3.8 NOISE

This section presents an analysis of the potential noise and vibration impacts associated with development and implementation of the Master Plan Update. This section includes a summary of applicable regulations related to noise and vibration, a description of ambient-noise conditions, an analysis of potential short-term construction and long-term operational noise impacts from implementation of the Master Plan Update, and identifies mitigation measures for those impacts determined to be significant. This section is based, in part, on the Noise and Vibration Calculations included as Appendix H.

As discussed further in Section 3.8.3, Methodology, the CEQA Guidelines Appendix G checklist question for noise impacts related to nearby airports was found to have no impact in the Initial Study prepared for the project, and thus, is not discussed in detail in this EIR.

Public comments related to noise were received during the public scoping period in response to the NOP. These comments address the project's potential to generate noise based on the heights of the proposed buildings. For a complete list of public comments received during the public scoping period, refer to Appendix A.

Noise Overview

Typical terms related to noise and vibration used throughout this section are defined below.

- Decibel (dB): a logarithmic unit used to measure the loudness of sound.
- A-weighted decibel (dBA): A sound measurement scale that adjusts the pressure of individual frequencies according to human sensitivities. The scale accounts for the fact that the region of highest sensitivity for the human ear is between 2,000 and 4,000 cycles per second (hertz).
- Equivalent sound level (L_{eq}): L_{eq} represents an average of the sound energy occurring over a specified period. In effect, L_{eq} is the steady-state sound level containing the same acoustical energy as the time-varying sound that actually occurs during the same period.
- Minimum sound level (L_{min}): The lowest individual dBA occurring over a given time period.
- Maximum sound level (L_{max}): The highest individual dBA occurring over a given time period.
- Day-Night Average (L_{dn}): The energy average of A-weighted sound levels occurring over a 24-hour period, with a 10-dB penalty applied to A-weighted sound levels occurring during nighttime hours between 10:00 PM and 7:00 AM.
- Community Noise Equivalent Level (CNEL): A rating of community noise exposure to all sources of sound that differentiates between daytime, evening, and nighttime noise exposure. These adjustments are +5 dBA for the evening, 7:00 PM to 10:00 PM, and +10 dBA for the night, 10:00 PM to 7:00 AM.
- Noise contour: a line drawn on a map representing equal levels of noise exposure. For example, a 60 dBA noise contour indicates the distances from a noise source at which the noise levels would be 60 dBA.
- Peak particle velocity (PPV): A measurement of vibration amplitude using the maximum instantaneous positive or negative peak of the vibration wave in inches per second.

3.8.1 Regulatory Setting

Federal

Noise Control Act of 1972

The Federal Noise Control Act of 1972 established programs and guidelines to identify and address the effects of noise on public health, welfare, and the environment. In 1981, the U.S. Environmental Protection Agency (EPA) administrators determined that subjective issues such as noise would be better addressed at more local levels of government, thereby allowing more individualized control for specific issues by designated federal, state, and local government agencies. Consequently, in 1982 responsibilities for regulating noise control policies were transferred to specific federal agencies, and state and local governments. However, noise control guidelines and regulations contained in the EPA rulings in prior years remain in place. The EPA has identified acceptable noise levels for various land uses to protect the public, with an adequate margin of safety, as described in its "Levels Document" guidance.[1] In the absence of local noise regulations, the EPA public-protecting guideline of 55 dBA L_{dn} would be assessed at the exterior of any existing noise sensitive land use where the existing outdoor ambient sound level is not already in excess of this value. Noise sensitive land uses are understood to include but are not limited to residences.

Department of Housing and Urban Development Noise Standards

The Department of Housing and Urban Development standards define day-night average sound levels (L_{dn}) below 65 dBA outdoors as acceptable for residential areas. Outdoor levels up to 75 dBA L_{dn} may be made acceptable through the use of insulation in buildings.[2]

Federal Transit Administration Noise and Vibration Standards

The Federal Transit Administration (FTA) has published guidelines for the analysis of ground-borne noise and vibration relating to transportation and construction-induced vibration. The ground motion caused by vibration is measured as particle velocity in inches per second and, in the United States, is referenced as vibration decibels (VdB). With respect to human response within residential uses (i.e., annoyance), FTA recommends a maximum acceptable vibration standard of 80 VdB.

State

California Code of Regulations

In 1974, the California Commission on Housing and Community Development adopted noise insulation standards for residential buildings (California Code of Regulations Title 24, Part 2, Chapter 12, Section 1207.11.2). Title 24 establishes standards for interior room noise attributable to outside noise sources. Title 24 also specifies that acoustical studies should be prepared whenever a residential building or structure is proposed to be located in areas with exterior noise levels 60 dB L_{dn} or greater. The acoustical analysis must show that the building has been designed to limit intruding noise to an interior level not exceeding 45 dB for any habitable room.

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1 U.S. Environmental Protection Agency, updated September 2016, EPA Identifies Noise Levels Affecting Health and Welfare, available at: https://www.epa.gov/archive/epa/aboutepa/epa-identifies-noise-levels-affecting-health-and-welfare.html#:~:text=Likewise%2C%20levels%20of%2055%20decibels,of%20the%20daily%20human%20condition, accessed March 2, 2022.

2 Code of Federal Regulations, Title 24, Part 51.

Section 1092 of Title 25, Chapter 1, Subchapter 1, Article 4, of the California Administrative Code includes noise insulation standards which detail specific requirements for new multi-family structures (hotels, motels, apartments, condominiums, and other attached dwellings) located within the 60 CNEL contour adjacent to roads, railroads, rapid transit lines, airports, or industrial areas. An acoustical analysis is required showing that these multi-family units have been designed to limit interior noise levels, with doors and windows closed to 45 CNEL in any habitable room. Title 21 of the California Administration Code (Subchapter 6, Article 2, Section 5014) also specifies that noise levels in all habitable rooms shall not exceed 45 CNEL. A community's sensitivity to noise may be evaluated by starting with the general guidelines developed by the state of California, and then applying adjustment factors. These allow acceptability standards to be set which reflect the desires of the community and its assessment of the relative importance of noise pollution and are below the known levels of health impairment.

