 ^c | Residential/Parking (rooftop open space) | 2 | Commercial/Parking (rooftop open space) | 4 | | X |
| Parcel C1 ³ | Residential/Parking (rooftop open space) | 2 | Residential/Parking (rooftop open space) | 3 | | X |
| Parcel D | Residential | 2 | Residential | 2 | | X |
| Parcel E1 | Residential | 4 | Residential | 3 | | X |
| Parcel E2 | Residential | 2 | Residential | 2 | | X |
| Parcel E3 | Residential | 4 | Residential | 4 | | X |
| Parcel E4 | RALI | 4 | RALI | 4 | | X |
| Parcel F | Residential | 3 | Commercial | 3 | | X |
| Parcel G | Residential | 3 | Commercial | 3 | | X |
| Parcel H1 | Residential | 5 | Commercial | 5 | | X |
| Parcel H2 | Residential | 5 | Commercial | 5 | | X |
| Building 2 | Residential | 2 | Commercial | 2 | X | |
| Building 12 | RALI | 2 | RALI | 2 | X | |
| Building 21 | RALI | 4 | RALI | 4 | X | |
| Illinois Parcels⁴ | | | | | | |
| 20 th /Illinois Parcel PKN | Residential | 1 | Residential | 1 | | X |
| 20 th /Illinois Parcel PKS | Residential | 3 | Residential | 2 | | |
| Hoedown Yard HDY | Residential | 4 | Commercial | 3 | | X |

Notes:

- ¹ Timing of phases is expected to be as follows: Phases 1 and 2 (2018-2020), Phase 3 (2021-2023), Phase 4 (2024-2026), and Phase 5 (2027-2029).
- ² All 28-Acre Site parcels except existing Buildings 2, 12, and 21 would be permitted to include parking as an accessory use (both above or below grade). Buildings 2, 12, and 21 would be renovated and converted into commercial, RALI, or residential uses. Also RALI uses would be on the ground-floor levels of all future buildings on Parcels A, B, C1, C2, D, E1, E2, E3, F, G, H1, H2, PKN, PKS, HDY1, HDY2, and Buildings 2 and 12. Parcel E4 and Building 21 would contain only RALI uses.
- ³ Under both scenarios, Parcel C1 could be developed with residential, commercial, or parking uses and Parcel C2 could be developed with residential or parking uses. Active public rooftop open space (sports courts, play fields, urban agriculture plots, seating, and observational terrace areas) could be developed on the roof of both of these parcels under both scenarios as well, if the parcels are built as district parking structures.
- ⁴ Retail/Restaurant uses would be allowed on the ground floor and accessory parking would be allowed on all four parcels.

Source: Forest City; Turnstone / SWCA

Open spaces programmed as part of the Proposed Project are anticipated to accommodate public outdoor events, including art exhibitions, theater performances, cultural events, outdoor fairs, festivals and markets, outdoor film screenings, evening/night markets, food events, street fairs, and lecture services. Fewer than 100 events per year are anticipated, including approximately 25 mid-size events attracting attendance between 500-750 people, and four larger-size events attracting up to 5,000 people.

Proposed Construction Phasing

For both development scenarios, the Maximum Residential Scenario and the Maximum Commercial Scenario, Proposed Project construction is expected to begin in 2018 and would be phased over an approximately 11-year period, concluding in 2029. Proposed development is expected to involve up to five phases, designated as Phases 1, 2, 3, 4, and 5 (see Figure 2.26: Proposed Phasing Plan – Maximum Residential Scenario, and Figure 2.27: Proposed Phasing Plan – Maximum Commercial Scenario, in Chapter 2, Project Description, pp. 2.82 and 2.85, respectively). Phasing may not occur exactly as laid out in the conceptual phasing plan, but this plan provides a representative approximation of project phasing.

The project applicant, Forest City, as master developer, would be responsible for completing infrastructure improvements (e.g., utilities, streets, open space) and site preparation/grading. Within each phase, such infrastructure development would occur in tandem with the development of adjacent parcels. Third-party developers would construct vertical development on individual parcels. Figures 2.26 and 2.27 show proposed phasing of open space and roadways. Proposed phasing plans are estimates and subject to change. Project build-out and design could vary from the phasing plans depending on market demand.

IMPACT EVALUATION

Project Construction

Impact NO-1: Construction of the Proposed Project would expose people to or generate noise levels in excess of standards in the Noise Ordinance (Article 29 of the San Francisco Police Code) or applicable standards of other agencies. (*Less than Significant with Mitigation*)

On-Site Equipment Operation

Construction activity noise levels at and near any construction site would fluctuate depending on the particular type, number, and duration of use of various pieces of construction equipment. Construction-related material haul trips would increase ambient noise levels along haul routes, with the magnitude of the increase depending on the number of haul trips made and types of vehicles used. In addition, certain types of construction equipment generate impulsive noises

(such as pile driving), which can be particularly annoying to most people. Given the project's proximity to the Bay, it is assumed that at least some development in the project site area, such as construction of the secant walls proposed in the northeastern and southeastern portions (near Parcels B and H2) would entail pile-driving activities.

Table 4.F.8: Typical Construction Noise Levels, shows typical noise levels associated with a range of construction equipment. As indicated in this table, operation of jackhammers and concrete saws would have the potential to exceed the 86 dBA at 50 feet or 80 dBA at 100 feet noise limit for construction equipment (as specified by the Police Code) by 2 to 4 dBA. While jackhammers with approved acoustic shields are exempt from this ordinance limit,²³ concrete saws would not be exempt. Therefore, operation of concrete saws or any other equipment not exempt from the Police Code that exceeds 86 dBA (Leq) at 50 feet would be a significant noise impact.

However, implementation of noise control measures as specified in Mitigation Measure M-NO-1: Construction Noise Control Plan, shown below, would ensure that all construction equipment noise subject to the noise ordinance be maintained at or below the 86-dBA limit, reducing potential construction-related noise impacts on off-site residents and future on-site residents affected by later construction phases to a less-than-significant level.

Mitigation Measure M-NO-1: Construction Noise Control Plan.

Over the project's approximately 11-year construction duration, project contractors for all construction projects on the Illinois Parcels and 28-Acre Site will be subject to construction-related time-of-day and noise limits specified in Section 2907(a) of the Police Code, as outlined above. Therefore, prior to construction, a Construction Noise Control Plan shall be prepared by the project sponsors and submitted to the Department of Building Inspection. The construction noise control plan shall demonstrate compliance with the Noise Ordinance limits. Noise reduction strategies that could be incorporated into this plan to ensure compliance with ordinance limits may include, but are not limited to, the following:

- Require the general contractor to ensure that equipment and trucks used for project construction utilize the best available noise control techniques (e.g., improved mufflers, equipment redesign, use of intake silencers, ducts, engine enclosures, and acoustically-attenuating shields or shrouds).
- Require the general contractor to locate stationary noise sources (such as compressors) as far from adjacent or nearby sensitive receptors as possible, to muffle such noise sources, and to construct barriers around such sources and/or the construction site, which could reduce construction noise by as much as 5 dBA. To further reduce noise, the contractor shall locate stationary equipment in pit areas or excavated areas, to the maximum extent practicable.

²³ See Section 2907(b) of the Police Code.

Table 4.F.8: Typical Construction Noise Levels

| Construction Equipment | Noise Level (dBA, Leq at 50 feet) | Noise Level (dBA, Leq at 100 feet) |
|---|--------------------------------------|--|
| Jackhammer (Pavement Breaker) ¹ | 88 | 82 |
| Concrete Saw or Mounted Impact Hammer (Hoe Ram) | 90 | 84 |
| Loader | 79 | 73 |
| Dozer | 82 | 76 |
| Excavator | 81 | 75 |
| Grader | 85 | 79 |
| Compactor | 83 | 77 |
| Dump Truck | 76 | 70 |
| Flatbed Truck | 74 | 68 |
| Concrete Truck | 81 | 75 |
| Forklift (gas-powered) | 83 | 77 |
| Street Sweeper (vacuum) | 82 | 76 |
| Generator | 81 | 75 |
| Compressor | 78 | 72 |
| Roller | 80 | 74 |
| Crane | 81 | 75 |
| Paver | 77 | 71 |
| Pile Driver ¹ | 101 | 95 |
| San Francisco Noise Ordinance Limit | 86 | 80 |

Notes: The above Leq noise levels are calculated assuming a 100 percent usage factor at full load (i.e., Lmax noise level 100 percent) for the 1-hour measurement period. Noise levels in **bold** exceed the above ordinance limit, but as indicated, two of the three exceedances are exempt from this limit.

¹ Exempt from the ordinance noise limit of 86 dBA at 50 feet or 80 dBA at 100 feet.

Sources: U.S. Department of Transportation, Federal Highway Administration, 9.0 Construction Equipment Noise Levels and Ranges, Table 9.1, RCNM Default Noise Emission Reference Levels and Usage Factors, Construction Noise Handbook, Updated July 2011. Available online at http://www.fhwa.dot.gov/environment/noise/construction_noise/handbook/handbook09.cfm Accessed January 4, 2016; U.S. Department of Transportation, Federal Transit Administration, Transit Noise and Vibration Impact Assessment, May 2006. Available online at http://www.fta.dot.gov/documents/FTA_Noise_and_Vibration_Manual.pdf. Accessed January 4, 2016.

- Require the general contractor to use impact tools (e.g., jack hammers, pavement breakers, and rock drills) that are hydraulically or electrically powered wherever possible to avoid noise associated with compressed air exhaust from pneumatically powered tools. Where use of pneumatic tools is unavoidable, an exhaust muffler on the compressed air exhaust shall be used, along with external noise jackets on the tools, which would reduce noise levels by as much as 10 dBA.
- Include noise control requirements for construction equipment and tools, including concrete saws, in specifications provided to construction contractors to the maximum extent practicable. Such requirements could include, but are not limited to, erecting temporary plywood noise barriers around a construction site, particularly where a site adjoins noise-sensitive uses; utilizing noise control blankets on a building structure as the building is erected to reduce noise levels emanating from the construction site; performing all work in a manner that minimizes noise; using equipment with effective mufflers; undertaking the most noisy activities during times of least disturbance to surrounding residents and occupants; and selecting haul routes that avoid residential uses.²⁴
- Prior to the issuance of each building permit, along with the submission of construction documents, submit to the Planning Department and Department of Building Inspection or the Port, as appropriate, a plan to track and respond to complaints pertaining to construction noise. The plan shall include the following measures: (1) a procedure and phone numbers for notifying the Department of Building Inspection or the Port, the Department of Public Health, and the Police Department (during regular construction hours and off-hours); (2) a sign posted on-site describing permitted construction days and hours, noise complaint procedures, and a complaint hotline number that shall be answered at all times during construction; (3) designation of an on-site construction complaint and enforcement manager for the project; and (4) notification of neighboring residents and non-residential building managers within 300 feet of the project construction area at least 30 days in advance of extreme noise-generating activities (such as pile driving) about the estimated duration of the activity.

Implementation of Mitigation Measure M-NO-1 would reduce construction equipment noise impacts relating to the Noise Ordinance to a less-than-significant level.

²⁴ Based on FHWA documentation, the following reductions can be achieved: 3-dBA reduction for a noise barrier or other obstruction (like a dirt mound) that interrupts the line-of-sight between the noise source and the receptor; 8-dBA reduction if the noise source is completely enclosed or completely shielded with a solid barrier located close to the source; 5-dBA reduction if the enclosure and/or barrier have some gaps in it; 10-dBA reduction if the noise source is completely enclosed and completely shielded with a solid barrier located close to the source; 15-dBA reduction if a building stands between the noise source and receptor and completely shields the noise source; and 5-dBA reduction if noise source is enclosed or shielded with heavy vinyl noise curtain material (e.g., SoundSeal BBC-13-2 or equivalent).

Impact NO-2: Construction of the Proposed Project would cause a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project. (*Significant and Unavoidable with Mitigation*)

On-Site Construction Activities

Project implementation would result in operation of heavy equipment on the project site for demolition of existing structures, construction of new structures, and rehabilitation of on-site structures to be retained. Construction activities would occur intermittently on the project site over the 11-year construction duration and could expose nearby sensitive receptors to temporary increases in noise levels substantially in excess of ambient levels.

Proposed redevelopment of the Pier 70 Mixed-Use District project site would result in demolition of seven existing structures, removal of a portion of Irish Hill, demolition of portions of the existing Slipways 5 through 8, construction of new buildings, and rehabilitation of three existing buildings (Figure 2.6: Proposed Rehabilitation, Retention, and Demolition Plan, in Chapter 2, Project Description, p. 2.24, shows the proposed buildings and other structures to be demolished as well as existing buildings to be rehabilitated). Construction activities associated with new building construction would include site preparation, pile driving, placement of infrastructure, placement of foundations for structures, and fabrication of structures. Demolition and construction activities would require the use of heavy trucks, material loaders, cranes, concrete saws, and other mobile and stationary construction equipment listed in Table 4.F.8, p. 4.F.34. Piles would be driven with the use of impact or vibratory pile drivers. General building construction would be less noise intrusive, involving cranes, forklifts, saws, and nail guns. Project construction would also result in temporary increases in truck traffic noise along haul routes for off-hauling excavated materials and materials deliveries.

Because the project would be constructed in phases over an 11-year period, multiple construction activities could be occurring on different parcels within the project site at any given time (i.e., demolition could occur on one parcel while pile driving occurs on another) so that some of the noisier construction activities, such as pile driving, on one project parcel could overlap with other noisier construction phases, such as demolition, on other parcels. If pile drivers operated on one parcel while a mounted impact hammer or concrete saw (for demolition) occurred on another parcel at the same time (worst-case condition), the combined noise level from these two noisiest pieces of equipment would be 89 dBA (Leq) at 50 feet.²⁵ When compared to the FTA daytime

²⁵ A 20 percent usage factor was applied to both pieces of equipment. Pile drivers generate 101 dBA (L_{max}) or 88 dBA (Leq) with a 20 percent usage factor. Mounted impact hammers generate 90 dBA (L_{max}) or 83 dBA (Leq) with a 20 percent usage factor. If these two pieces of equipment were to operate at the same time in the same vicinity (not likely since one would be used for demolition and the other as part of foundation work), the combined noise level would be 89 dBA (Leq).

thresholds of 90 dBA (L_{eq}) at residential uses, the maximum combined L_{eq} noise level would not exceed these thresholds because it is expected that both types of equipment would not operate simultaneously closer than 50 feet to any existing residential or commercial uses. It is noted that while pile driving and demolition activities could occur at any given time over the 11-year construction duration, they would not occur continuously over this time period and it is unlikely that pile drivers and either impact hammers or concrete saws would operate simultaneously at closer than 50 feet from any existing residential or commercial uses for any sustained period of time.

Noise Impacts on Off-Site Receptors

As listed in Table 4.F.5, p. 4.F.11, the closest existing off-site sensitive receptors are located 140 to 200 feet from the closest site boundary (northwest corner of Parcel PKN). When construction occurs near the northwest corner of Parcel PKN, the maximum combined L_{eq} noise level of 89 dBA (L_{eq}) at 50 feet would attenuate to 80 dBA and 77 dBA (L_{eq}) at these respective receptors. Measurement Location LT-4 (across the street from the 820 Illinois Street residential development) is the closest noise measurement location to these receptors. Ambient noise levels averaged 62 dBA (L_{dn}) or an average of 57 dBA (daytime L_{eq}) at this location and when these ambient noise levels are applied to the “Ambient+10 dBA” threshold, the thresholds would be 72 dBA (L_{dn}) or 67 dBA (daytime L_{eq}) at these receptors and the maximum combined noise levels at the three closest off-site receptors would exceed these thresholds by up to 13 dBA, a significant noise impact.

For all but these three receptor locations (residences at 820 Illinois Street and 628 20th Street (second floor), and Dogpatch Alt School at 616 20th Street), there are intervening buildings that would block and reduce Proposed Project-related construction noise at nearby existing receptors.²⁶ For example, the AIC building to the west of the site would interrupt the line-of-sight (at ground level and lower floors) between the project site and existing residential receptors located west of the AIC building. If phasing occurs as proposed, it would result in the construction of residential buildings on the western portion of the project site (Illinois Parcels) first. These buildings would also help block and reduce project-related construction noise (including noise from pile-driving activities to the east on the 28-Acre Site) at all existing off-site receptors (including the closest existing receptors).

With implementation of noise controls during all construction phases (specified in Mitigation Measure M-NO-1) as well as implementation of noise controls during pile driving (specified in Mitigation Measure M-NO-2: Noise Control Measures During Pile Driving, pp. 4.F.40-4.F.41), the potential for noise disturbance of existing off-site receptors (assumed to be present during the

²⁶ The three exceptions are the east-facing existing residential units on the upper floors of the residential building at 820 Illinois Street (located approximately 200 feet northwest of the project site boundary), second floor residence at 628 20th Street (located about 190 feet to the northwest) and the Dogpatch Alt School (Site 2) at 616 20th Street (located about 140 feet from the project site boundary).

11-year construction period) located approximately 140 to 200 feet to the northwest would be reduced. However, even with implementation of these noise controls, the feasibility of quieter, alternative pile driving methods in all areas cannot be determined at this time and also the potential would still exist that combined noise levels from simultaneous operation of the noisiest types of construction equipment could still exceed the Ambient+10 dBA threshold. Given this uncertainty and the potential 11-year duration of this activity, this impact is conservatively considered to remain significant and unavoidable with mitigation, even with implementation of Mitigation Measures M-NO-1 and M-NO-2.

