3.C Noise and Vibration – Impact Preview

3.C.1 Impacts and Mitigation Measures

Significance Criteria

The criteria for determining the significance of impacts in this analysis are consistent with the environmental checklist in Appendix G of the CEQA Guidelines, as recently updated in 2018 and modified by the San Francisco Planning Department. For the purpose of this analysis, the following criteria were used to determine whether implementing the proposed project would result in a significant noise or vibration impact. Implementation of the proposed project would have a significant noise or vibration effect if the project would:

- Substantially increase, either temporarily or permanently, ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;
- Generate excessive groundborne vibration or groundborne noise levels; or,
- For a project located within the vicinity of a private airstrip or an airport land use plan, or, where such a plan has not been adopted, in an area within two miles of a public airport or public use airport, would the project expose people residing or working in the area to excessive noise levels.

The project site is not within an airport land use plan area,[1] nor is it near a private airstrip. Therefore, the proposed project would not result in the long-term exposure of workers to excessive airport-related noise levels, and these criteria are not discussed further in this EIR.

Approach to Analysis

This analysis evaluates the potential noise impacts associated with construction and operation of proposed residential, small retail commercial, and community (e.g., child care) facilities on the project site. Project construction would be phased over 6 years, and phased construction would result in future onsite residents of the first phase being exposed to noise associated with construction of the second phase. Once Phase 1 has been completed and occupied in August 2024, future residents at Blocks C, D, E, F, TH1 and TH2 would be subject to construction noise on the project site for up to 2.5 years through 2027. In addition, childcare use could occur in Building B, and noise compatibility of this use on this block is considered.

Project Features

Key construction elements of the proposed project that could directly, or indirectly, result in noise or vibration impacts include the following:

[1] San Francisco International Airport, *2019 Noise Exposure Map*, August 13, 2015, *https://media.flysfo.com/media/sfo/noise-abatement/sfo_p150_2019-nem-36x24-plot-signed_ada.pdf*, accessed January 23, 2019.

- Demolition of the west side berm, and north and east embankments, followed by grading, excavation, and construction of site infrastructure in Phase 0;
- Finish grading, excavation for subgrade parking, construction of building foundations, building construction, architectural coatings, and paving in Phase1 and Phase 2;
- As stated in Section 2.G.1, construction would generally occur between the hours of 7 a.m. and 8 p.m., up to seven days a week.

Mobile equipment such as excavators, graders, backhoes, loaders, dump trucks, compactors, pavers, man lifts, and forklifts would be used for demolition, site clearing, excavation and grading, but also for building construction, and/or hardscape and landscape materials installation. Track/tire-mounted cranes and/or tower cranes would be used for building construction, including but not limited to, steel and precast erection, and building façades. Miscellaneous stationary equipment would include generators, air compressors, and cement/mortar mixers, and possibly crushing and processing equipment. A variety of other smaller mechanical equipment would also be used at the project site during the construction period, such as jackhammers/pavement breakers, saw cutters, chopping saws, tile saws, stud impact guns, impact drills, torque wrenches, welding machines, and concrete boom pumps. The proposed project would not require pile driving or specialized compaction techniques for imported.[2] soil.

Project construction would also generate offsite truck trips for deliveries of concrete and other building materials, transportation of construction equipment to and from the site, hauling soils and debris from the site, and street sweepers.

Key operational elements of the proposed project that could directly or indirectly result in noise impacts include the following:

- Traffic increases associated with long-term development of 3,163 vehicle trips per day in the Developer's proposed Option and 4,442 trips per day under the Additional Housing Option.[3] These traffic increases could result in traffic noise increases along onsite streets and offsite streets in the project vicinity.
- Operation of mechanical equipment (including heating/ventilation/air conditioning (HVAC) and emergency standby diesel generators) would introduce new stationary noise sources.[4]

---

2 Rockridge Geotechnical, *Draft Preliminary Geotechnical Investigation Proposed Residential Development at Balboa Reservoir Phelan and Ocean Avenues, San Francisco, California*, prepared for BRIDGE Housing Corporation, January 22, 2018

3 Kittleson & Associates, Travel Demand Memorandum – Draft 3, December 10, 2018, Table 6.

4 Consistent with the air quality analysis, it is assumed that there would be two emergency generators for the Developer's Proposed Option and six for the Additional Housing Option. They would be tested for 50 hours per year (consistent with BAAQMD permitting limits), which is roughly equivalent to 4 hours per month. They would be located at be located in the building basements and their emissions will be ventilated at street-level and a minimum of 50 feet from the property line.