Office of Planning and Research General Plan Noise Element Guidelines

California Government Code Section 65302(f) mandates that the legislative body of each county, town, and city adopt a noise element as part of their comprehensive general plan. The local noise element must recognize the land use compatibility guidelines established by the State Department of Health Services. The State of California General Plan Guidelines, published by the State Governor's Office of Planning and Research (OPR), provides guidance for the acceptability of specific land use types within areas of specific noise exposure. Table 3.8-1, Land Use Compatibility for Community Noise Environments, presents guidelines for determining acceptable and unacceptable community noise exposure limits for various land use categories. The guidelines also present adjustment factors that may be used to arrive at noise acceptability standards that reflect the noise control goals of the community, the particular community's sensitivity to noise, and the community's assessment of the relative importance of noise pollution. OPR guidelines are advisory in nature. Local jurisdictions such as the City of Long Beach have the responsibility to set specific noise standards based on local conditions.

As depicted in Table 3.8-1, the range of noise exposure levels assumes overlap between the normally acceptable, conditionally acceptable, normally unacceptable, and clearly unacceptable categories. OPR's State General Plan Guidelines note that noise planning policy needs to be flexible and dynamic to reflect not only technological advances in noise control, but also economic constraints governing application of noise-control technology and anticipated regional growth and demands of the community. In project-specific analyses, each community must decide the level of noise exposure its residents are willing to tolerate within a limited range of values below the levels of known health impairment. Therefore, local jurisdictions may use their discretion to determine which noise levels are considered acceptable or unacceptable, based on land use, project location, and other project factors.

Table 3.8-1: Land Use Compatibility for Community Noise Environments

Land Use Category	Community Noise Exposure (CNEL)			
	Normally Acceptable	**Conditionally Acceptable**	**Normally Unacceptable**	**Clearly Unacceptable**
Residential-Low Density, Single-Family, Duplex, Mobile Homes	50 – 60	55 – 70	70 – 75	75 – 85
Residential – Multiple Family	50 – 65	60 – 70	70 – 75	70 – 85
Transient Lodging – Motel, Hotels	50 – 65	60 – 70	70 – 80	80 – 85
Schools, Libraries, Churches, Hospitals, Nursing Homes	50 – 70	60 – 70	70 – 80	80 – 85
Auditoriums, Concert Halls, Amphitheaters	NA	50 – 70	NA	65 – 85
Sports Arenas, Outdoor Spectator Sports	NA	50 – 75	NA	70 – 85
Playgrounds, Neighborhood Parks	50 – 70	NA	67.5 – 77.5	72.5 – 85
Golf Courses, Riding Stables, Water Recreation, Cemeteries	50 – 70	NA	70 – 80	80 – 85
Office Buildings, Business Commercial and Professional	50 – 70	67.5 – 77.5	75 – 85	NA
Industrial, Manufacturing, Utilities, Agriculture	50 – 75	70 – 80	75 – 85	NA

Notes: CNEL = community noise equivalent level; NA = not applicable

NORMALLY ACCEPTABLE: Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

CONDITIONALLY ACCEPTABLE: New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features have been included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning, will normally suffice.

NORMALLY UNACCEPTABLE: New construction or development should be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise-insulation features must be included in the design.

CLEARLY UNACCEPTABLE: New construction or development should generally not be undertaken.

Source: Office of Planning and Research, General Plan Guidelines and Technical Advisories, available at: https://opr.ca.gov/planning/general-plan/guidelines.html, accessed March 2, 2022.

California State University

As an entity of the state of California, the CSU has requirements that contractors must adhere to if awarded development contracts. The CSU's "Contract General Conditions for Collaborative Design-Build Major-Build Major Projects" construction guidebook includes the following Sound Control Requirements for construction of major projects:

- The Design-Builder shall comply with all sound control and noise level rules, regulations and ordinances which apply to the work. In the absence of any such rules, regulations and ordinances, the Design-Builder shall conduct its work to minimize disruption to others due to sound and noise from the workers and shall be responsive to the Trustees' requests to reduce noise levels.

- Design-Builder shall not cause or allow sounds to be produced in excess of 65 decibels measured at the job site between the hours of 7:00 p.m. and 7:00 a.m. Design-Builder shall not cause or allow sounds to be produced in excess of 85 decibels measured at the job site between the hours of 7:00 a.m. and 7:00 p.m. without the consent of the University.
- Each internal combustion engine, used for any purpose on the project or related to the project, shall be equipped with a muffler or a type recommended by the manufacturer. No internal combustion engine shall be operated on the project without a muffler.
- Loading and unloading of construction materials will be scheduled so as to minimize disruptions to University activities. Construction activities will be scheduled to minimize disruption to the University and to University users.

Local

CSULB is an entity of the CSU, a state agency, and the campus is state-owned property; therefore, development on the campus is not subject to local plans, policies, regulations, or ordinances governing noise and vibration. However, the noise and vibration analysis considers the following local plans, polices, and ordinances as guidance in developing appropriate noise and vibration significance thresholds for assessing impacts.

City of Long Beach

<u>General Plan Noise Element</u>

The City of Long Beach General Plan (General Plan) Noise Element was adopted in 1975 and provides a description of existing and projected future noise levels, and incorporates comprehensive goals, policies, and implementing actions. The following goals related to construction noise are applicable to the Master Plan Update:

- Respond to demands for a reasonably quiet environment which is compatible with both existing ambient noise levels and continued building and industrial development.
- Reduce the level of noise exposure to the population caused by demolition and construction activities.
- Reduce the level of outdoor noise exposure to the population generated by industries.