Noise Impacts on On-Site Receptors

While early construction of Proposed Project residential uses on the Illinois Parcels would help reduce construction-related noise levels at existing receptors, it would also expose future residents living in these new residential buildings to construction noise generated during subsequent phases of project construction. Construction activities in this area would occur in phases over an 11-year period. Phasing may not occur exactly as laid out in the conceptual phasing plan, but this plan provides a representative approximation of project phasing.

If Proposed Project phasing occurs as proposed for the Maximum Residential Scenario, residential uses would be developed during all five phases (2018 to 2029), while commercial and RALI uses would be developed during all phases except Phase 1. If Proposed Project phasing occurs as proposed for the Maximum Commercial Scenario, more residential areas would be developed in the early phases (Phases 1, 2, and 3; 2018 to 2023) while more commercial uses would be developed in the later phases (Phases 3, 4, and 5; 2021 to 2029).

As a result of this possible phasing under either scenario, future residents in the project site area that face an adjacent or nearby construction project could be subject to demolition and construction noise for as long as 6 to 9 years. Construction-related noise generated on any given parcel would primarily affect receptors located within about 900 feet and with a direct line-of-sight (a piece of equipment generating 85 dBA would attenuate to 60 dBA over a distance of 900 feet). Depending on the order of construction within each phase and overall phasing, some Proposed Project buildings that have already been constructed could interrupt the direct line-of-sight between construction sources and noise-sensitive receptors, and reduce the number of receptors directly exposed to construction noise with no intervening buffering structure.

It is likely that pile driving would be required for construction of some buildings or structures on the 28-Acre Site and possibly on the northern portion of the Illinois Parcels. Construction of secant walls in the northeastern and southeastern portions of the 28-Acre Site could also require pile driving on upland portions of the site. In addition, other impact tools such as jackhammers, concrete saws, or mounted impact hammers (hoe rams) could be used during demolition

activities. As indicated above, simultaneous operation of such equipment would generate a maximum combined L_{eq} noise level of 89 dBA (L_{eq}) at 50 feet. Future on-site residents with a direct line-of-sight and 50 feet from demolition or construction activities could be subject to such maximum combined noise levels. As listed in Table 4.F.3, p. 4.F.11, ambient noise levels on the project site ranged between 58 dBA and 68 dBA (L_{dn}) and averaged 64 dBA (L_{dn}). Daytime noise levels ranged from 53 dBA (L_{eq}) to 73 dBA (L_{eq}) and average 61 dBA (L_{eq}). When these ambient noise levels are applied to the “Ambient+10 dBA” threshold, the average thresholds are 74 dBA (L_{dn}) and 71 dBA (daytime L_{eq}) at on-site receptors, and the maximum combined noise level of 89 dBA (L_{eq}) at 50 feet would, at times, exceed these thresholds at the closest future on-site residential receptors (those occupying residential units built in earlier phases) by up to 18 dBA. The degree of disturbance would vary with proximity of the demolition and construction activities to sensitive receptors, but is considered significant and unavoidable because the “Ambient +10 dBA” threshold could be exceeded.

Construction of proposed changes to the street network, new infrastructure (including those associated with all three sewer options), and open space improvements in the project site area would include use of similar construction equipment as would development projects, although typically for a lesser duration and generally with fewer pieces of equipment than for a major development. Accordingly, construction noise impacts associated with the street network, new infrastructure, and open space would be similar to, but somewhat less substantial than, those for development projects in the project site area, except that pile driving would not be necessary for the street network changes, utility lines (including those associated with all three sewer options), or open space improvements. Building demolition, road construction, and building construction would all occur concurrently within each phase. It is expected that infrastructure improvements (including utility lines proposed in roadways) would be done at the same time as road construction. Construction of open spaces would occur during all five phases of construction. Simultaneous operation of the noisiest pieces of equipment associated with demolition (mounted impact hammer or concrete saw) and other construction activities (excavator) would result in a combined noise level of 85 dBA (L_{eq}) at 50 feet. Such maximum combined noise levels would still exceed the average “Ambient+10 dBA” thresholds of 74 dBA (L_{dn}) or 71 dBA (daytime L_{eq}) at on-site receptors located at this proximity. Therefore, construction-related noise increases during other phases of construction, such as construction for road and infrastructure improvements, could adversely affect future on-site residents, a significant noise impact.

With implementation of noise controls during all construction phases (specified in Mitigation Measure M-NO-1) as well as implementation of noise controls during pile driving (specified in Mitigation Measure M-NO-2), the potential for noise disturbance of future on-site residents would be reduced. However, even with implementation of these noise controls, the potential would still exist that combined noise levels from simultaneous operation of the noisiest types of

construction equipment could still exceed the Ambient+10 dBA threshold, and therefore, construction-related noise impacts on future on-site residential receptors is conservatively considered to be significant and unavoidable with mitigation.

Off-Site Haul Truck Traffic

The net export total of about 340,000 cubic yards of soil and an import of about 20,000 cubic yards of clean fill would generate a total of about 45,000 truck trips, which would be phased over the duration of the planned construction activities (averaging 17 truck trips per day). This average daily increase would be minor on the principal major access streets in the project vicinity, comprising less than 0.1 percent of daily traffic on Illinois Street in the project vicinity and an even smaller percentage of daily traffic on Third Street. Construction-related truck trips generated during the estimated 11-year Proposed Project construction duration would be required by the Construction Traffic Control Plan to travel on designated truck routes (i.e., Third Street and Cesar Chavez Street for regional access to the I-280 and SR 101 freeways²⁷), minimizing truck traffic in residential areas. There are residential uses on Third Street between 22nd Street and 23rd Street, but no residential uses on Third Street to the south (between 23rd Street and Cesar Chavez Street). There are no existing residential uses on Cesar Chavez Street between Third Street and the SR 101 freeway. There are also no residential uses on Illinois Street between 22nd Street and Cesar Chavez Street, although Illinois Street is not a designated truck route. Given the minimal increase in traffic on local roadways that would be attributable to project-related haul trucks, temporary increases in traffic noise resulting from haul trucks would be less than significant. Use of truck routes that avoid residential uses as required by the Construction Traffic Control Plan would further reduce less-than-significant construction-related truck noise impacts.

Mitigation Measure M-NO-2: Noise Control Measures During Pile Driving

The Construction Noise Control Plan (required under Mitigation Measure M-NO-1) shall also outline a set of site-specific noise and vibration attenuation measures for each construction phase when pile driving is proposed to occur. These attenuation measures shall be included wherever impact equipment is proposed to be used on the Illinois Parcels and/or 28-Acre Site. As many of the following control strategies shall be included in the Noise Control Plan, as feasible:

- Implement “quiet” pile-driving technology such as pre-drilling piles where feasible to reduce construction-related noise and vibration.
- Use pile-driving equipment with state-of-the-art noise shielding and muffling devices.

²⁷ San Francisco Municipal Transportation Agency, 2009, *San Francisco Truck Traffic Routes*. Trucks are expected to use truck routes, arterials, or freeways except for local deliveries.

- Use pre-drilled or sonic or vibratory drivers, rather than impact drivers, wherever feasible (including slipways) and where vibration-induced liquefaction would not occur.
- Schedule pile-driving activity for times of the day that minimize disturbance to residents as well as commercial uses located on-site and nearby.
- Erect temporary plywood or similar solid noise barriers along the boundaries of each Proposed Project parcel as necessary to shield affected sensitive receptors.
- Other equivalent technologies that emerge over time.

While implementation of construction-related noise control measures in Mitigation Measure M-NO-1 and pile-driving noise reduction measures in Mitigation Measure M-NO-2 would reduce the project's temporary or periodic increases in ambient noise levels, these measures would not necessarily reduce these noise increases to below the Ambient+10 dBA threshold because feasibility of quieter, alternative pile driving methods in all areas cannot be determined at this time. Given this uncertainty and the potential 11-year duration of this activity, this impact is conservatively considered to remain significant and unavoidable, even with implementation of Mitigation Measures M-NO-1 and M-NO-2.

Impact NO-3: Construction of the Proposed Project would expose people and structures to or generate excessive groundborne vibration levels. (*Less than Significant with Mitigation*)

Groundborne Noise and Vibration

Groundborne noise refers to a condition where noise is experienced inside a building or structure as a result of vibrations produced outside of the building and transmitted as ground vibration between the source and receiver. Groundborne noise can be problematic even in situations where the primary airborne noise path is blocked, such as in the case of construction of a subway tunnel in proximity to homes or other noise-sensitive structures. While the Proposed Project would involve excavation to a maximum depth of 27 feet, noise and vibration-generating construction activities associated with construction of proposed basement levels would not involve tunneling or underground construction where the airborne noise path is blocked. Therefore, impacts related to groundborne noise from construction activities are not expected to be substantial.

The Proposed Project would include the types of construction activities that could produce excessive groundborne vibration (i.e., pile driving for foundations or secant walls). In addition, construction equipment used for demolition, site preparation, and shoring activities, such as jackhammers, pavement breakers, and drills, could generate varying degrees of temporary groundborne vibration, with the highest levels expected during demolition, excavation, and below-grade construction stages of each construction phase. Excavation for basements on the Illinois Parcels would require excavation into bedrock where use of hoe-rams or jackhammers would be

required. Project construction would also entail the use of heavy trucks for material deliveries and for off-site hauling of excavated materials and demolition debris during the daytime hours and throughout the 11-year construction period. All construction activities would be conducted primarily between 7:00 a.m. and 8:00 p.m. in compliance with Section 2908 of the City's Noise Ordinance and subject to noise controls outlined in Mitigation Measures M-NO-1 and M-NO-2.

If groundborne vibration generated by project-related demolition and construction activities were to exceed 0.5 in/sec PPV, it could cause cosmetic damage to a nearby structure. Older structures (i.e., potentially historic), such as the unreinforced monumental masonry Buildings 113 and 114 (building locations are indicated on Figure 4.D.2: Contributing and Non-contributing Features on the Project Site, in Section 4.D, Cultural Resources, p. 4.D.37), may be more fragile and cosmetic damage could occur at lower vibration levels (possibly as low as 0.2 in/sec PPV). Typical vibration levels associated with the operation of various types of construction equipment at 25, 60, and 160 feet, some of which are similar to those proposed to be used for the Proposed Project, are listed in Table 4.F.9: Vibration Levels for Construction Equipment. While vibration attenuation with distance can vary depending on subsoils, normal attenuation rates indicate that vibration generated by impact pile drivers could result in cosmetic damage to adjacent historic buildings if it occurs within 160 feet of these buildings. Parcel PKN is located approximately 80 feet from the older Buildings 113 and 114, and Parcel A is located approximately 50 feet from Building 113. Cosmetic damage to project buildings could occur if impact pile drivers are operated within 70 feet of project structures and 160 feet of Buildings 113 or 114, assuming maximum reference vibration levels. Use of sonic or vibratory pile drivers, if feasible, would generate lower levels of vibration with commensurate minimum setback distances of approximately 35 feet from project structures and 70 feet from historic buildings required to avoid cosmetic damage.

Pile driving and building locations on project parcels have not been specified for the entire site, but pile driving is proposed adjacent to and east of the 20th Street Historic Core, which adjoins the northwestern boundary of the 28-Acre Site and eastern boundary of the 20th/Illinois Parcels. While it may be possible to maintain a setback of 70 feet or more between pile drivers and adjacent structures at many locations to avoid cosmetic damage to adjacent structures, the minimum separation between some parcels such as between Parcel E1, Parcel E4, and Building 21 or between Parcels E2 and E3 would be less than 70 feet. At distances of less than 70 feet, vibration from impact or vibratory pile-driving activities could result in cosmetic damage to Proposed Project structures and historic Buildings 113 and 114, a significant vibration impact. When the more stringent threshold of 0.2 in/sec PPV is applied to historic buildings, cosmetic damage could occur at distances of up to 160 feet from historic buildings (as indicated in Table 4.F.9). However, implementation of measures such as evaluating specific potentially historic buildings,

Table 4.F.9: Vibration Levels for Construction Equipment

| Equipment | Peak Particle Velocity (PPV) (in/sec) | | |
|--|---------------------------------------|-------------------------|--------------------------|
| | At 25 Feet | At 60 Feet ¹ | At 160 Feet ¹ |
| Impact or Vibratory Pile Driver | | | |
| Range | 0.170–1.518 | 0.065–0.579 | 0.022–0.197 |
| Typical | 0.65 | 0.248 | 0.084 |
| Other Construction Equipment | | | |
| Vibratory Roller/Compactor | 0.210 | 0.080 | 0.027 |
| Large Bulldozer | 0.089 | 0.034 | 0.012 |
| Caisson Drilling | 0.089 | 0.034 | 0.012 |
| Loaded Trucks | 0.076 | 0.029 | 0.010 |
| Jackhammer | 0.035 | 0.013 | 0.005 |
| Small Bulldozer | 0.003 | 0.001 | 0.000 |

Note:

¹ Vibration amplitudes for construction equipment assume normal propagation conditions and were calculated using the following formula: $PPV_{equip} = PPV_{ref} \times (25/D)^{1.1}$ where:

- PPV (equip) = the peak particle velocity in in/sec of the equipment adjusted for the distance
- PPV (ref) = the reference vibration level in in/sec from pages 31-33 and Table 18 of the Caltrans Vibration Guidance Manual as well as Table 12-2 of the FTA Noise and Vibration Guidance Manual
- D = the distance from the equipment to the receiver

Source: Caltrans, *Transportation and Construction Vibration Guidance Manual*, September 2013, pp. 29-34. Available online at <http://www.dot.ca.gov/hq/env/noise/publications.htm>. Accessed on December 16, 2016; Federal Transit Administration, *Transit Noise and Vibration Impact Assessment*, May 2006. Available online at <https://www.transit.dot.gov/regulations-and-guidance/environmental-programs/noise-and-vibration>. Accessed on December 16, 2016.

establishing and enforcing appropriate vibration limits for the affected structures based on site-specific conditions, and monitoring vibration levels at structures of concern (as specified in Mitigation Measure M-NO-3: Vibration Control Measures During Construction) would be adequate to reduce the potential for cosmetic damage to adjacent project and historic structures to a less-than-significant level. Depending on the timing of development at Parcels E2, E3, and E4, as well as the timing of the proposed relocation of Historic Building 21 to within 25 feet of new development, construction-related vibration impacts on this building from adjacent pile driving activities could be avoided entirely if development precedes relocation. If, however, relocation of Building 21 precedes development at adjacent Parcels E2, E3, and E4, significant vibration impacts could occur. If this occurred, implementation of Mitigation Measure M-NO-3 would reduce the potential for cosmetic damage to a less-than-significant level.

While vibratory pile driving (or similar continuous vibration sources) can reduce the potential impacts to fragile structures that can occur with impact pile driving (where higher intermittent vibration levels can occur when the hammer strikes the pile), continuous vibration can also cause liquefaction (or differential settlement in sandy soils), due to the continuous nature of the

vibration. AASHTO²⁸ states: “Saturated, loose, uniformly or poorly graded sands and silts are sensitive to cyclic vibration such as might be produced by vibratory pile driving. These activities can produce noticeable settlement even at low vibration levels (0.1 to 0.7 in/sec), which are known to produce threshold cracking.” Evaluation of this potential, enforcement of an appropriate vibration limit, and using smaller equipment or pre-drilling pile holes, as specified in Mitigation Measure M-NO-3, would reduce the potential for structural damage from vibration-induced liquefaction to a less-than-significant level.²⁹

Mitigation Measure M-NO-3: Vibration Control Measures During Construction

As part of the Construction Noise Control Plan required under Mitigation Measure M-NO-1, appropriate vibration controls (including pre-drilling pile holes and using smaller vibratory equipment) shall be specified to ensure that the vibration limit of 0.5 in/sec PPV can be met at adjacent or nearby existing structures and Proposed Project buildings located on the Illinois Parcels and/or 28-Acre Site, except as noted below:

- Where pile driving and other construction activities involving the use of heavy equipment would occur in proximity to any contributing building to the Union Iron Works Historic District, the project sponsors shall undertake a monitoring program to minimize damage to adjacent historic buildings and to ensure that any such damage is documented and repaired. The monitoring program, which shall apply within 160 feet where pile driving would be used and within 25 feet of other heavy equipment operation, shall include the following components:
 - Prior to the start of any ground-disturbing activity, the project sponsors shall engage a historic architect or qualified historic preservation professional to undertake a pre-construction survey of historical resource(s) identified by the San Francisco Planning Department within 160 feet of planned construction to document and photograph the buildings’ existing conditions.
 - Based on the construction and condition of the resource(s), a structural engineer or other qualified entity shall establish a maximum vibration level that shall not be exceeded at each building, based on existing conditions, character-defining features, soils conditions and anticipated construction practices in use at the time (a common standard is 0.2 inch per second, peak particle velocity).
 - To ensure that vibration levels do not exceed the established standard, a qualified acoustical/vibration consultant shall monitor vibration levels at each structure within 160 feet of planned construction and shall prohibit vibratory construction activities that generate vibration levels in excess of the standard. Should vibration levels be observed in excess of the standard, construction shall be halted and alternative construction techniques put in practice. (For example, pre-drilled piles could be substituted for driven piles, if soil conditions allow;

²⁸ American Association of State Highway Transportation Officials (AASHTO), *Evaluation of Transportation-Related Earthborne Vibrations*, R 8-96, 2004.