Methodology for Analysis of Construction Impacts

Sensitive Receptors and Construction Phasing

Project construction would require the operation of heavy equipment on the project site as discussed above, which could potentially affect three distinct groups of noise-sensitive receptors: (1) existing, offsite noise-sensitive receptors within 900 feet of the project site, as described in Table 3.C-3 and shown in Figure 3.C-2, pp. **Error! Bookmark not defined**. and **Error! Bookmark not defined**., respectively, above and (2) future proposed onsite sensitive receptors, including residential and childcare uses. This analysis considers the potential noise effects on each of these sensitive receptors separately, as described below, with respect to construction phasing.

Both construction phases could affect the existing, offsite sensitive receptors, the first group of sensitive receptors discussed above. Potential impacts to the second group of sensitive receptors would occur following completion of Phase 1 of construction and occupation of the residential and, potentially, child care uses constructed therein. The proposed phasing schedule would expose future onsite users/occupants of Phase 1 to noise and/or vibration from the construction of Phase 2.

Construction Noise

This impact analysis evaluates the potential for construction equipment to generate noise levels in excess of standards established in the noise ordinance using default reference noise levels compiled by the Federal Highway Administration[5] for the types of equipment proposed to be used onsite (see Impact NO-1). This analysis also assesses the potential for construction-related noise to cause a substantial temporary or periodic increase in ambient noise levels at the closest existing offsite noise-sensitive receptors, future onsite sensitive receptors, and planned offsite sensitive receptors using Federal Transit Administration methodology for general quantitative noise assessment (see Impact NO-2).[6] The Federal Transit Administration methodology calls for estimating a combined noise level from the 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 Building boundary and the specified noise-sensitive receptor's property boundary. Project construction noise impacts are evaluated at sensitive receptor locations to determine whether the proposed project would result in: (1) an increase in noise levels that are 10 dBA above the ambient noise levels, or (2) noise levels of 90 dBA. If these quantitative standards are exceeded, the evaluation then considers the duration and

---

5 Federal Highway Administration (FHWA), *Construction Noise Handbook,* Chapter 9.0 Construction Equipment Noise Levels and Ranges, Table 9.1 RCNM Default Noise Emission Reference Levels and Usage Factors, Updated August 24, 2017, *https://www.fhwa.dot.gov/environment/noise/construction_noise/handbook/handbook09.cfm*, accessed on January 25, 2019.

6 U.S. Department of Transportation, Federal Transit Administration (FTA), Transit Noise and Vibration Impact Assessment, Section 7 Quantitative Noise Assessment Methods, September 2018, pp. 172 to 179, *https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123_0.pdf*, accessed on January 25, 2019.

severity of the exceedance to determine whether the project would result in a substantial temporary increase in noise levels.

This analysis also evaluates the potential for construction-related traffic noise impacts along local access roads by determining whether noise-sensitive receptors would be located along proposed/likely construction haul routes and the degree of noise increase on these routes from project-related average daily increases in construction truck traffic (see Impact NO-3).

Vibration and Groundborne Noise

This analysis focuses on groundborne vibration generated by construction-related activities involving certain types of heavy equipment (see Impact NO-4 for list of construction equipment considered), and evaluates potential vibration impacts on existing offsite sensitive receptors/ structures and future onsite receptors/structures.

This evaluation assesses vibration significance based on the Caltrans 2013 vibration guidance manual for building damage and sleep disturbance, which can result in adverse health effects.

Methodology for Analysis of Operational Impacts

Sensitive Receptors

As described in the previous section (Methodology for Analysis of Construction Impacts), project operation could potentially affect two groups of noise-sensitive receptors: (1) existing, offsite noise-sensitive receptors within 900 feet of the project site and (2) future proposed onsite sensitive receptors which consists of proposed residential and daycare uses that would occur on the project site. This impact evaluation considers both groups of receptors separately as described below.

Noise

Impact NO-5 evaluates the potential for operation of the proposed project to result in permanent increases in ambient noise levels primarily as a result of the addition of new stationary equipment. The analysis in Impact NO-5 is based on compliance with the Noise Ordinance requirements for fixed noise sources.

Noise modeling was completed to estimate existing (baseline) and future traffic noise levels along 7 street segments in the project area based on traffic volumes presented in Section 3.B, Transportation and Circulation. Traffic noise modeling was performed using the Federal Highway Administration Traffic Noise (RD-77-108) Model. The model results (included in Appendix D) are used to identify the future incremental noise level increases attributable to vehicle trips generated by project development. Impact NO-6 focuses on operational noise impacts resulting from project-related traffic increases on local roadways both onsite and offsite.