The General Plan suggests stationary noise levels[3] that, at present, average maximum noise levels outside the nearest building at the window of the occupied room closest to the site boundary, should not exceed 75 dBA in areas near main roads and heavy industries.

The City of Long Beach is currently in the process of updating the Noise Element of the General Plan. Although not yet adopted, the following construction noise policies from the Draft Noise Element are listed for informational purposes:

- Policy N 12-1: Reduce construction, maintenance, and nuisance noise at the source, when possible, to reduce noise conflicts.
- Policy N 12-2: Limit the allowable hours for construction activities and maintenance operations near sensitive uses.

[3] Stationary noise sources includes equipment or facility, fixed or moveable, that is capable of emitting a sound beyond the property boundary of the property on which it is used.

- Policy N 12-3: As part of the City's Municipal Code, establish noise level standards based on Place Type and time of day, to which construction noise shall conform.
- Policy N 12-4: Encourage off-site fabrication to reduce needed onsite construction activities and corresponding noise levels and duration.
- Policy N 12-5: Encourage the following construction best practices:
  - Schedule high-noise and vibration-producing activities to a shorter window of time during the day outside early morning hours to minimize disruption to sensitive uses.
  - Grading and construction contractors should use equipment that generates lower noise and vibration levels, such as rubber-tired equipment rather than metal tracked-equipment.
  - Construction haul truck and materials delivery traffic should avoid residential areas whenever feasible.
  - The construction contractor should place noise- and vibration-generating construction equipment and locate construction staging areas away from sensitive uses whenever feasible.
  - The construction contractor should use on-site electrical sources to power equipment rather than diesel generators where feasible.
  - All residential units located within 500 feet of a construction site should be sent a notice regarding the construction schedule. A sign legible at a distance of 50 feet should also be posted at the construction site. All notices and the signs should indicate the dates and durations of construction activities, as well as provide a telephone number for a "noise disturbance coordinator."
  - A "noise disturbance coordinator" should be established. The disturbance coordinator should be responsible for responding to any local complaints about construction noise. The disturbance coordinator should determine the cause of the noise complaint (e.g., starting too early, bad muffler) and should be required to implement reasonable measures to reduce noise levels.
- Policy N 12-6: Continue to provide information bulletins dispersing information on municipal code requirement and recommended best practices.
- Policy N 12-7: Work together with the Air Quality Management District to encourage the retirement of older construction equipment in favor of newer, quieter, and less polluting equipment.[4]

<u>Long Beach Municipal Code, Noise Ordinance, Chapter 8.80</u>

Chapter 8.80, *Noise*, of the Long Beach Municipal Code (LBMC) sets forth all noise regulations controlling unnecessary, excessive, and annoying noise and vibration in the City. As outlined in Section 8.80.150 of the LBMC, maximum exterior noise levels are based on land use districts. According to the Noise District Map in the LBMC, the CSULB main campus and the Beachside Village property and surrounding uses are located within Noise District One. District One is defined as "predominantly residential with other land use types also present"; District Two is defined as "predominantly commercial with other land use types present"; and Districts Three and Four are defined as "predominantly industrial with other land types use also present." Table 3.8-2, City of Long Beach Noise Limits, summarizes the exterior and interior noise limits for the various

4 City of Long Beach, October 2022, *General Plan – Noise Element*.

land use districts within the City. The following noise limits are applicable while evaluating stationary noise impacts.

Table 3.8-2: City of Long Beach Noise Limits

Land Use District	Exterior Noise Level (L_{eq})		Interior Noise Level (L_{eq})	
	7 a.m. to 10 p.m.	10 p.m. to 7 a.m.	7 a.m. to 10 p.m.	10 p.m. to 7 a.m.
District One	50	45	45	35
District Two	60	55	-[a]	-[a]
District Three[b]	65	65	-[a]	-[a]
District Four[b]	70	70	-[a]	-[a]

a. Interior noise limits vary for different uses within this district.
b. Districts Three and Four limits are intended primarily for use at their boundaries rather than for noise control within the district.

Source: City of Long Beach, December 2022, Long Beach Municipal Code Section 8.80.160 and Section 8.80.170.

LBMC Section 8.80.250, Exemption - Emergencies, exempts performance of emergency work from the noise standard.

LBMC Section 8.80.202, Construction Activity - Noise Regulations, applies to construction activities where a building or other related permit is required and issued by the Building Official. LBMC Section 8.80.202 includes the following restrictions:

- Weekdays and Federal holidays: No person shall operate any tool or equipment used for construction, which produce loud or unusual noise which annoys or disturbs a reasonable person of normal sensitivity between the hours of 7:00 p.m. and 7:00 a.m. of the following day on weekdays, except for emergency work authorized by the Building Official. For purposes of this section, Federal holidays shall be considered weekdays.
- Saturdays: No person shall operate or permit the operation of any tools or equipment used for construction, which produces loud or unusual noise that annoys or disturbs a reasonable person of normal sensitivity between the hours of 7:00 p.m. on Friday and 9:00 a.m. on Saturday and after 6:00 p.m. on Saturday, except for emergency work authorized by the Building Official.
- Sundays: No person shall operate any tool or equipment used for construction at any time on Sunday, except for emergency work authorized by the Building Official or except for work authorized by permit issued by the Noise Control Officer.

LBMC Section 8.80.200 prohibits the operation of any device that creates vibration that is above the vibration perception threshold of an individual or at 150 feet from the source if on a public space or public right-of-way. The perception threshold as defined by the LBMC is 0.001 g's (gravity) in the frequency range of 0-30 hertz (Hz) and 0.003 g's in the frequency range of 30-100 Hz.

3.8.2 Environmental Setting

Noise Scales and Definitions

Sound is described in terms of the loudness (amplitude) of the sound and frequency (pitch) of the sound. The standard unit of measurement of the loudness of sound is the dB. Since the human ear is not equally sensitive to sound at all frequencies, a special frequency-dependent rating scale has been devised to relate noise to human sensitivity. The dBA performs this compensation by discriminating against frequencies in a manner approximating the sensitivity of the human ear.