²⁹ As discussed in “Geotechnical Stabilization” in Chapter 2, Project Description, p. 2.69, the Proposed Project would likely include the installation of below-grade secant pile walls along the northeastern and southeastern portions of the project site on either side of the craneways to prevent lateral spread from occurring.

smaller, lighter equipment could possibly also be used in some cases.) The consultant shall conduct regular periodic inspections of each building within 160 feet of planned construction during ground-disturbing activity on the project site. Should damage to a building occur as a result of ground-disturbing activity on the site, the building(s) shall be remediated to its pre-construction condition at the conclusion of ground-disturbing activity on the site.

- In areas with a “very high” or “high” susceptibility for vibration-induced liquefaction or differential settlement risks, the project’s geotechnical engineer shall specify an appropriate vibration limit based on proposed construction activities and proximity to liquefaction susceptibility zones and modify construction practices to ensure that construction-related vibration does not cause liquefaction hazards at these homes.

Implementation of Mitigation Measure M-NO-3 would reduce vibration noise impacts to a less-than-significant level.

Project Operations

Impact NO-4: Operation of the Proposed Project would result in a substantial permanent increase in ambient noise levels in the immediate project vicinity, or permanently expose persons to noise levels in excess of standards in the San Francisco General Plan and San Francisco Noise Ordinance. (*Less than Significant with Mitigation*)

Operation of the Proposed Project would increase ambient noise levels in the immediate vicinity of the project site, primarily through the on-site use of stationary equipment, such as emergency generators, heating/ventilation/air conditioning systems, a below-grade wastewater pump station, and outdoor activities in open space areas.

Stationary Equipment

Project implementation would add new mechanical equipment, such as heating/ ventilation/ air conditioning (HVAC) systems, which could produce operational noise. Operation of HVAC equipment would be subject to the City’s Noise Ordinance. Under Section 2909 of the Police Code, stationary sources are not permitted to result in noise levels that exceed the existing ambient (L₉₀) noise level by more than 5 dBA on residential property, 8 dBA on commercial and industrial property, and 10 dBA on public property. Section 2909(d) states that no fixed noise source may cause the noise level measured inside any sleeping or living room in a dwelling unit on residential property to exceed 45 dBA between 10:00 p.m. and 7:00 a.m. or 55 dBA between 7:00 a.m. and 10:00 p.m. with windows open, except where building ventilation is achieved through mechanical systems that allow windows to remain closed.

Based on noise measurements collected on the project site and its vicinity, the existing ambient (L₉₀) noise levels range between 44 and 58 dBA near the western boundary of the Illinois Parcels (LT-4 and LT-6) and between 57 and 62 dBA (LT-2) on the 28-Acre Site. Section 2909 of the

Police Code would allow mechanical equipment to generate up to 8 dB higher than the lowest ambient (or up to 52 dBA, L_{90}) near the western boundary of the Illinois Parcels and up to 8 dB higher (or up to 65 dBA, L_{90}) near the 28-Acre Site northern boundary. Depending on size, noise from HVAC equipment can generate noise levels of up to 75 dBA (L_{90}) at 30 feet. Assuming HVAC equipment operates 24 hours per day (worst-case), such noise levels would exceed ordinance noise limits if this equipment is placed near parcel boundaries, resulting in a significant impact. However, with incorporation of noise attenuation measures (e.g., provision of sound enclosures/barriers, addition of roof parapets to block noise, and increasing setback distances from sensitive receptors), as specified in Mitigation Measure M-NO-4a: Stationary Equipment Noise Controls, p. 4.F.50, HVAC-related noise would be reduced to ordinance noise limits (52 dBA) at the western boundary of the Illinois Parcels, and the mitigated noise level would attenuate to below 30 dBA at the closest existing sensitive receptors (140 to 200 feet away). With windows open, interior noise levels would be even lower and well below the 45-dBA nighttime interior noise limit (with windows open) specified in Section 2909, indicating that potential noise impacts would be reduced to less than significant. Other nearby sensitive receptors to the west, northwest, and southwest are located farther away and noise levels from project mechanical equipment would be less. Intervening buildings would also interrupt any direct lines-of-sight between these more distant receptors and rooftop noise sources.

With respect to on-site project residences, an interior noise level of 45 dBA (L_{dn} or CNEL) would be required by Title 24 of the California Building Code, and design of Proposed Project residences (under either the Maximum Residential or Maximum Commercial scenarios) would need to account for not only existing noise sources, as required by Title 24, but also future noise sources known at the time of development (including HVAC systems), as required in Mitigation Measure M-NO-4a. Therefore, incorporation of noise attenuation measures, as specified in Mitigation Measure M-NO-4a, would ensure compliance with the Section 2909 of the Police Code requirements in the interiors of Proposed Project residential units under both existing and future noise conditions, reducing potential noise impacts from stationary equipment to a less-than-significant level.

Emergency generators would be required on at least 11 of the proposed parcels where building heights would exceed 70 feet under both the Maximum Residential and Maximum Commercial scenarios, as well as at the proposed pump station. The only exception would be Parcel E1, which would not require an emergency generator under the Maximum Commercial Scenario, because the building on this parcel would be 65 feet high under this scenario. These parcels are located along the northern (A, B, D, and E1) and southern (F, G, H1, and H2) boundaries of the project site, as well as in the center of the site and just east of Irish Hill (C1 and C2). The closest existing off-site sensitive receptors would be located 700 feet or more from the closest of these buildings (C1). The emergency generators would create temporary noise from use during a power failure, could periodically result in temporary noise during testing to ensure their continued

reliability, and could operate continuously following a catastrophic emergency until electric power service is restored to the area. Emergency generators typically operate for approximately 1 hour per week (50 hours per year) and such a short noise event would not substantially alter ambient noise levels. Depending on the size, emergency generators can generate noise levels of 75 to 80 dBA (Leq) at 50 feet and the L90 noise level would be similar to the Leq level due to the continuous nature of generator noise. Although there are no existing off-site sensitive receptors within 700 feet of parcels that could contain buildings requiring generators, some of the Proposed Project buildings where emergency generators would be located would be developed with residential uses. Therefore, the Proposed Project's residential receptors could be located as close as 50 feet from these buildings/parcels. At this distance, noise levels generated by operation of emergency generators would exceed noise limits specified in Section 2909(d) of the Police Code (55 dBA from 7:00 a.m. to 10:00 p.m. and 45 dBA from 10:00 p.m. to 7:00 a.m. inside any sleeping or living room in any dwelling unit located on residential property), a significant impact. However, with incorporation of noise attenuation measures specified in Mitigation Measure M-NO-4a, this impact would be reduced to a less-than-significant level.

A wastewater pump station (the 20th Street Pump Station) and electrical transformers are proposed to be located to the north of the 28-Acre Site between Building 108 and Building 6. Pumps associated with the pump station would be located below grade, while other pump station facilities and transformers would be above grade. Noise increases resulting from these new facilities would ultimately depend on the number and size of pumps, the size and type of transformers, extent of noise attenuation features incorporated into the facility design, ambient noise levels in the vicinity, and proximity to sensitive receptors. Although pump noise can be highly variable, below-grade pumps are estimated to generate approximately 52 dBA (Leq or L90) (due to the continuous nature of pump noise when operating) at 25 feet from any vent openings to the below-grade pump station structure.³⁰ In the same vicinity, transformers (up to 1,000 kilovolt amps [kVA]) could generate noise levels of up to 38-44 dBA (Leq or L90 due to the continuous nature of transformer noise) at 25 feet, depending on the type of transformer (liquid immersed vs. dry-type).³¹ As indicated in Table 4.F.3, p. 4.F.11, daytime L90 noise levels in this vicinity (LT-3) were measured to range from 52 to 58 dBA (L90), and therefore, combined noise generated by these facilities (53 dBA, Leq or L90) would have a slight potential to increase ambient noise levels in this vicinity. Existing industrial uses (BAE Systems Ship Repair) and proposed commercial uses (under both the Maximum Residential and Maximum Commercial scenarios) would be located adjacent to this

³⁰ This level assumes that the interior level will not exceed 85 dBA (to avoid the need for OSHA worker hearing protection) and the building/enclosure reduces interior noise levels by 20 dBA at vent openings (conservative since most enclosures can provide at least 25 dB reductions).

³¹ Transformer noise levels were estimated based on National Electrical Manufacturers Association standards (NEMA, *NEMA TR 1-2013, Transformers, Step Voltage Regulators and Reactors*, p. 4, 2014; NEMA *Transformers, Regulators and Reactors, No. TR 1*, p. 4, 1994. Since distance is not specified in NEMA standards, for the purpose of this analysis, levels were assumed to be a near-field noise level at 5 feet and then converted to a far-field noise level at 50 feet by applying a 20-dB reduction.

facility, and Section 2909(b) would limit noise increases adjacent to such uses to 8 dBA above ambient (L90). Whether or not future noise levels exceed ordinance noise limits will ultimately depend on the size and design of the proposed wastewater pump station facilities as well as ambient noise levels at the closest property plane for the pump station. Given the range of existing ambient noise levels in the pump station vicinity, addition of the proposed pump station is conservatively considered to have the potential to slightly exceed ordinance noise limits, a significant impact. However, with implementation of Mitigation Measure M-NO-4a, the design of the wastewater pump station will be required to comply with applicable noise limits specified in Section 2909 of the Police Code and this would ensure this impact is reduced to less than significant. Compliance with this ordinance limit would ensure that project-related noise increases from this pump station would be maintained at acceptable levels at existing industrial uses, proposed commercial uses, and more distant proposed residential uses.

Other Noise-Generating Uses

Development of commercial-office uses in proximity to existing residential uses would increase the potential for noise disturbance or conflicts. Sources of noise typically associated with such non-residential uses that can cause sleep disturbance include mechanical equipment, delivery trucks and associated loading areas, parking cars, and use of refuse bins. Mechanical equipment (stationary noise sources) can include emergency generators as well as refrigeration and HVAC units, and associated noise impacts from these sources are discussed above.

With respect to delivery trucks, if deliveries and associated unloading/loading activities occur in proximity to future residential buildings and during the nighttime hours, future residents could be subject to sleep disturbance by noise from these activities. Noise typically associated with delivery trucks includes trucks maneuvering in and out of designated loading areas, audible warnings when trucks reverse into loading areas, idling during deliveries, opening and closing of truck doors and rollup doors, use of rolling hand carts and dollies, and engines starting. There would be a potential for sleep disturbance from these types of noise under both scenarios, because all future commercial-office or RALI buildings would be located adjacent to one or more residential buildings (as close as 23 to 38 feet in some instances), a potentially significant noise impact. The California Air Resources Board limits the idling of diesel trucks (over 10,000 pounds) to no more than 5 minutes, and this rule would help minimize truck idling noise in loading areas. Audible warnings are required by Cal-OSHA to be at least 5 dBA above ambient noise levels. These devices are highly directional in nature, and when in reverse, the trucks and the warning alarm would be directed towards the loading area and adjacent commercial-office structures. Audible warnings are, of course, intended to warn persons who are behind the vehicle when it is backing up, and could cause sleep disturbance if they occur during the nighttime (including early morning) hours near residential uses, a potentially significant noise impact. However, locating loading areas on the sides of commercial-office buildings that face away from

residential buildings to the extent feasible or designing loading areas with noise shielding (preferably enclosures) or restricting these activities to the daytime hours (7:00 a.m. to 8:00 p.m.), as specified in Mitigation Measure M-NO-4b: Design of Future Noise-Generating Uses, first bullet, would reduce the significant impact related to the potential for sleep disturbance of future residents from this noise source to a less-than-significant level.

Noise associated with parking cars includes engines starting and car doors slamming. Such noise can cause annoyance at adjacent residential uses if it is concentrated in one area (i.e., a surface parking lot is located adjacent to residences), and if it occurs during the evening or nighttime hours, it could cause sleep disturbance, a potentially significant impact. Parking for each project building is proposed to be located under the building (below-grade parking) or in a parking garage. These types of parking facilities could be designed to avoid or minimize the potential for such noise disturbance or annoyance at future residences with incorporation of appropriate noise-shielding measures into any future parking structures, as specified in Mitigation Measure M-NO-4b, second bullet. This would reduce significant noise conflicts from this future use to a less-than-significant level.

Noise associated with trash or refuse facilities for both future residential and commercial-office uses could disturb or annoy any future nearby residents, a significant impact. Such noise is typically associated with trash-dumping activities, operation of trash compactors and garbage truck collection activities (including truck noise, operation of motors that lift trash containers, banging of containers during trash collection activities, and audible warnings when trucks reverse).

As indicated in Impact NO-4 under “Stationary Equipment,” p. 4.F.45, Section 2909 limits noise increases from fixed (stationary) mechanical equipment associated with each Proposed Project building (residential or commercial-office) to 5 dBA from residential sources and 8 dBA for commercial-office sources, and this requirement would limit the potential for noise compatibility problems. However, there are no similar code restrictions or noise limits that restrict activities such as these (i.e., parking structures, loading docks, and trash bins) that are related to commercial-office uses. Implementation of noise avoidance or minimization practices through the design of both future commercial-office and residential buildings, as specified in Mitigation Measures M-NO-6: Design of Future Noise-Sensitive Uses, pp. 4.F.70-4.F.71, and Mitigation Measure M-NO-4b would help reduce to a less-than-significant level the potential conflicts between future noise-generating uses and residential receptors and the potential for sleep disturbance. Mitigation Measure M-NO-6 would require a site-specific noise evaluation for each residential parcel or building to be developed to ensure that applicable interior noise standards are met, and the evaluation is required to account for planned commercial-office and open space uses in adjacent areas, future variations in Proposed Project build-out (building heights, location, and phasing), any changes in activities adjacent to or

near the Illinois Parcels or 28-Acre Site (given the Proposed Project's long build-out period), and any shielding provided by surrounding buildings that exist at the time of development. In addition, implementation of noise control measures in the design of noise-generating uses such as loading docks, trash enclosures, surface parking lots, and mechanical equipment evaluation, as specified in Mitigation Measure M-NO-4b, would ensure that new sources of noise associated with development of new non-residential uses are properly evaluated and potential sleep disturbance effects ameliorated, so that potential conflicts between new noise-generating uses and existing noise-sensitive uses would be avoided or reduced to a less-than-significant level.

Mitigation Measure M-NO-4a: Stationary Equipment Noise Controls

Noise attenuation measures shall be incorporated into all stationary equipment (including HVAC equipment and emergency generators) installed on buildings constructed on the Illinois Parcels and 28-Acre Site as well as into the below-grade or enclosed wastewater pump station as necessary to meet noise limits specified in Section 2909 of the Police Code.³² Interior noise limits shall be met under both existing and future noise conditions, accounting for foreseeable changes in noise conditions in the future (i.e., changes in on-site building configurations). Noise attenuation measures could include provision of sound enclosures/barriers, addition of roof parapets to block noise, increasing setback distances from sensitive receptors, provision of louvered vent openings, location of vent openings away from adjacent commercial uses, and restriction of generator testing to the daytime hours.

Mitigation Measure M-NO-4b: Design of Future Noise-Generating Uses near Residential Uses

Future commercial/office and RALI uses shall be designed to minimize the potential for sleep disturbance at any future adjacent residential uses. Design approaches such as the following could be incorporated into future development plans to minimize the potential for noise conflicts of future uses on the project site:

- Design of Future Noise-Generating Commercial/Office and RALI Uses. To reduce potential conflicts between sensitive receptors and new noise-generating commercial or RALI uses located adjacent to these receptors, exterior facilities such as loading areas/docks, trash enclosures, and surface parking lots shall be located on the sides of buildings facing away from existing or planned sensitive receptors (residences or passive open space). If this is not feasible, these types of facilities shall be enclosed or equipped with appropriate noise shielding.
- Design of Future Above-Ground Parking Structure. If parking structures are constructed on Parcels C1 or C2, the sides of the parking structures facing adjacent or

³² Under Section 2909 of the Police Code, stationary sources are not permitted to result in noise levels that exceed the existing ambient (L90) noise level by more than 5 dBA on residential property, 8 dBA on commercial and industrial property, and 10 dBA on public property. Section 2909(d) states that no fixed noise source may cause the noise level measured inside any sleeping or living room in a dwelling unit on residential property to exceed 45 dBA between 10:00 p.m. and 7:00 a.m. or 55 dBA between 7:00 a.m. and 10:00 p.m. with windows open, except where building ventilation is achieved through mechanical systems that allow windows to remain closed.

nearby existing or planned residential uses shall be designed to shield residential receptors from noise associated with parking cars.

Implementation of Mitigation Measures M-NO-4a and M-NO-4b would reduce noise compatibility impacts on noise-sensitive receptors from stationary sources to a less-than-significant level.

Impact NO-5: Operation of the Proposed Project would cause substantial permanent increases in ambient noise levels along some roadway segments in the project site vicinity. (*Significant and Unavoidable with Mitigation*)

Operational Traffic Noise

Operation of the Proposed Project would result in permanent increases in ambient noise levels, primarily through project-related increases in traffic. As explained above under “Methodology for Analysis of Operational Impacts,” pp. 4.F.27-4.F.28, for operational noise impacts, the following thresholds are applied to determine the significance of project-related traffic noise increases: (1) an increase of more than 5 dBA is considered a significant traffic noise increase; and (2) in places where the existing or resulting noise environment is “Conditionally Acceptable,” “Conditionally Unacceptable,” or “Unacceptable” for noise-sensitive uses based the San Francisco Land Use Compatibility Chart for Community Noise (Figure 4.F.3), any noise increase greater than 3 dBA is considered a significant traffic noise increase.