In general, traffic noise increases of less than 3 dBA are barely perceptible to people, while a 5-dBA increase is readily noticeable.[7] 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 3.C-3, above]) for sensitive noise receptors, any noise increase greater than 3 dBA is considered a significant noise impact. These standards were applied to determine whether the project's incremental traffic-related noise increases would be significant.

Vibration and Groundborne Noise

Operational groundborne noise and vibration are not common environmental problems, 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, small retail commercial, and child care uses, and no vibration analysis is required for operation of these proposed uses.

Methodology for Analysis of Cumulative Impacts

The geographic scope of potential cumulative construction noise impacts encompasses a 900-foot radius from the boundaries of the project site. The geographic scope for cumulative traffic noise increases is consistent with the transportation analysis and includes the street segments adjacent to intersections analyzed in Section 3.B, Transportation and Circulation. Thus the geographic scope for the analysis of cumulative traffic noise increases is larger.

Cumulative construction noise and vibration impacts are assessed based on a review of the foreseeable future projects (a list-based approach) that are located within the project's 900-foot area of noise influence and are expected to be under construction at the same time as the proposed project (see Section 3.A, Impact Overview, for a more detailed description of these projects). Foreseeable future projects that meet these criteria and could affect the same noise-sensitive receptors (those located adjacent to or near the project site or along shared construction haul routes) are identified below in Impact C-NO-1.

If the analysis above determines that there is the potential for cumulative impacts, then the analysis determines if the project's contribution to the cumulative impact would be cumulatively considerable (i.e., significant), in which case, the analysis then identifies mitigation measures that would reduce the severity of the project's contribution to the cumulative impact.

The proposed project would not include sources of operational vibration and therefore would not have the potential to combine with operational vibration from any adjacent or nearby cumulative

[7] California Department of Transportation (Caltrans), *Technical Noise Supplement (TeNS) to the Traffic Noise Analysis Protocol,* pp. 2-44, September 2013, *http://www.dot.ca.gov/env/noise/docs/tens-sep2013.pdf,* accessed January 25, 2019.

projects. Therefore, no cumulative vibration analysis is required, and no cumulative vibration impact would occur.

Impact Evaluation

Summary of Impacts, Significance Determinations, & Mitigation Measures Evaluation

IMPACT	Significance Determination	Brief Discussion and Rationale for Significance Determination, plus possible Mitigation Measure(s) if appropriate
Project Impacts		
Impact NO-1: Construction of the proposed project would result in noise levels in excess of standards in the Noise Ordinance (Article 29 of the San Francisco Police Code) or applicable standards of other agencies.	LSM	Operation of construction equipment not exempt from compliance with the noise ordinance (e.g., concrete saws) could generate noise levels up to 90 dBA at 50 feet, exceeding the 86 dBA at 50 feet limit in the noise ordinance. Implementation of the following mitigation measure would reduce this impact to less than significant. **Mitigation Measure M-NO-1: Construction Noise Control Measures** The project sponsor shall implement construction noise controls as necessary to ensure compliance with the Noise Ordinance limits and to reduce construction noise levels at sensitive receptor locations to the degree feasible. Noise reduction strategies that could be implemented 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 the rock/concrete crusher, or compressors) as far from adjacent or nearby sensitive receptors as possible, to muffle such noise sources, and/or 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. • Require the general contractor to use impact tools (e.g., jack hammers and pavement breakers) 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 specifically concrete saws, in specifications provided to construction contractors. 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. Moveable sound barrier curtains can provide up to 15 dBA of sound attenuation (INC, 2014). • 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