Decibels are based on the logarithmic scale. The logarithmic scale compresses the wide range in sound pressure levels to a more usable range of numbers in a manner similar to the Richter scale used to measure earthquakes. In terms of human response to noise, a sound 10 dBA higher than another is judged to be twice as loud, and 20 dBA higher four times as loud, and so forth. Everyday sounds normally range from 30 dBA (very quiet) to 100 dBA (very loud). Typical A-weighted noise levels for various noise sources are shown in Table 3.8-3.

Table 3.8-3: Typical A-Weighted Noise Levels

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	— 110 —	Rock band
Jet fly-over at 1,000 feet	— 100 —	
Gas lawn mower at 3 feet	— 90 —	
Diesel truck at 50 feet at 50 miles per hour	— 80 —	Garbage disposal at 3 feet
Gas lawn mower at 100 feet	— 70 —	Vacuum cleaner at 10 feet
Heavy traffic at 300 feet	— 60 —	
Quiet urban daytime	— 50 —	Dishwasher in next room
Quiet urban nighttime	— 40 —	Theater, large conference room (background)
Quiet suburban nighttime	— 30 —	Library
Quiet rural nighttime	— 20 —	
	— 10 —	Broadcast/recording studio
Lowest threshold of human hearing	— 0 —	Lowest threshold of human hearing

Source: California Department of Transportation, September 2013, *Technical Noise Supplement to the Traffic Noise Analysis Protocol*.

Many methods have been developed for evaluating community noise to account for, among other things:

- The variation of noise levels over time;
- The influence of periodic individual loud events; and
- The community response to changes in the community noise environment.

Human Response to Changes in Noise Levels

Human response to sound is highly individualized. Annoyance is the most common issue regarding community noise. However, many factors influence people's response to noise. The factors can include the character of the noise, the variability of the sound level, the presence of tones or impulses, and the time of day of the occurrence. Additionally, non-acoustical factors, such as the person's opinion of the noise source, the ability to adapt to the noise, the attitude towards the source and those associated with it, and the predictability of the noise, all influence people's response. As such, response to noise varies widely from one person to another and with any particular noise, individual responses will range from "not annoyed" to "highly annoyed".

The effects of noise are often only transitory, but adverse effects can be cumulative with prolonged or repeated exposure. The effects of noise on the community can be organized into six broad categories, including noise-induced hearing loss, interference with communication, effects of noise on sleep, effects on performance and behavior, extra-auditory health effects, and annoyance.

Interference with communication has proven to be one of the most important components of noise-related annoyance. Noise-induced sleep interference is one of the critical components of community annoyance. Sound level, frequency distribution, duration, repetition, and variability can make it difficult to fall asleep and may cause momentary shifts in the natural sleep pattern, or level of sleep. It can produce short-term adverse effects on mood changes and job performance, with the possibility of more serious effects on health if it continues over long periods. Noise can cause adverse effects on task performance and behavior at work, and non-occupational and social settings. These effects are the subject of some controversy, since the presence and degree of effects depends on a variety of intervening variables. Most research in this area has focused mainly on occupational settings, where noise levels must be sufficiently high and the task sufficiently complex for effects on performance to occur.

Annoyance can be viewed as the expression of negative feelings resulting from interference with activities, as well as the disruption of one's peace of mind and the enjoyment of one's environment. Field evaluations of community annoyance are useful for predicting the consequences of planned actions involving highways, airports, road traffic, railroads, or other noise sources. The consequences of noise-induced annoyance are privately held dissatisfaction, publicly expressed complaints to authorities, and potential adverse health effects, as discussed above. In a study conducted by the United States Department of Transportation, the effects of annoyance to the community were quantified.[5] In areas where noise levels were consistently above 60 dBA CNEL, approximately nine percent of the community is highly annoyed. When levels exceed 65 dBA CNEL, that percentage rises to 15 percent. Although evidence for the various effects of noise have differing levels of certainty, it is clear that noise can affect human health. Most of the effects are, to a varying degree, stress related.

Ground-Borne Vibration

Sources of ground-borne vibrations include natural phenomena (earthquakes, volcanic eruptions, sea waves, landslides, etc.) or man-made causes (explosions, machinery, traffic, trains, construction equipment, etc.). Vibration sources may be continuous (e.g., factory machinery) or transient (e.g., explosions).

5 Federal Transit Administration, September 2018, *Transit Noise and Vibration Impact Assessment Manual*, Figure 3.7 Community Annoyance Due to Noise.

Ground vibration consists of rapidly fluctuating motions or waves with an average motion of zero. Several different methods are typically used to quantify vibration amplitude. One is the peak particle velocity (PPV); another is the root mean square (RMS) velocity. The PPV is defined as the maximum instantaneous positive or negative peak of the vibration wave. The RMS velocity is defined as the average of the squared amplitude of the signal. PPV is typically used for evaluating potential building damage, whereas PPV and RMS vibration velocity amplitudes are used to evaluate human response to vibration. Typically, ground-borne vibration, generated by man-made activities, attenuates rapidly with distance from the source of vibration. Man-made vibration issues are therefore usually confined to short distances (i.e., 500 feet or less) from the source. Both construction and operation of development projects can generate ground-borne vibration.

Table 3.8-4, Human Reaction and Damage to Buildings from Continuous Vibration Levels, displays the reactions of people and the effects on buildings produced by continuous vibration levels. The annoyance levels shown in Table 3.8-4 should be interpreted with care since vibration may be found to be annoying at much lower levels than those listed, depending on the level of activity or the sensitivity of the individual. To sensitive individuals, vibrations approaching the threshold of perception can be annoying. Low-level vibrations frequently cause irritating secondary vibration, such as a slight rattling of windows, doors, or stacked dishes. The rattling sound can give rise to exaggerated vibration complaints, even though there is very little risk of actual structural damage. In high noise environments, which are more prevalent where ground borne vibration approaches perceptible levels, this rattling phenomenon may also be produced by loud airborne environmental noise causing induced vibration in exterior doors and windows.