Noise modeling was completed to estimate existing (baseline) and future traffic noise levels along 79 road segments in the Pier 70 Mixed-Use District project area based on traffic volumes presented in the project’s Traffic Impact Study.³³ Noise modeling results are presented in Table 4.F.10: Summary of Existing and Existing Plus Project Traffic Noise Levels. Traffic noise levels presented in this table have been modeled for the purpose of identifying the future incremental noise level increases attributable to project and cumulative development.

Table 4.F.10 indicates that Proposed Project implementation (under both the Maximum Residential and Maximum Commercial scenarios) would result in traffic noise increases ranging from 0 to 14.3 dBA on local roadways providing access to the site. Of the 79 road segments examined, traffic noise increases on all analyzed street segments would not exceed the above

³³ Fehr & Peers, *Pier 70 Mixed-Use District Project Transportation Impact Study*, December 2016.

Table 4.F.10: Summary of Existing and Existing Plus Project Traffic Noise Levels

| Street | Segment or Cross-Street | Ldn/CNEL Noise Level (dBA) at 50 Feet from Roadway Centerline | | | | | Existing Use |
|--------------|--------------------------------------|---|------------------------|--------------------------|------------------------|--------------------------|----------------|
| | | Baseline (2020) | With Project (Max Res) | Project Change (Max Res) | With Project (Max Com) | Project Change (Max Com) | |
| Third Street | North of Harrison | 67.1 | 67.4 | 0.4 | 67.5 | 0.4 | Res/Com/Off |
| | Harrison to Bryant | 67.8 | 68.1 | 0.3 | 68.1 | 0.4 | Res/Com/Ind |
| | South of Bryant | 67.5 | 68.0 | 0.5 | 68.1 | 0.6 | Res/Com/Ind |
| | North of King | 67.3 | 67.9 | 0.5 | 67.9 | 0.6 | Res/Com |
| | King to Terry Francois | 66.3 | 67.3 | 1.0 | 67.4 | 1.1 | Ballpark/Res |
| | Terry Francois to Channel | 65.6 | 66.8 | 1.1 | 66.9 | 1.2 | Vacant/Parking |
| | Channel to Mission Rock | 65.5 | 66.7 | 1.2 | 66.8 | 1.3 | Res/Parking |
| | South of Mission Rock | 65.3 | 66.6 | 1.3 | 66.7 | 1.4 | UCSF/Inst/Res |
| | North of 16 th | 66.2 | 67.5 | 1.2 | 67.6 | 1.3 | UCSF/Inst |
| | 16 th to Mariposa | 66.4 | 67.9 | 1.5 | 67.9 | 1.5 | Hospital/Ind |
| | Mariposa-20 th | 65.5 | 66.9 | 1.4 | 66.9 | 1.4 | Res/Com/Ind |
| | 20 th to 22 nd | 66.0 | 67.3 | 1.3 | 67.5 | 1.4 | Res/Com/Ind |
| | 22 nd to 23 rd | 66.4 | 67.9 | 1.5 | 58.8 | 1.5 | Com/Res |
| | 23 rd to 25 th | 66.2 | 68.5 | 2.3 | 68.5 | 2.3 | Ind |
| | 25 th to Cesar Chavez | 66.3 | 68.1 | 1.8 | 68.0 | 1.8 | Com/Ind |
| | South of Cesar Chavez | 65.6 | 66.1 | 0.5 | 66.1 | 0.5 | Ind |

Table 4.F.10 Continued

| Street | Segment or Cross-Street | Ldn/CNEL Noise Level (dBA) at 50 Feet from Roadway Centerline | | | | | Existing Use |
|-------------------------|----------------------------|---|------------------------------|--------------------------------|------------------------------|--------------------------------|-----------------|
| | | Baseline (2020) | With Project (Max Res) | Project Change (Max Res) | With Project (Max Com) | Project Change (Max Com) | |
| 16 th Street | West of Mississippi | 64.5 | 65.3 | 0.8 | 65.3 | 0.8 | Com/Ind |
| | East of Mississippi | 65.7 | 66.6 | 0.9 | 66.5 | 0.8 | Com/Ind |
| | West of Owens | 65.7 | 66.5 | 0.9 | 66.5 | 0.8 | UCSF/Inst. |
| | East of Owens | 65.9 | 66.8 | 0.9 | 66.8 | 0.9 | UCSF/Inst. |
| | West of Third | 65.4 | 66.9 | 1.5 | 66.8 | 1.4 | UCSF/Hospital |
| | East of Third | 60.0 | 62.2 | 2.3 | 62.3 | 2.3 | UCSF/Inst. |
| 18 th Street | West of Arkansas | 54.7 | 55.6 | 0.9 | 55.6 | 0.9 | Res/Ind |
| | East of Arkansas | 55.4 | 56.2 | 0.8 | 56.2 | 0.8 | Res/Com |
| | West of Texas | 58.3 | 58.8 | 0.4 | 58.8 | 0.4 | Res/Com |
| | Texas to Pennsylvania | 58.5 | 58.8 | 0.3 | 58.8 | 0.3 | Res/Com |
| | East of Pennsylvania | 59.0 | 60.4 | 1.3 | 60.2 | 1.1 | Off/Com |
| | West of Indiana | 59.0 | 60.4 | 1.3 | 60.2 | 1.1 | Ind |
| | East of Indiana | 59.2 | 61.2 | 2.0 | 61.2 | 2.0 | Ind |
| 20 th Street | West of Third | 58.9 | 60.0 | 1.1 | 60.0 | 1.1 | Res/Ind |
| | East of Third | 59.7 | 65.1 | 5.5 | 65.2 | 5.5 | Ind |
| | West of Illinois | 59.6 | 65.0 | 5.5 | 65.1 | 5.5 | Ind |
| | East of Illinois | 62.4 | 67.1 | 4.6 | 67.0 | 4.6 | Ind |

Table 4.F.10 Continued

| Street | Segment or Cross-Street | Ldn/CNEL Noise Level (dBA) at 50 Feet from Roadway Centerline | | | | | Existing Use |
|-------------------------|----------------------------|---|------------------------------|--------------------------------|------------------------------|--------------------------------|-----------------|
| | | Baseline (2020) | With Project (Max Res) | Project Change (Max Res) | With Project (Max Com) | Project Change (Max Com) | |
| 22 nd Street | West of Indiana | 59.4 | 62.1 | 2.7 | 62.1 | 2.7 | Ind |
| | Indiana to Tennessee | 58.8 | 61.8 | 3.0 | 61.8 | 3.0 | Res |
| | Tennessee to Third | 58.4 | 61.6 | 3.2 | 61.6 | 3.2 | Com/Res |
| | East of Third | 58.5 | 66.9 | 8.4 | 66.7 | 8.2 | Ind |
| | West of Illinois | 58.1 | 66.9 | 8.7 | 66.7 | 8.6 | Ind |
| | East of Illinois | 51.1 | 65.4 | 14.3 | 65.4 | 14.3 | Ind |
| 23 rd Street | West of Third | 56.5 | 60.0 | 3.5 | 60.0 | 3.4 | Ind |
| | East of Third | 54.9 | 58.7 | 3.8 | 58.8 | 3.8 | Ind |
| | West of Illinois | 53.6 | 58.2 | 4.6 | 58.2 | 4.7 | Ind |
| | East of Illinois | 50.9 | 50.9 | 0.0 | 50.9 | 0.0 | Ind |
| 25 th Street | West of Pennsylvania | 56.5 | 56.5 | 0.0 | 56.5 | 0.0 | Res |
| | East of Pennsylvania | 59.4 | 61.7 | 2.3 | 61.8 | 2.3 | Ind |
| | West of Indiana | 59.3 | 61.6 | 2.3 | 61.7 | 2.4 | Ind |
| | East of Indiana | 59.4 | 61.7 | 2.3 | 61.8 | 2.3 | Ind |
| | West of Third | 57.4 | 61.7 | 4.4 | 62.0 | 4.6 | Ind |
| | East of Third | 53.0 | 57.9 | 4.8 | 58.4 | 5.4 | Ind |
| | West of Illinois | 54.0 | 58.2 | 4.2 | 58.7 | 4.7 | Ind |
| | East of Illinois | 49.5 | 49.5 | 0.0 | 49.5 | 0.0 | Ind |

Table 4.F.10 Continued

| Street | Segment or Cross-Street | Ldn/CNEL Noise Level (dBA) at 50 Feet from Roadway Centerline | | | | | Existing Use |
|-----------------|--------------------------------------|---|------------------------------|--------------------------------|------------------------------|--------------------------------|-----------------|
| | | Baseline (2020) | With Project (Max Res) | Project Change (Max Res) | With Project (Max Com) | Project Change (Max Com) | |
| Cesar Chavez | West of Pennsylvania | 65.1 | 66.4 | 1.3 | 66.4 | 1.3 | Ind |
| | East of Pennsylvania | 64.6 | 67.2 | 2.6 | 67.2 | 2.6 | Ind |
| | West of Third | 63.4 | 66.6 | 3.2 | 66.6 | 3.2 | Ind |
| | East of Third | 58.2 | 62.5 | 4.3 | 62.5 | 4.3 | Ind |
| Arkansas Street | North of 18 th | 54.9 | 54.9 | 0.0 | 54.9 | 0.0 | Res/Ind |
| | South of 18 th | 54.2 | 54.2 | 0.0 | 54.2 | 0.0 | Res |
| Future Driveway | East of Illinois | NA | 65.2 | NA | 65.2 | NA | Ind |
| Illinois Street | North of Mariposa | 56.8 | 59.9 | 3.1 | 59.9 | 3.1 | Vacant/UCSF |
| | Mariposa-19 th | 59.9 | 62.9 | 3.0 | 62.9 | 3.0 | Res/Com/Ind |
| | 19 th to 20 th | 60.4 | 63.4 | 3.0 | 63.4 | 3.0 | Res/Com/Ind |
| | 20 th to Driveway | 58.9 | 64.7 | 5.7 | 64.4 | 5.5 | Ind |
| | Driveway to 22 nd | 58.9 | 65.9 | 7.0 | 65.8 | 6.9 | Ind |
| | South of 22 nd | 57.6 | 63.2 | 5.7 | 63.4 | 5.8 | Ind |
| Indiana Street | North of 22 nd | 54.1 | 54.1 | 0.0 | 54.1 | 0.0 | Com/Ind |
| | South of 22 nd | 54.6 | 54.6 | 0.0 | 54.6 | 0.0 | Ind |
| | North of 25 th | 58.6 | 60.3 | 1.7 | 60.6 | 1.9 | Ind/Res |
| | South of 25 th | 57.5 | 57.5 | 0.0 | 57.5 | 0.0 | Ind/Res |

Table 4.F.10 Continued

| Street | Segment or Cross-Street | Ldn/CNEL Noise Level (dBA) at 50 Feet from Roadway Centerline | | | | | Existing Use |
|------------------|----------------------------|---|------------------------------|--------------------------------|------------------------------|--------------------------------|-----------------|
| | | Baseline (2020) | With Project (Max Res) | Project Change (Max Res) | With Project (Max Com) | Project Change (Max Com) | |
| Mariposa Street | West of I-280 Ramp | 63.8 | 63.9 | 0.1 | 63.9 | 0.1 | Ind/Res |
| | East of I-280 Ramp | 65.6 | 65.9 | 0.4 | 66.0 | 0.4 | Ind |
| | East of Indiana | 63.4 | 64.1 | 0.7 | 64.1 | 0.7 | Ind |
| | West of Third | 62.5 | 63.3 | 0.8 | 63.3 | 0.8 | Ind/Res |
| | East of Third | 60.3 | 61.5 | 1.2 | 61.5 | 1.2 | Ind |
| | West of Illinois | 60.2 | 61.4 | 1.2 | 61.4 | 1.2 | Ind |
| | East of Illinois | 59.6 | 59.6 | 0.0 | 59.6 | 0.0 | Ind |
| Tennessee Street | North of 22 nd | 53.4 | 53.4 | 0.0 | 53.4 | 0.0 | Com/Res |
| | South of 22 nd | 49.7 | 49.7 | 0.0 | 49.7 | 0.0 | Res/Com |
| Texas Street | North of 18 th | 52.6 | 52.6 | 0.0 | 52.6 | 0.0 | Res |
| | South of 18 th | 51.5 | 51.5 | 0.0 | 51.5 | 0.0 | Res |

Notes: Noise levels may vary by up to one-tenth of a decibel due to rounding. Noise levels in **bold** exceed either of the following threshold increases when compared to baseline noise levels: (1) an increase of 5 dBA or more, or (2) an increase of 3 dBA or more in areas where the existing or resulting noise increase exceeds acceptable (or satisfactory) levels for the affected use (see Figure 4.F.3: San Francisco Land Use Compatibility Chart for Community Noise, p. 4.F.23).

Res: Residential; Com: Commercial; Off: Office; Ind: Industrial; Inst: Institutional; UCSF: University of California, San Francisco

Traffic noise modeling was completed using the Federal Highway Administration RD-77-108 model. Assumptions include: Travel speeds on all streets, 25 mph, except on 16th, Third, and Cesar Chavez, where the posted speed limit is 30 mph; Vehicle Mix: 98% Autos/1.5% Medium Trucks/0.5% Heavy Trucks; Day-Night Split: 76% Day (7:00 a.m. to 7:00 p.m.), 12% Evening (7:00 p.m. to 10:00 p.m.), and 12% Night (10:00 p.m. to 7:00 a.m.). Background noise levels due to traffic on other roadways (such as cross-streets or nearby freeways) and non-traffic-related activities are not reflected in these noise levels. Noise levels in this table are intended to indicate incremental noise changes due to project implementation and future growth. Since they do not include background noise levels, they may not necessarily reflect actual noise levels along these roadway segments if there are other nearby sources of noise. Changes between scenarios analyzed may not show change due to rounding in the noise modeling results.

Source: Orion Environmental Associates, 2016

thresholds except for the following, which would exceed traffic noise thresholds, resulting in significant impacts:

- 20th Street (east of Third Street to east of Illinois Street)
- 22nd Street (east of Tennessee Street to east of Illinois Street)
- Illinois Street (20th Street to south of 22nd Street)

These street segments either directly adjoin the project site or are within two blocks of the project site and provide direct access to the site. Based on the significance thresholds for traffic noise increases, these increases would be significant. As shown in Table 4.F.10, existing land uses located adjacent to all but one of the above-listed street segments are currently industrial, and such uses are not considered sensitive to traffic noise increases (i.e., not noise-sensitive receptors). There is one street segment, 22nd Street between Tennessee Street and Third Street where there are residential uses and the resulting noise level is estimated to slightly exceed 60 dBA (L_{dn} or CNEL) and the incremental increase attributable to the project would be 3.2 dB, 0.2 dB above the threshold.

The Proposed Project would include a shuttle service, operated and maintained by the Pier 70 TMA, to connect the Pier 70 Mixed-Use District to regional transit hubs. The primary goal of the proposed shuttle service at Pier 70 is to provide a first-mile / last-mile connection for transit riders traveling to or from the project site, particularly for riders needing to use frequent local and regional transit. These riders would be expected to take regional transit services operated by BART, Caltrain, Alameda-Contra Costa Transit (AC Transit), Golden Gate Transit, San Mateo County Transit (SamTrans), or other regional transit providers, but would need an additional connection to access these services when traveling to or from Pier 70. The exact structure of any shuttle service provided for the Proposed Project site has not been established and would depend on factors that are not known at this time. For planning and analysis purposes, two routes have been preliminarily identified; however, final service routes and stops would be determined based on rider feedback and demand, peak period traffic congestion on local streets, and BART and Caltrain schedules and service plans at specific stations. The two preliminary routes assumed for this analysis are:

- 22nd Street, Mississippi Street, and 16th Street to access the 22nd Street Caltrain Station and the 16th Street / Mission BART station; and
- Third Street, 16th Street, and King Street to access the Fourth and King Caltrain Station (with some trips extending to the Transbay Transit Center)).)

An increase in shuttle bus volumes along these routes would incrementally increase traffic noise levels along these streets. However, the degree of impact would depend on bus sizes, frequency of buses on an hourly basis, and hours of operation. The future shuttle bus schedule is not known

at this time, but it is anticipated that any shuttle trips would be relatively minor and adequately accounted for in the modeled traffic noise analysis above.

Reduction of project-related one-way traffic by 20 percent through transportation demand management measures required in Air Quality Mitigation Measure M-AQ-1f: Transportation Demand Management (see Section 4.G, Air Quality, pp. 4.G.47-4.G.50), could reduce noise levels by up to 1.0 dB. Therefore, implementation of M-AQ-1f would reduce the above significant impacts related to noise increases to less than significant with mitigation at all of the above street segments except for three road segments:

- 22nd Street from Third Street to Illinois Street;
- 22nd Street east of Illinois Street (on the project site); and
- Illinois Street from the future 21st Street and 22nd Street (adjacent to the project site).

The one-block section of 22nd Street located off-site is developed with industrial uses and therefore, does not have noise-sensitive receptors. Project residences located adjacent to the section of 22nd Street east of Illinois Street (where the highest increase [14 dBA] is projected to occur) and the section of Illinois Street between the proposed 21st and 22nd streets (where the next highest increase [7 dBA] is projected to occur) would not be adversely affected by future noise levels because noise attenuation measures would be incorporated into these units as necessary to ensure that interior noise levels are maintained at acceptable levels even with future traffic noise level increases (see Mitigation Measure M-NO-6: Design of Future Noise-Sensitive Uses, pp. 4.F.70-4.F.71). While this mitigation measure would reduce the effects of project-related traffic noise increases on the interior environment of future uses, the Proposed Project's traffic would still result in noise levels that would cause a substantial permanent increase in ambient noise levels. Therefore, this impact would remain significant and unavoidable with mitigation.