IMPACT	Significance Determination	Brief Discussion and Rationale for Significance Determination, plus possible Mitigation Measure(s) if appropriate
		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 San Francisco 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 onsite describing permitted construction days and hours, noise complaint procedures, and a complaint hotline number that shall be answered at all times during construction; and (3) designation of an onsite construction compliance and enforcement manager for the project.
Impact NO-2: Construction of the proposed project would cause a substantial temporary or periodic increase in ambient noise levels at noise-sensitive receptors, above levels existing without the project.	LSM	Maximum combined noise levels from operation of the noisiest pieces of construction equipment would be 85 dBA at 50 feet for Phase 0 and 81 dBA at 50 feet for Phases 1 and 2. The combined noise level would not exceed the Federal Transit Administration's standard of 90 dBA at sensitive receptor locations but would exceed the 70-dBA "Ambient + 10 dBA" standard for westerly and southerly offsite receptors and future onsite receptors. Implementation of the following mitigation measure would reduce this impact to less than significant. **Mitigation Measure M-NO-1: Construction Noise Control Measures**
Impact NO-3: Construction truck traffic would cause a substantial temporary or periodic increase in ambient noise levels along access streets in the project vicinity.	LSM	Construction vehicle trips would generate a noise level of 62.8 dBA (Leq) at 50 feet from the roadway centerline along Frida Kahlo Way and City College North. When added to the existing daytime traffic noise level of 64.1 dBA (Leq) at 50 feet from the centerline of Frida Kahlo Way or 58.4 dBA (Leq) at 50 feet from the centerline of City College North, the maximum noise level contributions from construction truck trips would increase noise levels along either of these roadways by 2.4 or 5.5 dBA, respectively, if all trucks were to travel on the same route. Noise increases would not exceed the 5-dBA noise increase applicable to noise levels along Frida Kahlo Way but would exceed a 5-dBA increase along City College North adjacent to Riordan Archbishop High School. Implementation of the following mitigation would reduce this impact to less than significant. **Mitigation Measure M-NO-3: Restrict Hourly Haul Truck Trips** Construction contracts shall restrict contractors from generating more than 16 hourly truck trips (eight truck loads).
Impact NO-4: Construction of the proposed project would not generate excessive groundborne vibration that could result in building damage.	LS	Construction equipment used for demolition, site preparation, and excavation activities, such as hoe rams and bulldozers, could generate varying degrees of temporary groundborne vibration, with the highest levels expected during demolition and excavation. Groundborne vibration generated by project-related demolition and construction activities would be well below the 0.5 in/sec peak particle velocity threshold. Impacts would be less than significant and **no mitigation is required.**
Impact NO-5: Operation of the proposed project could result in a substantial permanent increase in ambient noise levels in the immediate project vicinity, and permanently expose noise-sensitive receptors to noise levels in excess of standards in the San Francisco Noise Ordinance from onsite stationary equipment.	LSM	Operation of the proposed project would increase ambient noise levels in the immediate vicinity primarily through the onsite use of stationary equipment, such as heating/ventilation/air conditioning (HVAC) systems and emergency generators. Potential noise increases at the closest existing offsite noise-sensitive receptors and future onsite sensitive receptors from operation of HVAC systems and emergency generators could exceed Ambient + 5 dBA Standard and/or 45-dBA Interior / 60-dBA Exterior Nighttime Ordinance Standard. Implementation of the following mitigation would reduce this impact to less than significant.

IMPACT	Significance Determination	Brief Discussion and Rationale for Significance Determination, plus possible Mitigation Measure(s) if appropriate
		Mitigation Measure M-NO-5: Stationary Equipment Noise Controls
Impact NO-6: Operation of the proposed project would not cause a substantial permanent increase in ambient noise levels from project-related traffic.	LS	Project implementation would result in traffic noise increases ranging from 0 to 4.1 dBA on local roadways near the project site. The proposed project-related traffic noise increases would not result in an increase of more than 5 dBA. Impacts would be less than significant and **no mitigation is required.**
Cumulative Impacts		
Impact C-NO-1: Cumulative construction of the proposed project combined with construction of other past, present, and reasonably foreseeable future projects would cause a substantial temporary or periodic increase in ambient noise levels.	SUM	Concurrent construction of cumulative projects would have the potential to cumulatively increase noise levels at existing sensitive receptors. Combined noise levels of construction equipment from the proposed project and City College East Basin Parking Lot could generate a cumulative noise level of 88 dBA at the closest sensitive receptors at Riordan High School and would exceed the "Ambient + 10 dBA" limit of 67 dBA (Leq) threshold during the daytime hours. Implementation of the following mitigation measure would reduce the project's contribution to the cumulative impact; however construction noise levels could still exceed the "Ambient + 10 dBA" standard. **Mitigation Measure M-NO-1: Construction Noise Control Measures**
Impact C-NO-2: Operation of the proposed project in combination with past, present, and reasonably foreseeable future projects would not cause a substantial permanent increase in ambient noise levels.	LS	Operation of mechanical equipment at the reasonably foreseeable development project sites would be localized and would be required to meet the performance standards identified in the noise ordinance. Operation of the proposed project in combination with the reasonably foreseeable development projects would result in less-than-significant cumulative noise impacts. Cumulative plus proposed project traffic noise levels would not exceed ambient traffic noise levels by more than 5 dBA. Cumulative noise impacts due to increases in traffic would be less than significant and **no mitigation is required.**