Table 3.8-4: Human Reaction and Damage to Buildings from Continuous Vibration Levels

Peak Particle Velocity (inch/second)	Human Reaction	Effect on Buildings
0.006–0.019	Range of threshold of perception	Vibrations unlikely to cause damage of any type
0.08	Vibrations readily perceptible	Recommended upper level to which ruins and ancient monuments should be subjected
0.1	Level at which continuous vibrations may begin to annoy people, particularly those involved in vibration sensitive activities	Virtually no risk of architectural damage to normal buildings
0.2	Vibrations may begin to annoy people in buildings	Threshold at which there is a risk of architectural damage to normal dwellings[a]
0.4–0.6	Vibrations considered unpleasant by people subjected to continuous vibrations and unacceptable to some people walking on bridges	Architectural damage and possibly minor structural damage

[a.] Historic and some old buildings have a threshold of 0.25 PPV (in/sec).

Source: California Department of Transportation, April 2020, *Transportation and Construction Vibration Guidance Manual*, Table 20.

Existing Noise Environment

Existing noise sources in the area surrounding the CSULB main campus and Beachside Village property consist of stationery and transportation sources typical of urban environments. Typical stationary sources of noise include airports; industrial and construction activities; air conditioning and refrigeration units; high level radio, stereo, or television usage; power tools; lawnmowers; appliances used in the home; and barking dogs. Transportation-related noise sources include aircrafts, automobiles, trucks, and buses.

Mobile Noise Source

The primary noise source in the area surrounding the CSULB main campus and Beachside Village property is vehicle traffic along State Route 22, as well as local roads including North Bellflower Boulevard, Palo Verde Avenue, North Studebaker Road, East Campus Drive, East Anaheim Road, and East 7th Street. Noise is also generated by students and people at various events on campus.

To assess the potential for mobile noise impacts, it is necessary to determine the existing noise generated by vehicles traveling through the surrounding area. The existing roadway noise levels in the surrounding area were modeled using the Federal Highway Administration's (FHWA) Highway Noise Prediction Model (FHWA RD-77-108). The model uses a typical vehicle mix for urban/suburban areas in California and requires parameters, including traffic volumes, vehicle speed, and roadway geometry to compute typical equivalent noise levels during daytime, evening, and nighttime hours. The results are shown in Table 3.8-5, Existing Traffic Noise Levels. These noise levels assume that no shielding is provided between the traffic and the location where the noise contours are drawn. As shown in Table 3.8-5, traffic noise on these roadways ranges from approximately 55.7 to 71.8 dBA CNEL when measured 100 feet from the roadway centerline. The highest noise level is at State Route 22.

Table 3.8-5: Existing Traffic Noise Levels

Roadway Segment	Existing					
	ADT	dBA at 100 Feet from Roadway Centerline	Distance from Roadway Centerline to: (Feet)			
			70 CNEL Noise Contour	65 CNEL Noise Contour	60 CNEL Noise Contour	55 CNEL Noise Contour
North Bellflower Boulevard						
Between Interstate 405 and East 23rd Street	31,784	64.8	--	97	209	451
Between Garford Street and East Atherton Street	22,920	65.3	--	105	227	489
Between Atherton Street and Beach Drive	22,500	63.9	--	85	182	393
Between Beach Drive and East 7th Street	23,103	63.0	--	73	158	341
Palo Verde Avenue						
Between East Stearns Street and East Atherton Street	19,650	62.1	--	64	138	297
Between East Atherton Street and East Anaheim Road	12,465	60.1	--	--	102	219

Table 3.8-5: Existing Traffic Noise Levels

Roadway Segment	Existing					
	ADT	dBA at 100 Feet from Roadway Centerline	Distance from Roadway Centerline to: (Feet)			
			70 CNEL Noise Contour	65 CNEL Noise Contour	60 CNEL Noise Contour	55 CNEL Noise Contour
North Studebaker Road						
Between East Willow Street and East Stearns Street	21,183	62.7	--	71	152	328
Between East Stearns Street and East Atherton Street	17,911	63.0	--	--	158	339
Between East Anaheim Road and CA-22	24,021	64.2	--	88	189	408
East Atherton Street						
Between Ximeno Avenue and Clark Avenue	11,191	59.5	--	--	93	200
Between Clark Avenue and North Bellflower Boulevard	14,914	60.9	--	--	114	246
Between North Bellflower Boulevard and Merriam Way	14,211	58.1	--	--	74	160
Between Merriam Way and Palo Verde Avenue	15,396	58.7	--	--	82	176
Between Palo Verde Avenue and North Studebaker Road	7,910	55.8	--	--	--	113
East Anaheim Road						
Between Palo Verde Avenue and North Studebaker Road	8,339	55.7	--	--	51	111
East 7th Street						
Between Bellflower Boulevard and East Campus Drive	69,364	67.5	68	146	314	676
Between East Campus Drive and North Studebaker Road	72,534	69.7	96	206	443	955
State Route 22						
East of Studebaker Road	100,443	71.8	131	282	608	1,309

Notes:

ADT = average daily traffic; dBA = A-weighted decibels; CNEL = community noise equivalent level.

"--" = contour is located within the road right-of-way.

Roadway noise levels and contours were calculated using the FHWA highway traffic noise prediction model (FHWA RD-77-108) with California Vehicle Noise (CALVENO) Emission Levels.

Sources: Fehr & Peers modeling for the Transportation Impact Analysis for the Master Plan Update (2023); refer to Appendix H, Noise and Vibration Calculations.