Reduction of project-related one-way traffic by 20 percent through transportation demand management measures required in Air Quality Mitigation Measure M-AQ-1f: Transportation Demand Management, would reduce project-related noise increases on local streets in the project area to less-than-significant levels except on three road segments. Therefore, significant impacts related to traffic noise increases on these three road segments would remain significant and unavoidable, even with implementation of Mitigation Measure M-AQ-1f.

Impact NO-6: The Proposed Project's occupants would be substantially affected by future noise levels on the site. (*Less than Significant with Mitigation*)

As indicated above in Impacts NO-1 through NO-5, construction and operation of the Proposed Project would result in significant short- and long-term noise increases at the project site and its immediate vicinity. Therefore, the impact of these increases on future residents or users of the

project site is evaluated below.³⁴ Besides residential uses, future users of the site include open space/park/playground, commercial, and RALI uses. Open space/park/playground users in urban areas, commercial uses, and RALI uses are not considered to be sensitive to noise, and therefore, noise compatibility of these uses is not considered a CEQA impact. Noise compatibility of all proposed uses is evaluated in Table 4.F.11: Noise Compatibility by Parcel - Maximum Residential Scenario, and Table 4.F.12: Noise Compatibility by Parcel - Maximum Commercial Scenario, but where noise levels are considered Conditionally Acceptable for a proposed use, it is not considered a significant CEQA impact unless the use is residential; this is because residential uses are the only proposed land use that are noise-sensitive.

Compatibility with Future Noise Levels

As indicated above, the primary sources of future noise on the project site and its vicinity are from BAE Systems Ship Repair facility activities, earthmoving activities in the southwestern corner of the Illinois Parcel (PG&E Hoedown Yard), Existing Plus Project traffic noise on Illinois Street and other local streets, tonal noise from transformers at PG&E Potrero Substation, and loading dock activities along Illinois Street at the AIC Building. In addition to shipyard-related noise, there is continuous, distant background traffic noise from the I-280 freeway and other roadways. Passing Muni light rail and Caltrain rail operations also contribute to background noise. Long-term noise measurements collected in the project site and vicinity indicate that noise levels on the Illinois Parcels from these existing and future noise sources range from 64 to 68 dBA (L_{dn}), while noise levels in the southeastern portion of the 28-Acre Site range from 57 to 59 dBA (L_{dn}), which are somewhat quieter than those typical of light industrial/urban mixed-use locations. When measurement locations LT-3 and LT-4 are compared with measurement locations LT-1 and LT-2, existing intervening buildings (located both off- and on-site) appear to effectively shield some portions of the Mixed-Use District project site from noise generated by ship repair activities.

In general, the Maximum Residential Scenario would result in development of the greatest number of new residences, while the Maximum Commercial Scenario would result in development of the least number of residences. Both scenarios would result in development of the same amount of open space. Under both scenarios, multi-family residential units would be developed generally along the western and central portions of the project site (east side of Illinois Street, across from the AIC on Parcels PKN and PKS, and in the center of the site, Parcels D and E1, and in the central and eastern portions of the site (Parcels E2 and E3). Under both scenarios, Parcel C1 could be developed with residential, commercial, or parking uses and Parcel C2 could

³⁴ In *California Building Industry Association v. Bay Area Air Quality Management District*, the California Supreme Court concluded that CEQA generally does not require an analysis of how existing environmental conditions will impact a project's future users or residents unless a proposed project risks exacerbating an existing environmental hazard or condition. In that case, the potential impact of such hazards on future residents or users should be evaluated.

be developed with residential or parking uses. Active rooftop open space (sports courts, play fields, urban agriculture plots, seating, and observational terrace areas) could be developed on both of these parcels under both scenarios as well, if the parcels are developed with parking uses. However, under the Maximum Residential Scenario, residential uses would be developed along the southern boundary instead of commercial uses (Parcels HDY 1/HDY2, F/G, H1/H2) as well as in the center of the project site (Building 2). Noise levels are lowest in the southeast portion of the Mixed-Use District project site and the residential units in the center of the site would be shielded from BAE operational noise by commercial-office buildings to the north. Under both scenarios, residential uses on the western boundary of the project site would be subject to the highest noise levels from traffic on Illinois Street as well as activities at the AIC building and from operation of Potrero Substation.

The degree to which noise causes disturbance to people depends on noise frequencies, bandwidths, levels, and time patterns. In addition, higher frequencies, pure tones, and fluctuating noise levels tend to be more disturbing than lower frequencies, broadband, and constant-level noise. Although there are no standards or guidelines in the State Code or City noise guidelines that pertain to noise frequency or bandwidth, it is important to consider the noise character when considering the suitability of the project site for residential uses and potential for future noise conflicts.

Based on the data presented in Table 4.F.3, p. 4.F.11, the existing L_{dn} over most of the Mixed-Use District project site ranged from 60 to 69 dBA (L_{dn}) on the Illinois Parcels (LT-6 and LT-7), with slightly lower noise levels (57 to 59 dBA, L_{dn}) occurring in the southeastern corner of the 28-Acre Site (LT-5). A breakdown of noise compatibility by parcel and use for the Maximum Residential Scenario is presented in Table 4.F.11: Noise Compatibility by Parcel - Maximum Residential Scenario, while the same breakdown is provided for the Maximum Commercial Scenario in Table 4.F.12: Noise Compatibility by Parcel - Maximum Commercial Scenario.

PROPOSED RESIDENTIAL USES

The San Francisco Land Use Compatibility Chart for Community Noise (Figure 4.F.3, p. 4.F.23) indicates that noise levels up to 60 dBA (L_{dn}) are considered satisfactory (Acceptable) for residential uses, and no special noise insulation measures are required; between 60 dBA and 70 dBA (L_{dn}), noise levels are considered Conditionally Acceptable, where a detailed noise analysis is required and needed noise insulation features must be included in the design; above 65 dBA (L_{dn}), new residential construction is generally discouraged, but if it does proceed, a detailed noise analysis is required and needed noise insulation features must be included in the design.

As indicated in Tables 4.F.11 and 4.F.12, future noise levels at all Proposed Project parcels designated for residential use have existing noise levels that are considered Conditionally Acceptable, ranging between 60 dBA and 70 dBA (L_{dn}), with one exception: Illinois Parcels PKN

Table 4.F.11: Noise Compatibility by Parcel - Maximum Residential Scenario

| Project Parcel/ Building | Max Res Scenario Proposed Use | Existing Noise Level (Ldn) | With Future Traffic Noise Increases (Ldn) ¹ | Noise Compatibility with Proposed Use (Comparison to City Noise Guidelines in Figure 4.F.3) | Noise Mitigation Needed |
|---------------------------------|-------------------------------|----------------------------|--|---|-------------------------|
| 28-Acre Site² | | | | | |
| Parcel A | Com-Office | 60-66 dBA | 60-70 dBA | Acceptable for commercial-office uses (≤ 70 dBA, Ldn). | N/A |
| Parcel B | Com-Office | 60-66 dBA | 65-69 dBA | Acceptable for commercial-office uses (≤ 70 dBA, Ldn). | N/A |
| Parcel C1 | Com-Office or Residential | 58-66 dBA | 58-71 dBA | Acceptable for commercial-office uses (≤ 70 dBA, Ldn) except Conditionally Acceptable on north façade (71-75 dBA, Ldn) or Conditionally Acceptable for residential uses (> 60 dBA, Ldn). | N/A or Yes (M-NO-6) |
| | or Parking | | 58-71 dBA | Parking use is not subject to City noise guidelines, but potential for disturbance of adjacent residents from noise associated with parking activities. | N/A |
| Parcel C2 | Residential | 58-66 dBA | 58-70 dBA | Conditionally Acceptable for residential uses (> 60 dBA, Ldn). | Yes (M-NO-6) |
| | or Parking | 58-66 dBA | 58-70 dBA | Parking use is not subject to City noise guidelines, but potential for disturbance of adjacent residents from noise associated with parking activities. | N/A |
| Parcel D | Residential | 66 dBA | 66-70 dBA | Conditionally Acceptable for residential uses (> 60 dBA, Ldn). Project residences would be subject to shipyard noise with measured nighttime levels of 58-64 dBA (Leq) and 60-69 dBA (Lmax). Proposed building demolition could increase shipyard-related noise at this parcel during the early phases by creating a more direct line of sight between residential uses and BAE ship repair activities, but new construction in the northern portion of the 28-Acre Site could ultimately result in offsetting decreases (by blocking direct lines of sight) from shipyard-related noise levels on this parcel, depending on phasing. | Yes (M-NO-6) |
| Parcel E1 | Residential | 66 dBA | 66-69 dBA | Conditionally Acceptable for residential uses (> 60 dBA, Ldn). Project residences would be subject to shipyard noise with measured nighttime levels of 58-64 dBA (Leq) and 60-69 dBA (Lmax). Proposed building demolition could increase shipyard noise at this parcel during early phases by creating a more direct line of sight between residential uses and BAE ship repair activities, but new construction in the northern portion of the 28-Acre Site could ultimately result in offsetting decreases (by blocking direct lines of sight) from shipyard noise, depending on phasing. | Yes (M-NO-6) |
| Parcel E2 | Residential | 58-66 dBA | 66-69 dBA | Conditionally Acceptable for residential uses (> 60 dBA, Ldn). | Yes (M-NO-6) |

Table 4.F.11 Continued

| Project Parcel/ Building | Max Res Scenario Proposed Use | Existing Noise Level (Ldn) | With Future Traffic Noise Increases (Ldn)¹ | Noise Compatibility with Proposed Use (Comparison to City Noise Guidelines in Figure 4.F.3) | Noise Mitigation Needed |
|---|--|---|--|--|--|
| Parcel E3 | Residential | 58-66 dBA | 58-68 dBA | Conditionally Acceptable for residential uses (>60 dBA, Ldn). | Yes (M-NO-6) |
| Parcel F | Residential | 58-66 dBA | 58-70 dBA | Conditionally Acceptable for residential uses (>60 dBA, Ldn). Proposed building demolition could increase shipyard noise at this parcel during early phases by creating a more direct line of sight between residential uses and BAE ship repair activities, but building rehabilitation and new construction in the northern and central portions of the 28-Acre Site could ultimately result in offsetting decreases (by blocking direct lines of sight) from shipyard noise, depending on phasing. | Yes (M-NO-6) |
| Parcel G | Residential | 58-66 dBA | 58-69 dBA | Conditionally Acceptable for residential uses (>60 dBA, Ldn). Proposed building demolition could increase shipyard noise at this parcel during early phases by creating a more direct line of sight between residential uses and BAE ship repair activities, but building rehabilitation and new construction in the northern and central portions of the 28-Acre Site could ultimately result in offsetting decreases (by blocking direct lines of sight) from shipyard noise, depending on phasing. | Yes (M-NO-6) |
| Parcel H1 | Residential | 58-66 dBA | 58-68 dBA | Conditionally Acceptable for residential uses (>60 dBA, Ldn). Proposed building demolition could increase shipyard noise at this parcel during early phases by creating a more direct line of sight between residential uses and BAE ship repair activities, but building rehabilitation and new construction in the northern and central portions of the 28-Acre Site could ultimately result in offsetting decreases (by blocking direct lines of sight) from shipyard noise, depending on phasing. | Yes (M-NO-6) |
| Parcel H2 | Residential | 58-66 dBA | 58-68 dBA | Conditionally Acceptable for residential uses (>60 dBA, Ldn). Proposed building demolition could increase shipyard noise at this parcel during early phases by creating a more direct line of sight between residential uses and BAE ship repair activities, but building rehabilitation and new construction in the northern and central portions of the 28-Acre Site could ultimately result in offsetting decreases (by blocking direct lines of sight) from shipyard noise, depending on phasing. | Yes (M-NO-6) |

Table 4.F.11 Continued

| Project Parcel/ Building | Max Res Scenario Proposed Use | Existing Noise Level (Ldn) | With Future Traffic Noise Increases (Ldn)¹ | Noise Compatibility with Proposed Use (Comparison to City Noise Guidelines in Figure 4.F.3) | Noise Mitigation Needed |
|-------------------------------------|--------------------------------------|-----------------------------------|--|--|--------------------------------|
| Building 2 | Residential | 66 dBA | 66-70 dBA | Conditionally Acceptable for residential uses (>60 dBA, Ldn). Project residences would be subject to shipyard noise with measured nighttime levels of 58-64 dBA (Leq) and 60-69 dBA (Lmax). Proposed building demolition could increase shipyard noise at this parcel during early phases by creating a more direct line of sight between residential uses and BAE ship repair activities, but building rehabilitation and new construction in the northern and central portions of the 28-Acre Site could ultimately result in offsetting decreases (by blocking direct lines of sight) from shipyard noise, depending on phasing. | Yes (M-NO-6) |
| Parcel E4 | RALI | 66 dBA | 66-69 dBA | Acceptable for RALI uses (≤70 dBA, Ldn), but potential noise conflicts with adjacent residential uses. | N/A |
| Building 12 | RALI | 58-66 dBA | 58-69 dBA | Acceptable for RALI uses (≤70 dBA, Ldn) but potential noise conflicts with adjacent residential uses. | N/A |
| Building 21 | RALI | 66 dBA | 66 dBA | Acceptable for RALI uses (≤70 dBA, Ldn) but potential noise conflicts with adjacent residential uses. | N/A |
| Parcel C1 Rooftop | Parks / Sport Courts | 58-66 dBA | 58-71 dBA | Acceptable for playgrounds/parks (≤70 dBA, Ldn) except Conditionally Acceptable only on C1 immediately adjacent to 21 st Street (71-77.5 dBA, Ldn). | N/A |
| Parcel C2 Rooftop | Parks / Sport Courts | 58-66 dBA | 58-70 dBA | Acceptable for playgrounds/parks (≤70 dBA, Ldn). | N/A |
| Waterfront Promenade | Open Space / Parks | 58-66 dBA | 58-66 dBA | Acceptable for water-related recreational uses (≤75 dBA, Ldn). | N/A |
| Waterfront Terrace | Open Space / Parks | 66 dBA | 58-68 dBA | Acceptable for water-related recreational uses (≤75 dBA, Ldn), but potential noise conflicts with adjacent residential uses. | N/A |
| Slipway Commons | Open Space / Parks | 66 dBA | 58-66 dBA | Acceptable for water-related recreational uses (≤75 dBA, Ldn), but potential noise conflicts with adjacent residential uses. | N/A |
| Building 12 Market Plaza/Square | Open Space / Parks | 66 dBA | 66-68 dBA | Acceptable for playgrounds/parks (≤70 dBA, Ldn), but potential noise conflicts with adjacent residential uses. | N/A |
| Illinois Parcels³ | | | | | |
| Parcel PKN | Residential | 62-64 dBA | 65-72 dBA | Conditionally Acceptable for residential uses (>60 dBA, Ldn), and new residential construction generally discouraged on south façade | Yes (M-NO-6) |

Table 4.F.11 Continued

| Project Parcel/ Building | Max Res Scenario Proposed Use | Existing Noise Level (Ldn) | With Future Traffic Noise Increases (Ldn)¹ | Noise Compatibility with Proposed Use (Comparison to City Noise Guidelines in Figure 4.F.3) | Noise Mitigation Needed |
|---------------------------------|--------------------------------------|-----------------------------------|--|---|--------------------------------|
| Parcel PKS | Residential | 62-64 dBA | 65-72 dBA | Conditionally Acceptable for residential uses (>60 dBA, Ldn), and new residential construction generally discouraged on north façade (>70 dBA, Ldn), but acceptable interior levels can still be achieved with supplemental noise-reduction measures. Project residences on west side would be subject to noise generated by AIC with measured nighttime Lmax up to 77 dBA, but averaging 70 dBA. | Yes (M-NO-6) |
| Hoedown Yard (HDY1/2) | Residential | 62-64 dBA ⁴ | 62-70 dBA | Conditionally Acceptable for residential uses (>60 dBA, Ldn). Project residences on west side would be subject to noise generated by AIC (up to 77 dBA, Lmax, averaging 70 dBA, Lmax) to the west and Potrero Substation to the south (increased ambient of 10 to 13 dBA, Leq, at 200 feet). ⁵ | Yes (M-NO-6) |
| 20 th Street Plaza | Open Space / Parks | 62-64 dBA | 62-71 dBA | Acceptable for playgrounds/parks (≤70 dBA, Ldn), but Conditionally Acceptable at the northern margin of the plaza adjacent to 20 th Street. | N/A |
| Irish Hill Playground | Open Space / Parks | 62-64 dBA | 62-72 dBA | Acceptable for playgrounds/parks (≤70 dBA, Ldn), but Conditionally Acceptable on north side adjacent to 21 st Street (71-77.5 dBA, Ldn) | N/A |

Notes: N/A = Not applicable and no mitigation required because it is not a noise-sensitive use. As indicated under “Attenuation of Noise,” p. 4.F.4, closed windows reduce noise levels by approximately 25 dBA, while open windows reduce noise levels by about 15 dBA.

¹ Traffic noise levels were first estimated for each project roadway based on future estimated traffic volumes, and then adjusted for distance to the edge of the road rights-of-way to represent the maximum noise level at closest possible location of a building façade. Noise levels by façade are listed for each parcel and building on the project site in Appendix F, Project On-Site Noise Exposure by Parcel. The above table summarizes these estimates by presenting the lowest and highest combined noise levels for each parcel at the edge of the adjacent or closest road rights-of-way.

² All 28-Acre Site parcels except existing Buildings 2, 12, and 21 would be permitted to include accessory parking. Also RALI uses would be allowed on the ground floor of Parcels A, B, C1, C2, D, E1, E2, E3, F, G, H1, and H2.

³ Retail/Restaurant uses would be allowed on the ground floor and accessory parking on all four parcels.

⁴ Ambient noise levels for Parcel HDY are estimated based on measurements collected along Illinois Street to the north because measurements at Parcel HDY included noise from heavy equipment operations associated with the existing PG&E corporation yard activities in the Hoedown Yard. These operations would cease on this parcel when this parcel is redeveloped as part of project implementation, but transformer noise from Potrero Substation would continue.

⁵ When measured L90 levels between midnight and 4:00 a.m. are compared between LT-6 and LT-7 (same distance to Illinois Street except LT-7 is located 200 feet from Potrero Substation to the south), the difference in nighttime ambient was 10 to 13 dBA, which could be attributable to Potrero Substation.

Source: Orion Environmental Associates, 2016

Table 4.F.12: Noise Compatibility by Parcel - Maximum Commercial Scenario

| Project Parcel/ Building | Max Com Scenario Proposed Use | Existing Noise Level (Ldn) | With Future Traffic Noise Increases (Ldn) ¹ | Noise Compatibility with Proposed Use (Comparison to City Noise Guidelines in Figure 4.F.3) | Noise Mitigation Needed |
|---------------------------------|-------------------------------------|-------------------------------------|---|---|-------------------------------|
| 28-Acre Site² | | | | | |
| Parcel A | Com-Office | 60-66 dBA | 60-70 dBA | Acceptable for commercial-office uses (≤ 70 dBA, Ldn). | N/A |
| Parcel B | Com-Office | 60-66 dBA | 65-69 dBA | Acceptable for commercial-office uses (≤ 70 dBA, Ldn). | N/A |
| Parcel C1 | Com-Office | 58-66 dBA | 58-71 dBA | Acceptable for commercial-office uses (≤ 70 dBA, Ldn) except Conditionally Acceptable on north façade (70-75 dBA, Ldn). | N/A |
| | or Parking | | 58-71 dBA | Parking use not subject to City noise guidelines, but potential noise conflicts with adjacent residential uses. | N/A |
| Parcel C2 | Residential | 58-66 dBA | 58-70 dBA | Conditionally Acceptable for residential uses (> 60 dBA, Ldn). | Yes (M-NO-6) |
| | or Parking | 58-66 dBA | 58-70 dBA | Parking use not subject to City noise guidelines, but potential noise conflicts with adjacent residential uses. | N/A |
| Parcel D | Residential | 66 dBA | 66-70 dBA | Conditionally Acceptable for residential uses (> 60 dBA, Ldn). Project residences would be subject to shipyard noise with measured nighttime levels of 58-64 dBA (Leq) and 60-69 dBA (Lmax). Proposed building demolition could increase shipyard-related noise at this parcel during the early phases by creating a more direct line of sight between residential uses and BAE ship repair activities, but new construction in the northern portion of the 28-Acre Site could ultimately result in offsetting decreases (by blocking direct lines of sight) from shipyard-related noise levels on this parcel, depending on phasing. | Yes (M-NO-6) |
| Parcel E1 | Residential | 66 dBA | 66-69 dBA | Conditionally Acceptable for residential uses (> 60 dBA, Ldn). Project residences would be subject to shipyard noise with measured nighttime levels of 58-64 dBA (Leq) and 60-69 dBA (Lmax). Proposed building demolition could increase shipyard-related noise at this parcel during the early phases by creating a more direct line of sight between residential uses and BAE ship repair activities, but new construction in the northern portion of the 28-Acre Site could ultimately result in offsetting decreases (by blocking direct lines of sight) from shipyard-related noise levels on this parcel, depending on phasing. | Yes (M-NO-6) |
| Parcel E2 | Residential | 58-66 dBA | 66-69 dBA | Conditionally Acceptable for residential uses (> 60 dBA, Ldn). | Yes (M-NO-6) |
| Parcel E3 | Residential | 58-66 dBA | 58-68 dBA | Conditionally Acceptable for residential uses (> 60 dBA, Ldn). | Yes (M-NO-6) |

Table 4.F.12 Continued

| Project Parcel/ Building | Max Com Scenario Proposed Use | Existing Noise Level (Ldn) | With Future Traffic Noise Increases (Ldn)¹ | Noise Compatibility with Proposed Use (Comparison to City Noise Guidelines in Figure 4.F.3) | Noise Mitigation Needed |
|---------------------------------|--------------------------------------|-----------------------------------|--|---|--------------------------------|
| Parcel F | Com-Office | 58-66 dBA | 58-70 dBA | Acceptable for commercial-office uses (≤ 70 dBA, Ldn). Proposed building demolition could increase shipyard-related noise at this parcel during the early phases by creating a more direct line of sight between residential uses and BAE ship repair activities, but building rehabilitation and new construction in the northern and central portions of the 28-Acre Site could ultimately result in offsetting decreases (by blocking direct lines of sight) from shipyard-related noise levels on this parcel, depending on phasing. | N/A |
| Parcel G | Com-Office | 58-66 dBA | 58-69 dBA | Acceptable for commercial-office uses (≤ 70 dBA, Ldn). Proposed building demolition could increase shipyard-related noise at this parcel during the early phases by creating a more direct line of sight between residential uses and BAE ship repair activities, but building rehabilitation and new construction in the northern and central portions of the 28-Acre Site could ultimately result in offsetting decreases (by blocking direct lines of sight) from shipyard-related noise levels on this parcel, depending on phasing. | N/A |
| Parcel H1 | Com-Office | 58-66 dBA | 58-68 dBA | Acceptable for commercial-office uses (≤ 70 dBA, Ldn). Proposed building demolition could increase shipyard-related noise at this parcel during the early phases by creating a more direct line of sight between residential uses and BAE ship repair activities, but building rehabilitation and new construction in the northern and central portions of the 28-Acre Site could ultimately result in offsetting decreases (by blocking direct lines of sight) from shipyard-related noise levels on this parcel, depending on phasing. | N/A |
| Parcel H2 | Com-Office | 58-66 dBA | 58-68 dBA | Acceptable for commercial-office uses (≤ 70 dBA, Ldn). Proposed building demolition could increase shipyard-related noise at this parcel during the early phases by creating a more direct line of sight between residential uses and BAE ship repair activities, but building rehabilitation and new construction in the northern and central portions of the 28-Acre Site could ultimately result in offsetting decreases (by blocking direct lines of sight) from shipyard-related noise levels on this parcel, depending on phasing. | N/A |
| Building 2 | Com-Office | 66 dBA | 66-70 dBA | Acceptable for commercial-office uses (≤ 70 dBA, Ldn). Proposed building demolition could increase shipyard-related noise at this parcel during the early phases by creating a more direct line of sight between residential uses and BAE ship repair activities, but new construction in the northern portion of the 28-Acre Site could ultimately result in offsetting decreases (by blocking direct lines of sight) from shipyard-related noise levels on this parcel, depending on phasing. | N/A |
| Parcel E4 | RALI | 66 dBA | 66-69 dBA | Acceptable for RALI uses (≤ 70 dBA, Ldn), but potential noise conflicts with adjacent residential uses. | N/A |

Table 4.F.12 Continued

| Project Parcel/ Building | Max Com Scenario Proposed Use | Existing Noise Level (Ldn) | With Future Traffic Noise Increases (Ldn)¹ | Noise Compatibility with Proposed Use (Comparison to City Noise Guidelines in Figure 4.F.3) | Noise Mitigation Needed |
|-------------------------------------|--|---------------------------------------|--|--|--------------------------------|
| Parcel C1 Rooftop | Parks / Sport Courts | 58-66 dBA | 58-71 dBA | Acceptable for playgrounds/parks (≤ 70 dBA, Ldn) except Conditionally Acceptable only on C1 immediately adjacent to 21 st Street (71-77.5 dBA, Ldn). | N/A |
| Parcel C2 Rooftop | Parks / Sport Courts | 58-66 dBA | 58-70 dBA | Acceptable for playgrounds/parks (≤ 70 dBA, Ldn). | N/A |
| Waterfront Promenade | Open Space / Parks | 58-66 dBA | 58-66 dBA | Acceptable for water-related recreational uses (≤ 75 dBA, Ldn). | N/A |
| Waterfront Terrace | Open Space / Parks | 66 dBA | 58-68 dBA | Acceptable for water-related recreational uses (≤ 75 dBA, Ldn), but potential noise conflicts with adjacent residential uses. | N/A |
| Slipway Commons | Open Space / Parks | 66 dBA | 58-66 dBA | Acceptable for water-related recreational uses (≤ 75 dBA, Ldn), but potential noise conflicts with adjacent residential uses. | N/A |
| Building 12 Market Plaza/Square | Open Space / Parks | 66 dBA | 66-68 dBA | Acceptable for playgrounds/parks (≤ 70 dBA, Ldn), but potential noise conflicts with adjacent residential uses. | N/A |
| Illinois Parcels³ | | | | | |
| Parcel PKN | Residential | 62-64 dBA | 65-72 dBA | Conditionally Acceptable for residential uses (> 60 dBA, Ldn), and new residential construction generally discouraged on south façade (> 70 dBA, Ldn), but acceptable interior levels can still be achieved with supplemental noise-reduction measures. Project residences on the west side would be subject to noise generated by AIC with maximum exterior noise levels up to 77 dBA (Lmax), averaging 70 dBA (Lmax) during the nighttime hours. | Yes (M-NO-6) |
| Parcel PKS | Residential | 62-64 dBA | 65-72 dBA | Conditionally Acceptable for residential uses (> 60 dBA, Ldn), and new construction generally discouraged on north façade (> 70 dBA, Ldn), but acceptable interior levels can still be achieved with supplemental noise-reduction measures. Project residences on west side would be subject to noise generated by AIC with maximum exterior noise levels up to 77 dBA (Lmax), averaging 70 dBA (Lmax) during the nighttime hours. | Yes (M-NO-6) |
| Hoedown Yard (HDY1/2) | Com-Office | 62-64 dBA ⁴ | 62-70 dBA | Acceptable for commercial-office uses (≤ 70 dBA, Ldn). Project commercial uses on west side would be subject to noise generated by AIC (up to 77 dBA (Lmax), averaging 70 dBA (Lmax) during the nighttime hours) to the west and PG&E transformers to the south (increased ambient of 10 to 13 dBA (Leq) at 200 feet during the night ⁵), no noise compatibility problems since commercial uses are not considered noise-sensitive. | N/A |

Table 4.F.12 Continued

| Project Parcel/ Building | Max Com Scenario Proposed Use | Existing Noise Level (Ldn) | With Future Traffic Noise Increases (Ldn)¹ | Noise Compatibility with Proposed Use (Comparison to City Noise Guidelines in Figure 4.F.3) | Noise Mitigation Needed |
|-------------------------------------|--|---|--|---|--|
| 20 th Street Plaza | Open Space / Parks | 62-64 dBA | 62-71 dBA | Acceptable for playgrounds/parks (≤ 70 dBA, Ldn) except Conditionally Acceptable adjacent to 20 th Street (70-77.5 dBA, Ldn). | N/A |
| Irish Hill Playground | Open Space / Parks | 62-64 dBA | 62-72 dBA | Acceptable for playgrounds/parks (≤ 70 dBA, Ldn) but Conditionally Acceptable adjacent to 21 st Street and Illinois Street (70-77.5 dBA, Ldn). | N/A |

Notes: N/A = Not applicable and no mitigation required because it is not a noise-sensitive use. As indicated under “Attenuation of Noise,” p. 4.F.4, closed windows reduce noise levels by approximately 25 dBA, while open windows reduce noise levels by about 15 dBA.

¹ Traffic noise levels were first estimated for each project roadway based on future estimated traffic volumes, and then adjusted for distance to the edge of the road rights-of-way to represent the maximum noise level at closest possible location of a building façade. Noise levels by façade are listed for each parcel and building on the project site in Appendix F, Project On-Site Noise Exposure by Parcel. The above table summarizes these estimates by presenting the lowest and highest combined noise levels for each parcel at the edge of the adjacent or closest road rights-of-way.

² All 28-Acre Site parcels except existing Buildings 2, 12, and 21 would be permitted to include accessory parking. Also RALI uses would be allowed on the ground floor of Parcels A, B, C1, C2, D, E1, E2, E3, F, G, H1, and H2.

³ Retail/Restaurant uses would be allowed on the ground floor and accessory parking on all four parcels.

⁴ Ambient noise levels for Parcel HDY are estimated based on measurements collected along Illinois to the north because measurements at Parcel HDY included noise from heavy equipment operations associated with the existing PG&E corporation yard activities. These operations would cease on this parcel when this parcel is redeveloped as part of project implementation, but transformer noise from Potrero Substation would continue.

⁵ When measured L90 levels between midnight and 4:00 a.m. are compared between LT-6 and LT-7 (same distance to Illinois except LT-7 is located 200 feet from Potrero Substation to the south), the difference in nighttime ambient was 10 to 13 dBA, which could be attributable to Potrero Substation.

Source: Orion Environmental Associates, 2016

and PKS, where future noise levels are estimated to be slightly higher (72 dBA, L_{dn}) at 19 feet from the centerline of the future 21st Street. Except for the residential units that would face 21st Street on these two parcels, it is expected that proposed residential uses on the project site could be designed to meet the 45-dBA (L_{dn} or CNEL) interior noise standard specified by Title 24 with incorporation of common noise attenuation measures. Examples of common noise attenuation measures include selecting glazing with higher noise reduction, improving exterior wall construction, and adapting the layout of interior spaces and/or location of windows. Therefore, compliance with Title 24's interior standard would reduce noise compatibility impacts to less-than-significant levels at all residential units except those subject to noise levels above 70 dBA (L_{dn}). Within the project site, residential units facing the future 21st Street on Parcels PKN and PKS would be subject to noise levels of up to 72 dBA (L_{dn}), resulting in a significant impact. With incorporation of noise attenuation measures into the project design as necessary in order to meet the 45-dBA interior noise standard, as specified in Mitigation Measure M-NO-6, this impact would be reduced to a less-than-significant level.

Historic Building 2 is proposed to be rehabilitated in compliance with the Secretary of the Interior's Standards for the Treatment of Historic Properties. Noise levels measured just north of this building (LT-2) were 66 dBA (L_{dn}). When future traffic noise levels are added to existing ambient noise levels, future noise levels at the edges of road rights-of way are estimated to range between 66 and 70 dBA (L_{dn}). This building is proposed for residential uses under the Maximum Residential Scenario. When compared to the City's compatibility guidelines for residential uses (Figure 4.F.3, p. 4.F.23), future noise levels in the vicinity of this building are considered to be Conditionally Acceptable, a significant impact. With incorporation of noise attenuation approaches into the project design as necessary in order to meet the 45-dBA interior noise standard of Title 24, as specified in Mitigation Measure M-NO-6, this impact would be reduced to a less-than-significant level.

The applicant would be required to demonstrate that the 45-dBA (L_{dn} or CNEL) interior noise standard specified by Title 24 would be met at all project residences, and additional noise attenuation measures are required to be incorporated into the project design as necessary to meet this interior standard, but also address potential sleep disturbance effects on affected parcels (as indicated in Tables 4.F.11 and 4.F.12) from adjacent or nearby industrial activities. It is noted that on-site noise levels could increase with proposed building demolition (as noted in Tables 4.F.11 and 4.F.12), but also decrease in the future with project implementation if existing heavy equipment operations at the Hoedown Yard cease and Proposed Project buildings are up to 90 feet tall in the northern portion of the 28-Acre Site. Such building heights could help partially shield the rest of the site from noise generated by the BAE Systems Ship Repair facility (i.e., BAE boilers and generators). Such future noise reductions, however, would ultimately depend on

the final locations and heights of proposed buildings but could reduce the extent of noise attenuation required at some residential units.

PROPOSED OPEN SPACE/PARK/PLAYGROUND USES

In urban environments, playgrounds and parks (active recreation areas) as well as open space areas in urban areas are not considered noise-sensitive uses, and therefore, the following analysis of noise compatibility is provided for informational purposes only. Under the City's compatibility guidelines for playgrounds and parks (Figure 4.F.3), noise levels up to 70 dBA (L_{dn}) are considered to be Acceptable, and no noise attenuation approaches need to be implemented. As indicated in Tables 4.F.11 and 4.F.12, future noise levels at all but three Proposed Project parcels designated for open space/park/playground uses are estimated to range between 60 dBA and 70 dBA (L_{dn}). Such levels are considered Acceptable for these outdoor uses. Future noise levels under both scenarios could reach 71 or 72 dBA along the edges of the Parcel C1 Rooftop, 20th Street Plaza, and Irish Hill Playground (located adjacent to 20th and 21st streets), and such levels are considered Conditionally Acceptable. While noise levels exceeding 70 dBA (L_{dn}) are attributable to traffic noise on these streets, they would only occur along the margins of the open spaces/parks located adjacent to these streets, not the main park or playground areas. Park users could access quieter areas within these parks (away from adjacent streets), and noise levels would be considered generally acceptable at proposed open space/park/playground areas.