Existing Noise Levels

Noise measurements were conducted on November 2, 2022, to quantify existing ambient noise levels in the project area. Noise measurements are listed in Table 3.8-6 and noise measurement locations are shown in Figure 3.8-1. The noise measurement sites are representative of typical existing noise exposure within and immediately adjacent to the CSULB main campus and the Beachside Village property. Short-term measurements were taken at each site between 10:00 a.m. and 12:30 p.m. As shown in Table 3.8-6, short-term noise levels during the daytime ranged from 53.0 to 69.4 dBA L_{eq}. The peak noise sources were traffic noise along the nearby roadways. Noise monitoring equipment used to record ambient noise levels consisted of a Brüel & Kjær Hand-held Analyzer Type 2250 equipped with a Type 4189 pre-polarized microphone. The monitoring equipment complies with applicable requirements of the American National Standards Institute for Type I (precision) sound level meters. The results of the recorded ambient noise measurements are included in Appendix H.

Table 3.8-6: Existing Ambient Noise Levels

Measurement Location Number	Location	L_{eq} (dBA)	L_{min} (dBA)	L_{max} (dBA)	Peak (dBA)[a]	Time
NM-1-SFH	Northeast corner of Palo Verde Avenue and East Anaheim Road	63.8	49.4	83.0	99.2	10:06 a.m.
NM-2-SFH	Northwest of the intersection of North College Place and East Atherton Street	64.5	48.0	81.9	98.3	10:23 a.m.
NM-3-SFH	Northwest corner of the intersection of Lave Avenue and East Atherton Street	69.4	49.2	81.2	98.2	10:40 a.m.
NM-4-SFH	Along the Alleyway at East of 1230 Los Altos Avenue	64.3	49.9	79.1	96.7	10:58 a.m.
NM-5-MFH	In front of the garage gate of 630-103 Brocton Court	53.1	41.2	64.8	90.4	11:21 a.m.
NM-6-SFH	Along East Campus Drive, West of 875 Hills Drive	62.9	45.0	79.9	99.3	11:45 a.m.
NM-7-SFH	In front of 1560 Park Avenue, along the sidewalk	53.0	43.5	75.0	89.0	12:06 p.m.

Notes: L_{eq} = Equivalent Sound Level; L_{min} = Minimum Noise Level; L_{max} = Maximum Noise Level

a. The peak noise levels represent the highest instantaneous levels measured at each location, whereas the L_{max} is the highest weighted noise level.

Source: Refer to Appendix H, Noise and Vibration Calculations.