Mitigation Measure M-NO-6: Design of Future Noise-Sensitive Uses

Prior to issuance of a building permit for vertical construction of specific residential building design on each parcel, a noise study shall be conducted by a qualified acoustician, who shall determine the need to incorporate noise attenuation measures into the building design in order to meet Title 24's interior noise limit for residential uses as well as the City's (Article 29, Section 2909(d)) 45-dBA (L_{dn}) interior noise limit for residential uses. This evaluation shall account for noise shielding by buildings existing at the time of the proposal, potential increases in ambient noise levels resulting from the removal of buildings that are planned to be demolished, all planned commercial or open space uses in adjacent areas, any known variations in project build-out that have or will occur (building heights, location, and phasing), any changes in activities adjacent to or near the Illinois Parcels or 28-Acre Site (given the Proposed Project's long build-out period), any new shielding benefits provided by surrounding buildings that exist at the time of development, future cumulative traffic noise increases on adjacent roadways, existing and planned stationary sources (i.e., emergency generators, HVAC, etc.), and future noise increases from all known cumulative projects located with direct line-of-sight to the project building.

To minimize the potential for sleep disturbance effects from tonal noise or nighttime noise events associated with nearby industrial uses, predicted noise levels at each project building shall account for 24/7 operation of the BAE Systems Ship Repair facility, 24/7 transformer noise at Potrero Substation (if it remains an open air facility), and industrial

activities at the AIC, to the extent such use(s) are in operation at the time the analysis is conducted.

Noise reduction strategies such as the following could be incorporated into the project design as necessary to meet Title 24 interior limit and minimize the potential for sleep disturbance from adjacent industrial uses:

- Orient bedrooms away from major noise sources (i.e., major streets, open space/recreation areas where special events would occur, and existing adjacent industrial uses, including AIC, Potrero Substation, and the BAE site) and/or provide additional enhanced noise insulation features (higher STC ratings) or mechanical ventilation to minimize the effects of maximum instantaneous noise levels generated by these uses even though there is no code requirement to reduce L_{max} noise levels. Such measures shall be implemented on Parcels D and E1 (both scenarios), Building 2 (Maximum Residential Scenario only), Parcels PKN (both scenarios), PKS (both scenarios), and HDY (Maximum Residential Scenario only);
- Utilize enhanced exterior wall and roof-ceiling assemblies (with higher STC ratings), including increased insulation;
- Utilize windows with higher STC / Outdoor/Indoor Transmission Class (OITC) ratings;
- Employ architectural sound barriers as part of courtyards or building open space to maximize building shielding effects, and locate living spaces/bedrooms toward courtyards wherever possible; and
- Locate interior hallways (accessing residential units) adjacent to noisy streets or existing/planned industrial or commercial development.

Implementation of Mitigation Measure M-NO-6 would reduce noise compatibility impacts on project residences to a less-than-significant level.

Impact NO-7: The Proposed Project's special events would result in substantial periodic, temporary noise increases. (*Less than Significant with Mitigation*)

The Proposed Project would include development of a number of public open spaces. The open space planning chapter in the *Pier 70 SUD Design for Development* provides concepts and approximate hypothetical site plans, but these concepts and site plans would be further developed. Under the conceptual ideas, the Market Square open space area is proposed to have open-air markets, market stalls, small performances, and gatherings (between Buildings 2, 12, and Parcel D). Community gatherings (i.e., festivals, performances, and nighttime cultural events) are proposed in the Slipways Common open space area (between Parcels E1, E2, E3, E4, and Building 21). A café terrace, social lawn, beer garden, food/beverage operations, and picnic area are proposed in the Waterfront Terrace open space area. Viewing pavilions proposed in the Waterfront Promenade would accommodate a variety of public program uses such as cultural events and gatherings. Typical events, occurring up to an estimated three times a month, could have attendance of approximately 500 to 750 people, while larger-scale events, occurring

approximately four times per year, could have attendance up to 5,000 people. The Waterfront Promenade would also include pedestrian and bike trails, café terrace, and passive recreation. The Irish Hill Playground (between Parcels PKS, HDY, C1, and C2) would have playground facilities. If Parcels C1 and C2 are built as district parking, there would be public open space on the rooftops. While final plans for this open space area have not been developed, potential uses for this open space include sport courts and play fields, urban agriculture plots, seating, and observational terrace areas.

Residential uses are proposed to be developed adjacent to the Irish Hill Playground (Parcel PKS under both scenarios and Parcel HDY under the Maximum Residential Scenario). Residential uses would also be developed adjacent to the Market Square open space area (Building 2 and Parcel D under the Maximum Residential Scenario, but only Parcel D under the Maximum Commercial Scenario). Residential uses would also be proposed adjacent to Slipway Commons, where events would be held during the day and evening (Parcels E1, E2, and E3 under both scenarios), as well as adjacent to the Waterfront Promenade, where cultural events would be held during the day and evening (Parcel H2 under Maximum Residential Scenario). RALI or commercial-office uses are proposed adjacent to the Waterfront Terrace open space area (Parcels B2 and E4 under both scenarios), where there would be more intensive outdoor uses (a beer garden and food/beverage operations).

The proximity of future residential uses to these types of open space uses would pose the potential for Proposed Project residents to be disturbed or annoyed by noise from outdoor active recreation/open space activities. Noise levels associated with the proposed café terrace, social lawn, beer garden, food/beverage operations, picnic areas and the playground would be typical of an urban, mixed-use residential area and would be less than significant in regards to compatibility with nearby sensitive receptors. The potential noise conflicts would be greatest where amplified sound systems would be used and/or events occur during the more noise-sensitive late evening/nighttime hours when sleep disturbance could occur.

As discussed above under Local Regulations and Guidelines, promoters of any proposed outdoor events on the site's outdoor plaza that would use amplified sound or music would be required to obtain a permit from the City prior to the event. Section 1060.1 of the Police Code requires a permit to conduct, operate, or maintain a place of entertainment, limited live performance locale or one-time event within the City and County of San Francisco. Concerts in the proposed open spaces would require the promoter to obtain a Limited Live Performance Permit from the San Francisco Entertainment Commission. This permit process requires a public hearing and includes a requirement for neighborhood outreach. Article 1, Section 47.2 of the Police Code, while generally focused on truck-mounted amplification equipment, regulates the use of any sound amplifying equipment, whether truck-mounted or otherwise. Hours of operation are restricted to

between 9:00 a.m. and 10:00 p.m., unless permitted by the San Francisco Entertainment Commission.

Due to uncertainties as to the nature and extent of future outdoor events at the project site, the use of amplified sound equipment could still have the potential for significant noise impacts to nearby sensitive receptors in excess of standards established in the San Francisco General Plan or San Francisco Noise Ordinance. Implementation of Mitigation Measure M-NO-7: Noise Control Plan for Outdoor Amplified Sound, shown below, would ensure that sound levels generated by amplified equipment would be consistent with Section 2909 of the City's Police Code, which establishes a not-to-exceed (except through a variance) noise standard for fixed sources of noise and from events subject to regulation by the Entertainment Commission. Event noise generated from a public property would be limited to 10 dBA above the local ambient at a distance of 25 feet or more; event noise generated from a commercial property would be limited to 8 dBA above the local ambient at any point outside the property plane. In addition, compliance with Section 2909(d) would limit noise from outdoor activities in residential interiors to 45 dBA between 10:00 p.m. and 7:00 a.m. or 55 dBA between 7:00 a.m. and 10:00 p.m. with windows open. Any variance to these limits granted pursuant to Section 2910 of the Police Code could only be approved through the Entertainment Commission hearing process required by Section 1060.1 of the Police Code.

Therefore, with implementation of Mitigation Measure M-NO-7: Noise Control Plan for Outdoor Amplified Sound, and with compliance with Sections 47.2, 1060.1 and 2909 of the Police Code, periodic and temporary noise increases associated with special events would be less than significant.

Mitigation Measure M-NO-7: Noise Control Plan for Special Outdoor Amplified Sound

The project sponsor shall develop and implement a Noise Control Plan for operations at the proposed entertainment venues to reduce the potential for noise impacts from public address and/or amplified music. This Noise Control Plan shall contain the following elements:

- The project sponsor shall comply with noise controls and restrictions in applicable entertainment permit requirements for outdoor concerts.
- Speaker systems shall be directed away from the nearest sensitive receptors to the degree feasible.
- Outdoor speaker systems shall be operated consistent with the restrictions of Section 2909 of the San Francisco Police Code, and conform to a performance standard of 8 dBA and dBC over existing ambient L90 noise levels at the nearest residential use.

Impact NO-8: Operation of the Proposed Project would not expose people and structures to or generate excessive groundborne vibration or noise levels. (*Less than Significant*)

Operational-related groundborne vibration is not a common environmental problem and even large vehicles (e.g., trucks and buses) do not generally result in perceptible vibration. Therefore, no significant long-term vibration effects are expected to be associated with proposed residential, commercial, and RALI uses under both the Maximum Residential and Maximum Commercial scenarios, and no mitigation is necessary.

Operation of pumps at the below-ground or enclosed wastewater pump station would have the potential to generate groundborne vibration that could cause sleep disturbance during the more sensitive nighttime hours if residential receptors are located nearby. However, vibration generated by pump station equipment can affect other equipment within the pump station if vibration levels are not controlled adequately. Therefore, controls that are already incorporated into the design to prevent damage to pump station equipment from excessive vibration would also be sufficient to avoid operational vibration levels from causing sleep disturbance at the closest residential receptors (located a minimum of 375 feet away) and cosmetic damage of adjacent project structures (located at least 75 feet away). Therefore, potential operational vibration effects associated with the proposed wastewater pump station would be less than significant and no mitigation is necessary.

CUMULATIVE IMPACTS

Cumulative construction noise impacts are assessed based on a review of the foreseeable future projects that are located adjacent or in close enough proximity to the project site so as to affect the same noise-sensitive receptors (those located adjacent to or near the project site or along shared construction haul routes), and under construction at the same time as the Proposed Project (see Section 4.A, Introduction to Chapter 4, pp. 4.A.12-4.A.17).

Cumulative operational noise impacts are assessed by modeling cumulative plus project traffic noise levels and comparing the results with existing modeled traffic noise levels to the criteria discussed above.

The geographic scope of potential cumulative noise impacts encompasses the project site and its immediate vicinity for cumulative construction-related noise impacts as well as road segments adjacent to intersections analyzed in the Transportation Impact Study (see Figure 4.E.1: Transportation Study Area and Study Intersections, in Section 4.E, Transportation and Circulation, p. 4.E.2, for study intersection locations). As noted in Section 4.E, p. 4.E.112, the cumulative traffic analysis utilizes a projections approach and the cumulative traffic noise analysis likewise uses a projections approach because it uses these traffic volumes to estimate

operational traffic noise increases. A list-based approach is also used to evaluate cumulative construction-related noise increases because cumulative impacts can occur if construction projects in proximity to each other occur simultaneously and affect the same noise-sensitive receptors that are located adjacent to or near the project sites or shared construction haul routes.

Construction

Impact C-NO-1: Construction of the Proposed Project combined with cumulative construction noise in the project area would not cause a substantial temporary or periodic increase in ambient noise levels in the project vicinity during construction. (*Less than Significant*)

In general, the potential for cumulative noise increases associated with Proposed Project construction would result if there are any other projects located nearby that could be constructed at the same time or substantially extend the duration of construction noise at any nearby sensitive receptors. The closest sensitive receptor is located approximately 140 feet northwest of the site (616 20th Street). The closest cumulative projects where concurrent construction could cumulatively increase noise levels in the vicinity of the project site would be the BAE Lease Renewal project, located immediately north of the 28-Acre Site, approximately 200 feet north of the Illinois Parcels, and Crane Cove Park, located north of the 20th Street Historic Core project and BAE Lease Renewal project. BAE improvements would involve mostly routine maintenance and repair work and are not expected to generate noise levels higher than normal operations. These activities are expected to occur every 18 months for 6 weeks at a time over the next 7 years. Crane Cove Park would involve primarily park improvements. Phase 1 of Crane Cove Park would be completed in January 2018, which is approximately when construction of the Proposed Project would start, minimizing the potential for overlapping construction activities. Phase 2 of Crane Cove Park has not been determined, but could occur between August 2026 to December 2028, which could overlap with Phase 5 of the Proposed Project (2027 to 2029). However, Phase 5 construction would occur in the southern margin of the 28-Acre Site, which is the most distant portion of the site from Crane Cove Park, and such separation would minimize the potential for cumulative construction noise increases. Given the limited duration and scope of potential concurrent construction activities associated with these two cumulative projects (i.e., neither would involve the extended duration of construction and pile driving activities like those associated with Project construction), cumulative noise impacts associated with any overlapping construction would be less than significant.

Construction activities associated with the Proposed Project in combination with construction of these and other cumulative projects in the vicinity (such as the Golden State Warriors Event Center and Mixed Use Development, Seawall Lot 337/Pier 48, and various smaller projects located in the neighborhoods to the west of the site) could result in cumulative increases in construction-related traffic on construction routes such as Illinois Street, 25th Street, or Cesar

Chavez Street. These are the streets that provide access to/from the I-280 and SR 101 freeways. As these streets already serve as truck routes, they have higher ambient noise levels than local residential streets. Given that these truck routes have limited residential or other sensitive receptor land uses located adjacent to these routes, cumulative traffic increases on these routes are not expected to substantially increase ambient noise levels in the vicinity of these routes for sensitive receptors and this cumulative impact would be less than significant. Therefore, the Proposed Project's contribution would not be cumulatively considerable.

Prior to Proposed Project implementation, Building 117 is expected to be demolished as part of the 20th Street Historic Core project. Demolition of this building could temporarily increase baseline noise levels on the project site from traffic on Illinois Street because it currently serves as a barrier and interrupts the line-of-sight between the project site and Illinois Street.³⁵ However, proposed construction of structures on Parcels C1 and C2 would restore this barrier effect for parcels and buildings to the east. In addition, retention of Buildings 2 and 12 would help to further block shipyard noise from parcels to the west and south (Parcels PSK, HDY, C1, C2, F, and G). Therefore, changes in the noise environment on the project site as a result of cumulative building demolition would not adversely affect future on-site residents.

Operation

Impact C-NO-2: Operation of the Proposed Project, in combination with other cumulative development would cause a substantial permanent increase in ambient noise levels in the project vicinity. (*Significant and Unavoidable with Mitigation*)

As indicated in Table 4.F.13: Summary of Cumulative Traffic Noise Levels, when traffic noise increases related to the Proposed Project (under both the Maximum Residential and Maximum Commercial scenarios) are added to future traffic noise increases resulting from cumulative development, the Proposed Project would add 0 to 8.0 dBA (L_{dn}) to estimated cumulative noise increases under both scenarios. Of the 79 road segments examined, the Proposed Project would contribute considerably to cumulative traffic noise increases along the following street segments because cumulative noise increases would exceed significance thresholds for traffic noise increases):

- 22nd Street (east of Third Street to east of Illinois Street)
- Illinois Street (Mariposa Street to 22nd Street)

³⁵ Increased baseline would result in lower impacts; therefore, not accounting for this increased baseline is a conservative approach.

Table 4.F.13: Summary of Cumulative Traffic Noise Levels

| Street | Segment or Cross-Street | Ldn/CNEL Noise Level (dBA) at 50 Feet from Roadway Centerline | | | | | | | | Existing Use |
|--------------|--------------------------------------|---|----------------------------|---------------------------|--------------------------------|----------------------------------|---------------------------|--------------------------------|----------------------------------|-----------------------|
| | | Baseline (2020) | Cumulative Baseline (2040) | With Cumulative + Max Res | Change from Baseline (Max Res) | Change from Cumulative (Max Res) | With Cumulative + Max Com | Change from Baseline (Max Res) | Change from Cumulative (Max Res) | |
| Third Street | North of Harrison | 67.1 | 67.3 | 67.7 | 0.6 | 0.4 | 67.8 | 0.7 | 0.4 | Res/Com/Off |
| | Harrison to Bryant | 67.8 | 68.3 | 68.6 | 0.8 | 0.3 | 68.7 | 0.9 | 0.3 | Res/Com/Ind |
| | South of Bryant | 67.5 | 67.9 | 68.3 | 0.8 | 0.4 | 68.4 | 0.9 | 0.5 | Res/Com/Ind |
| | North of King | 67.3 | 68.2 | 68.6 | 1.3 | 0.4 | 68.7 | 1.3 | 0.5 | Res/Com |
| | King to Terry Francois | 66.3 | 67.7 | 68.5 | 2.2 | 0.7 | 68.5 | 2.2 | 0.8 | Ballpark/Res |
| | Terry Francois to Channel | 65.6 | 67.4 | 68.2 | 2.6 | 0.8 | 68.3 | 2.7 | 0.9 | Vacant/Parking |
| | Channel to Mission Rock | 65.5 | 68.0 | 68.8 | 3.3 | 0.7 | 68.8 | 3.4 | 0.8 | Res/Parking |
| | South of Mission Rock | 65.3 | 67.7 | 68.5 | 3.2 | 0.8 | 68.6 | 3.3 | 0.9 | UCSF/Inst/ Res |
| | North of 16 th | 66.2 | 67.9 | 68.8 | 2.5 | 0.9 | 68.8 | 2.6 | 0.9 | UCSF/Inst |
| | 16 th to Mariposa | 66.4 | 67.5 | 68.7 | 2.3 | 1.2 | 68.7 | 2.3 | 1.2 | Hospital/Ind |
| | Mariposa-20 th | 65.5 | 67.4 | 68.4 | 2.8 | 1.0 | 68.3 | 2.8 | 0.9 | Res/Com/Ind |
| | 20 th to 22 nd | 66.0 | 68.4 | 69.2 | 3.1 | 0.8 | 69.3 | 3.2 | 0.9 | Res/Com/Ind |
| | 22 nd to 23 rd | 66.4 | 68.2 | 69.9 | 3.5 | 1.7 | 69.8 | 3.4 | 1.6 | Com/ Res |
| | 23 rd to 25 th | 66.2 | 67.4 | 69.2 | 3.0 | 1.9 | 69.2 | 3.0 | 1.8 | Ind |
| | 25 th to Cesar Chavez | 66.3 | 67.7 | 69.1 | 2.8 | 1.4 | 69.0 | 2.8 | 1.3 | Com/Ind |