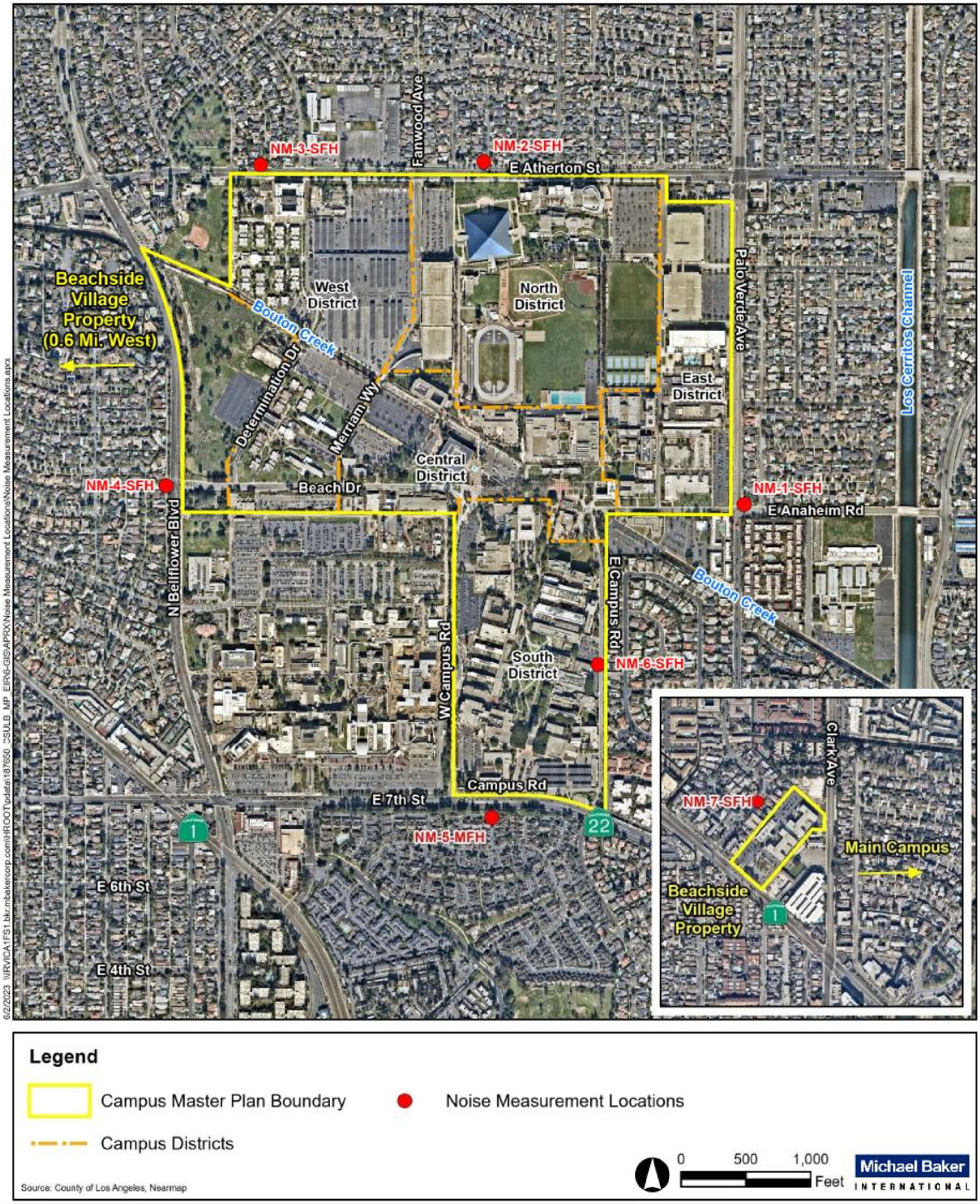

Figure 3.8-1: Noise Measurement Locations

Existing Vibration Environment

Vibration sources in urban environments are typically generated by heavy construction equipment and traffic on rough roads. Neither the CSULB main campus and the Beachside Village property, or the surrounding properties, contain any heavy construction equipment or other facilities or activities, such as heavy industrial uses, that would result in perceptible ground borne vibration. Several heavily traveled roadways are located adjacent to and near the boundaries of the CSULB main campus and the Beachside Village property, including Atherton Street, 7th Street, Bellflower Boulevard, and Pacific Coast Highway. According to the FTA, it is unusual for vibration from sources such as buses and trucks to be perceptible, even in locations close to major roads. As such, there are no existing sources of perceptible vibration at the CSULB main campus or the Beachside Village property or in the surrounding areas.

3.8.3 Methodology

The noise and vibration impact analysis in this section includes a program-level analysis and a project-level analysis of the most impactful near- and mid-term development projects in terms of noise during construction. Both construction and operation of development under the Master Plan Update and the near- and mid-term development projects are considered in the impact analysis, where relevant. In the event significant adverse environmental impacts would occur with the implementation of the Master Plan Update even with incorporation of applicable regulations, mitigation measures have been identified to reduce impacts to less than significant, where feasible.

Sensitive Receptors

Human response to noise varies widely depending on the type of noise, time of day, and sensitivity of the receptor. The effects of noise on humans can range from temporary or permanent hearing loss to mild stress and annoyance due to such things as speech interference and sleep deprivation. Prolonged stress, regardless of the cause, is known to contribute to a variety of health disorders. Noise, or the lack thereof, is a factor in the aesthetic perception of some settings, particularly those with religious or cultural significance. Certain land uses are particularly sensitive to noise, including schools, hospitals, rest homes, long-term medical and mental care facilities, and parks and recreation areas. Residential areas are also considered noise sensitive, especially during the nighttime hours.

The area surrounding the CSULB main campus and the Beachside Village property is predominantly composed of commercial, institutional, and residential uses. The closest noise-sensitive receptors to the near- and mid-term development projects, for the purposes of this noise analysis, are summarized in Table 3.8-7. It should be noted that the sensitive receptors identified are a representative subset of the sensitive receptors closest to the boundaries of the CSULB main campus and the Beachside Village property. The representative sites, which were used for assessing noise impacts in this analysis, were selected due to proximity to existing on-campus noise-sensitive receptors and the proposed near- and mid-term development projects. As such, the potential for noise and vibration impacts is based, in part, on the representative distances to the nearest sensitive receptors shown in Table 3.8-7.

Table 3.8-7: Sensitive Receptors Closest to Near- and Mid-Term Development Projects

Project	Nearest Sensitive Receptors	Land Use	Direction	Distance to Nearest Sensitive Receptors (feet)
Beachside Housing	Multi-family Residence	Residential	Northwest	140
College of the Arts Replacement Building	Single-family Residence	Residential	East	145
Faculty and Staff Housing	Multi-family Residence	Residential	Southeast	170
New 7th St. Community Outreach Facility	Multi-family Residence	Residential	South	225
Walter Pyramid Renovation	Single-family Residence	Residential	North	430
USU Renovation/Addition and Cafeteria Replacement	Single-family Residence	Residential	Southeast	580
New Parkside Housing Village	Preschool	Institutional	Northwest	670
Engineering Replacement Building	Single-family Residence	Residential	East	810
Hillside College Renovations/Addition	Single-family Residence	Residential	West	885
Aquatics Center and Pool Renovation	Single-family Residence	Residential	East	1,200
Jack Rose Track/Commencement Facilities	Single-family Residence	Residential	North	1,270

Construction Noise and Vibration

A review of the near- and mid-term development projects described in Chapter 2, Project Description, was conducted to determine their distance to the closest sensitive receptor and to determine the likely construction scenarios, including construction duration, equipment, existing and/or new building square footage, and demolition requirements. This information is shown in Table 3.8-8. Among the near- and mid-term development projects, the Faculty and Staff Housing project and the New Parkside Housing Village were selected as representative projects for modeling, as they were determined to be the most impactful and represent the worst-case noise modeling scenario. As such, it can reasonably be assumed that construction of the remainder of the near- and mid-term development projects would result in reduced noise levels from those modeled for the representative projects.

Table 3.8-8: Near- and Mid-Term Project Construction Specifications for Noise Analysis

Project	Construction Specifications (Gross Square Feet)				Distance to Nearest Sensitive Receptors (feet)
	Demolition	New Construction	Renovation	Demolition Plus New Construction	
Beachside Housing	-	-	122,000	-	140
College of the Arts Replacement Building	22,910	114,100	-	137,010	145
Faculty and Staff Housing	44,678	388,000	-	432,678	170
New 7th St. Community Outreach Facility	47,684	100,000	-	147,684	225
Walter Pyramid Renovation	-	-	157,400	-	430
USU Renovation/Addition and Cafeteria Replacement	35,305	50,000	160,000	85,305	580
New Parkside Housing Village	99,408	200,000	-	299,408	670
Engineering Replacement Building	65,692	71,000	-	136,692	810
Hillside College Renovations/Addition	-	20,000	96,124	20,000	885
Aquatics Center and Pool Renovation	-	20,000	38,000	20,000	1,200
Jack Rose Track/Commencement Facilities	-	5,000	-	5,000	1,270

To evaluate potential noise and vibration impacts from construction activities associated with implementation of the Master Plan Update as described in the analysis, five typical construction phases are evaluated, with anticipated equipment from the default CalEEMod equipment list applied to the near- and mid-term development projects and reference equipment noise and vibration levels from industry-accepted FHWA and FTA sources. The program-level analysis includes a qualitative analysis to evaluate the potential noise and vibration impacts to the nearby sensitive receptors. The project-level analysis used the FHWA's Roadway Construction Noise Model to estimate the potential noise levels based on the equipment type and number and distances between sensitive receptors and the representative near- and mid-term development projects.