Table 4.F.13 Continued

| Street | Segment or Cross-Street | Ldn/CNEL Noise Level (dBA) at 50 Feet from Roadway Centerline | | | | | | | | Existing Use |
|-------------------------|-------------------------|---|----------------------------|---------------------------|--------------------------------|----------------------------------|---------------------------|--------------------------------|----------------------------------|----------------|
| | | Baseline (2020) | Cumulative Baseline (2040) | With Cumulative + Max Res | Change from Baseline (Max Res) | Change from Cumulative (Max Res) | With Cumulative + Max Com | Change from Baseline (Max Res) | Change from Cumulative (Max Res) | |
| 16 th Street | South of Cesar Chavez | 65.6 | 67.1 | 67.5 | 1.9 | 0.3 | 67.5 | 1.9 | 0.3 | Ind |
| | West of Mississippi | 64.5 | 65.9 | 66.5 | 2.0 | 0.6 | 66.5 | 2.0 | 0.6 | Com/Ind |
| | East of Mississippi | 65.7 | 66.8 | 67.5 | 1.8 | 0.7 | 67.5 | 1.8 | 0.7 | Com/Ind |
| | West of Owens | 65.7 | 66.9 | 67.6 | 1.9 | 0.7 | 67.5 | 1.9 | 0.6 | UCSF/Inst. |
| | East of Owens | 65.9 | 66.3 | 67.2 | 1.3 | 0.9 | 67.1 | 1.2 | 0.8 | UCSF/Inst. |
| | West of Third | 65.4 | 66.6 | 67.8 | 2.4 | 1.2 | 67.7 | 2.3 | 1.1 | UCSF/Hospital |
| 18 th Street | East of Third | 60.0 | 63.1 | 64.3 | 4.4 | 1.3 | 64.3 | 4.4 | 1.3 | UCSF/Inst. |
| | West of Arkansas | 54.7 | 54.9 | 55.8 | 1.1 | 0.9 | 55.8 | 1.1 | 0.9 | Res/Ind |
| | East of Arkansas | 55.4 | 56.6 | 57.2 | 1.9 | 0.6 | 57.2 | 1.9 | 0.6 | Res/Com |
| | West of Texas | 58.3 | 59.1 | 59.5 | 1.1 | 0.4 | 59.5 | 1.1 | 0.4 | Res/Com |
| | Texas to Pennsylvania | 58.5 | 59.1 | 59.4 | 0.9 | 0.3 | 59.4 | 0.9 | 0.3 | Res/Com |
| | East of Pennsylvania | 59.0 | 59.9 | 61.0 | 2.0 | 1.1 | 60.8 | 1.8 | 0.9 | Off/Com |
| | West of Indiana | 59.0 | 59.9 | 61.0 | 2.0 | 1.1 | 60.8 | 1.8 | 0.9 | Ind |
| 20 th Street | East of Indiana | 59.2 | 60.7 | 62.3 | 3.1 | 1.5 | 62.2 | 3.0 | 1.5 | Ind |
| | West of Third | 58.9 | 59.8 | 60.7 | 1.8 | 0.9 | 60.7 | 1.8 | 0.9 | Res/School/Ind |
| | East of Third | 59.7 | 61.8 | 65.9 | 6.2 | 4.1 | 65.9 | 6.2 | 4.1 | Ind |

Table 4.F.13 Continued

| Street | Segment or Cross-Street | Ldn/CNEL Noise Level (dBA) at 50 Feet from Roadway Centerline | | | | | | | | Existing Use |
|-------------------------|-------------------------|---|----------------------------|---------------------------|--------------------------------|----------------------------------|---------------------------|--------------------------------|----------------------------------|--------------|
| | | Baseline (2020) | Cumulative Baseline (2040) | With Cumulative + Max Res | Change from Baseline (Max Res) | Change from Cumulative (Max Res) | With Cumulative + Max Com | Change from Baseline (Max Res) | Change from Cumulative (Max Res) | |
| 22 nd Street | West of Illinois | 59.6 | 62.8 | 66.2 | 6.7 | 3.4 | 66.3 | 6.7 | 3.4 | Ind |
| | East of Illinois | 62.4 | 64.5 | 67.9 | 5.5 | 3.4 | 67.9 | 5.5 | 3.4 | Ind |
| | West of Indiana | 59.4 | 61.8 | 63.5 | 4.1 | 1.8 | 63.5 | 4.1 | 1.8 | Ind |
| | Indiana to Tennessee | 58.8 | 61.1 | 63.1 | 4.4 | 2.0 | 63.1 | 4.4 | 2.0 | Res |
| | Tennessee to Third | 58.4 | 59.8 | 62.3 | 4.0 | 2.5 | 62.3 | 4.0 | 2.5 | Com/Res |
| | East of Third | 58.5 | 59.6 | 67.1 | 8.6 | 7.5 | 66.9 | 8.4 | 7.3 | Ind |
| | West of Illinois | 58.1 | 59.0 | 67.0 | 8.9 | 8.0 | 66.8 | 8.7 | 7.8 | Ind |
| 23 rd Street | East of Illinois | 51.1 | 59.5 | 66.3 | 15.2 | 6.7 | 66.3 | 15.2 | 6.7 | Ind |
| | West of Third | 56.5 | 58.4 | 60.9 | 4.4 | 2.6 | 60.9 | 4.4 | 2.5 | Ind |
| | East of Third | 54.9 | 58.3 | 60.5 | 5.5 | 2.1 | 60.5 | 5.5 | 2.2 | Ind |
| | West of Illinois | 53.6 | 58.4 | 60.5 | 6.9 | 2.1 | 60.5 | 6.9 | 2.1 | Ind |
| | East of Illinois | 50.9 | 53.2 | 53.2 | 2.3 | 0.0 | 53.2 | 2.3 | 0.0 | Ind |
| 25 th Street | West of Pennsylvania | 56.5 | 59.5 | 59.5 | 3.0 | 0.0 | 59.5 | 3.0 | 0.0 | Res |
| | East of Pennsylvania | 59.4 | 60.7 | 62.5 | 3.1 | 1.8 | 62.6 | 3.1 | 1.9 | Ind |
| | West of Indiana | 59.3 | 60.7 | 62.5 | 3.2 | 1.8 | 62.6 | 3.2 | 1.9 | Ind |
| | East of Indiana | 59.4 | 60.7 | 62.5 | 3.1 | 1.8 | 62.6 | 3.1 | 1.9 | Ind |
| | West of Third | 57.4 | 59.6 | 62.7 | 5.3 | 3.1 | 62.9 | 5.5 | 3.3 | Ind |

Table 4.F.13 Continued

| Street | Segment or Cross-Street | Ldn/CNEL Noise Level (dBA) at 50 Feet from Roadway Centerline | | | | | | | | Existing Use |
|-----------------|--------------------------------------|---|----------------------------|---------------------------|--------------------------------|----------------------------------|---------------------------|--------------------------------|----------------------------------|--------------------|
| | | Baseline (2020) | Cumulative Baseline (2040) | With Cumulative + Max Res | Change from Baseline (Max Res) | Change from Cumulative (Max Res) | With Cumulative + Max Com | Change from Baseline (Max Res) | Change from Cumulative (Max Res) | |
| | East of Third | 53.0 | 57.7 | 60.0 | 7.0 | 2.3 | 60.3 | 7.3 | 2.6 | Ind |
| | West of Illinois | 54.0 | 57.7 | 60.0 | 6.0 | 2.3 | 60.3 | 6.3 | 2.6 | Ind |
| | East of Illinois | 49.5 | 53.7 | 53.7 | 4.1 | 0.0 | 53.7 | 4.1 | 0.0 | Ind |
| | West of Pennsylvania | 65.1 | 65.5 | 66.7 | 1.6 | 1.2 | 66.7 | 1.6 | 1.2 | Ind |
| Cesar Chavez | East of Pennsylvania | 64.6 | 65.2 | 67.6 | 3.0 | 2.4 | 67.6 | 3.0 | 2.3 | Ind |
| | West of Third | 63.4 | 64.4 | 67.1 | 3.7 | 2.7 | 67.1 | 3.7 | 2.7 | Ind |
| | East of Third | 58.2 | 60.4 | 63.5 | 5.2 | 3.1 | 63.5 | 5.2 | 3.1 | Ind |
| | North of 18 th | 54.9 | 56.1 | 56.1 | 1.2 | 0.0 | 56.1 | 1.2 | 0.0 | Res/Ind |
| Arkansas Street | South of 18 th | 54.2 | 55.5 | 55.5 | 1.3 | 0.0 | 55.5 | 1.3 | 0.0 | Res |
| | East of Illinois | NA | NA | 65.2 | NA | NA | 65.2 | NA | NA | Ind |
| Future Driveway | North of Mariposa | 56.8 | 60.4 | 62.0 | 5.3 | 1.6 | 62.1 | 5.3 | 1.6 | Vacant/UCSF |
| | Mariposa-19 th | 59.9 | 60.4 | 63.7 | 3.8 | 3.3 | 63.7 | 3.8 | 3.3 | Res/Com/Ind |
| | 19 th to 20 th | 60.4 | 60.6 | 64.6 | 4.1 | 4.0 | 64.5 | 4.1 | 4.0 | Res/Com/Ind |
| | 20 th to Driveway | 58.9 | 59.5 | 64.8 | 5.9 | 5.3 | 64.6 | 5.7 | 5.1 | Ind |
| | Driveway to 22 nd | 58.9 | 60.9 | 66.4 | 7.5 | 5.5 | 66.3 | 7.4 | 5.3 | Ind |
| | South of 22 nd | 57.6 | 59.6 | 63.9 | 6.3 | 4.3 | 64.0 | 6.5 | 4.4 | Ind |
| Indiana Street | North of 22 nd | 54.1 | 55.3 | 55.3 | 1.1 | 0.0 | 55.3 | 1.1 | 0.0 | Com/Ind |
| | South of 22 nd | 54.6 | 55.2 | 55.2 | 0.6 | 0.0 | 55.2 | 0.6 | 0.0 | Ind |
| | North of 25 th | 58.6 | 61.5 | 62.5 | 3.8 | 0.9 | 62.6 | 4.0 | 1.1 | Ind/ Res |

Table 4.F.13 Continued

| Street | Segment or Cross-Street | Ldn/CNEL Noise Level (dBA) at 50 Feet from Roadway Centerline | | | | | | | | Existing Use |
|------------------|---------------------------|---|----------------------------|---------------------------|--------------------------------|----------------------------------|---------------------------|--------------------------------|----------------------------------|--------------|
| | | Baseline (2020) | Cumulative Baseline (2040) | With Cumulative + Max Res | Change from Baseline (Max Res) | Change from Cumulative (Max Res) | With Cumulative + Max Com | Change from Baseline (Max Res) | Change from Cumulative (Max Res) | |
| | South of 25 th | 57.5 | 60.0 | 60.0 | 2.6 | 0.0 | 60.0 | 2.6 | 0.0 | Ind/Res |
| Mariposa Street | West of I-280 Ramp | 63.8 | 64.3 | 64.3 | 0.5 | 0.1 | 64.3 | 0.5 | 0.1 | Ind/Res |
| | East of I-280 Ramp | 65.6 | 67.2 | 67.5 | 1.9 | 0.2 | 67.5 | 2.0 | 0.3 | Ind |
| | East of Indiana | 63.4 | 65.5 | 66.0 | 2.6 | 0.4 | 66.0 | 2.6 | 0.4 | Ind |
| | West of Third | 62.5 | 64.8 | 65.3 | 2.8 | 0.5 | 65.3 | 2.8 | 0.5 | Ind/Res |
| | East of Third | 60.3 | 63.1 | 63.8 | 3.5 | 0.7 | 63.8 | 3.4 | 0.7 | Ind |
| | West of Illinois | 60.2 | 63.1 | 63.8 | 3.6 | 0.7 | 63.8 | 3.6 | 0.7 | Ind |
| | East of Illinois | 59.6 | 61.5 | 61.5 | 1.9 | 0.0 | 61.5 | 1.9 | 0.0 | Ind |
| Tennessee Street | North of 22 nd | 53.4 | 56.0 | 56.0 | 2.7 | 0.0 | 56.0 | 2.7 | 0.0 | Com/Res |
| | South of 22 nd | 49.7 | 49.9 | 49.9 | 0.2 | 0.0 | 49.9 | 0.2 | 0.0 | Res/Com |
| Texas Street | North of 18 th | 52.6 | 53.1 | 53.1 | 0.5 | 0.0 | 53.1 | 0.5 | 0.0 | Res |
| | South of 18 th | 51.5 | 52.9 | 52.9 | 1.4 | 0.0 | 52.9 | 1.4 | 0.0 | Res |

Notes: Noise levels may vary by up to one-tenth of a decibel due to rounding. Noise levels in **bold** exceed either of the following threshold increases when compared to baseline noise levels: (1) an increase of 5 dBA or more, or (2) an increase of 3 dBA or more in areas where the existing or resulting noise increase exceeds acceptable (or satisfactory) levels for the affected use (see Figure 4.F.3: San Francisco Land Use Compatibility Chart for Community Noise, p. 4.F.23).

Res: Residential; Com: Commercial; Off: Office; Ind: Industrial; Inst: Institutional; UCSF: University of California, San Francisco Traffic noise modeling was completed using the Federal Highway Administration RD-77-108 model. Assumptions include: Travel speeds on all streets, 25 mph, except on 16th, Third, and Cesar Chavez, where the posted speed limit is 30 mph; Vehicle Mix: 98% Autos/1.5% Medium Trucks/0.5% Heavy Trucks; Day-Night Split: 76% Day (7:00 a.m. to 7:00 p.m.), 12% Evening (7:00 p.m. to 10:00 p.m.), and 12% Night (10:00 p.m. to 7:00 a.m.). Background noise levels due to traffic on other roadways (such as cross-streets or nearby freeways) and non-traffic-related activities are not reflected in these noise levels. Noise levels in this table are intended to indicate incremental noise changes due to Proposed Project implementation and future growth. Since they do not include background noise levels, they may not necessarily reflect actual noise levels along these roadway segments if there are other nearby sources of noise. Changes between scenarios analyzed may not show change due to rounding in the noise modeling.

Source: Orion Environmental Associates, 2016

These street segments either directly adjoin the project site or are within two blocks of the project site and provide direct access to the site. It is noted that existing land uses located adjacent to all but one of the above-listed street segments are commercial or industrial, and such uses are not considered sensitive to traffic noise increases (i.e., not noise-sensitive receptors). Residential development is located adjacent to the segment of Illinois Street between Mariposa Street and 20th Street. Based on the significance thresholds for traffic noise increases, these cumulative traffic noise increases would be a cumulatively significant impact because traffic noise would result in a substantial permanent increase in ambient noise levels, and the project's contribution to these cumulative increases would be cumulatively considerable.

Additionally, when 2040 cumulative (with Proposed Project) noise levels are compared to 2020 baseline noise levels, 2020 noise levels would increase by 0 to 15 dBA under both scenarios with increases exceeding the significance thresholds for traffic noise increases on the following roadway segments:

- Third Street (Channel to south of Mission Rock and 20th to 23rd Streets)
- 20th Street (east of Third Street to east of Illinois Street)
- 22nd Street (west of Third Street to east of Illinois Street)
- 23rd Street (Third Street to Illinois Street)
- 25th Street (west of Third Street to Illinois Street)
- Cesar Chavez (East of Third Street)
- Illinois Street (Mariposa Street to south of 22nd Street)
- Indiana Street (north of 25th Street)

These street segments either directly adjoin the project site or are within approximately eight blocks of the project site and several provide direct access to the site. It is noted that existing land uses located adjacent to many of the above-listed street segments are commercial or industrial, and such uses are not considered sensitive to traffic noise increases (i.e., not noise-sensitive receptors). There is a school and residential development located adjacent to 20th Street between Third Street and Illinois Street. Residential development is also located adjacent to Third Street (Channel to 25th), Illinois Street (Mariposa Street to 20th Street), and on 22nd Street (west of Third Street). Based on the significance thresholds for traffic noise increases, these cumulative traffic noise increases would also be a cumulatively significant impact because traffic noise would result in a substantial permanent increase in baseline noise levels. The project's contribution to these increases would range from 22 to 95 percent of these increases and therefore, the Proposed Project contribution to these cumulative traffic noise increases would be cumulatively considerable.

Implementation of Transportation Demand Management measures required in Air Quality Mitigation Measure M-AQ-1f: Transportation Demand Management, could result in reductions of one-way traffic by up to 20 percent, and such reductions could provide noise level reductions of up to 1.0 dB. Such reductions would reduce the above significant noise increases to less than significant along Illinois Street (between Mariposa Street and the proposed 23rd Street) and 22nd Street (west of Third Street) but would not be sufficient to reduce cumulative noise increases on any of the other above-listed street segments to less-than-significant levels (i.e., below threshold levels). Cumulative traffic noise increases would still exceed the significance thresholds for traffic noise increases on some of the above-listed street segments by up to 2.0 dBA when compared to future baseline noise levels (2040) and by up to 14.2 dBA when compared to existing baseline noise levels (2020). Therefore, the proposed project would result in a considerable contribution to this cumulative impact, which is significant and unavoidable with mitigation.

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