Operational Noise

Crowd Noise

Noise generated by groups of people (i.e., crowds) is dependent on several factors including vocal effort, impulsiveness, and the random orientation of the crowd members. Crowd noise is estimated at 60 dBA at one meter (3.28 feet) away for raised normal speaking. This noise level would have a +5 dBA adjustment for the impulsiveness of the noise source, and a -3 dBA adjustment for the random orientation of the crowd members.[6] Therefore, crowd noise would be approximately 62 dBA at one meter from the source (i.e., outdoor courtyards and/or other outdoor common space). Noise has a decay rate due to distance attenuation, which is calculated based on the Inverse Square Law. Based upon the Inverse Square Law, sound levels decrease by 6 dBA for each doubling of distance from the source.[7] Crowd noise, for example, would be reduced to 56 dBA at two meters from the source. The noise level from one source is generally imperceptible if it is equal to or lower than the ambient noise level, such that crowd noise at one meter from the source (62 dBA) would be imperceptible if the ambient noise level is 62 dBA or higher.

Roadway Noise

The FHWA-RD-77-108 model was used to estimate existing and future roadway noise levels for the nearest major roadways and freeway. Noise levels were modeled for each of the following scenarios: (1) baseline condition; (2) baseline with project condition; (3) cumulative condition; and (4) cumulative with project condition.

Thresholds of Significance

The significance thresholds used to evaluate the impacts of the Master Plan Update related to noise are based on Appendix G of the CEQA Guidelines. Based on Appendix G, a project would have a significant impact related to noise if it would:

- Result in generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies; or
- Result in generation of excessive ground borne vibration or ground borne noise levels.

In analyzing potential noise and vibration impacts associated with the Master Plan Update, pertinent noise standards introduced in the regulatory section have been considered and utilized to develop the following quantified significance thresholds.

- Temporary Construction Noise: For temporary construction activities associated with development under the Master Plan Update, a significant impact would result when construction noise exceeds 75 dBA between the hours of 7:00 a.m. and 7:00 p.m. at nearby sensitive receptors on adjacent parcels based on the recommended threshold listed in the City's General Plan, which is more conservative than the maximum construction noise levels outlined in the CSU construction guidebook. Additionally, in the absence of a City-established nighttime construction noise level limit, per the CSU construction guidebook, a significant construction noise impact would result in a significant impact if construction noise exceeds 65 dBA at the construction site boundary between the hours of 7:00 p.m. and 7:00 a.m. Project-level construction would be anticipated to be carried out as sequential phases but could have concurrent activities across the project site.
- Operational/Permanent Noise – Stationary Sources – Mechanical Equipment: For stationary noise source emissions associated with HVAC system noise, exceedance of 50 dBA during the day and 45 dBA during the night would be considered significant, per the City's exterior noise level limits (refer to Table 3.8-2).

6 M.J. Hayne, et al, November 2006, *Prediction of Crowd Noise, Acoustics*.
7 Cyril M. Harris, 1994, *Noise Control in Buildings*.

- Operational/Permanent Noise – Mobile Sources and Crowd Noise: For project-attributed increases to local roadway traffic volumes and crowd noise from outdoor gathering spaces and events at the proposed Jack Rose Track/Commencement Facilities, a significant permanent increase to the outdoor sound environment (either described with CNEL or L_{dn}) would be defined as an increase of 3 dBA or greater, where exterior noise levels would already exceed 65 dBA CNEL (an outdoor noise level considered "normally acceptable") based on OPR guidance. An increase of 3 dBA is perceived by the average healthy human ear as barely perceptible.[8,9]
- Vibration: Due to the lack of quantified vibration regulation or policy guidance at the local level, a 0.2 inch-per-second PPV is used as the threshold for an impact related to human annoyance to vibration based on California Department of Transportation guidance (refer to Table 3.8-4). Additionally, the FTA threshold of 0.2 inch-per-second PPV is used as the construction vibration damage criteria of the non-engineered timber and masonry buildings, such as residential buildings. For reinforced-concrete, steel or timber (no plaster) buildings, the criteria would be less stringent – on the order of 0.5 inch-per-second PPV.

Issues Not Evaluated Further

The Master Plan Update would not result in a significant impact related to the following CEQA Guidelines Appendix G checklist question, as determined in the Initial Study (Appendix A), and therefore is not evaluated further in this Draft EIR.

- *For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?*

  The CSULB main campus and Beachside Village property are not located within an airport land use plan; however, they are located within 2 miles of Long Beach Airport. According to the Long Beach Airport Noise Office, CNEL Contour Map, the CSULB main campus and Beachside Village property are located outside of the 60 decibel CNEL contours of the Long Beach Airport and is not affected by aircraft noise.[10] The City of Long Beach also has an Airport Noise Compatibility Ordinance (Municipal Code Chapter 16.43) which regulates Maximum SENEL (Single Event Noise Exposure Limits) limits, prohibited activities, cumulative noise limits (CNEL) and noise budgets, compliance with noise budgets, violation enforcement, general exemptions, and flight limits among other things.[11] Additionally, Long Beach Airport only permits increases in the number of air carrier flights if, as a group, the air carriers are below the noise budget, which was established based on noise data for the baseline year of 1989-1990.[12] As the Master Plan Update would involve proposed improvements to

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8 A 3.0 dB difference in noise level is generally the point at which the human ear will perceive a difference in noise level. As such, 3.0 dB is considered a conservative and reasonable threshold of significance, as neither the City of Long Beach or California State University has an adopted threshold.

9 California Department of Transportation, September 2013, *Technical Noise Supplement to the Traffic Noise Analysis Protocol.*

10 City of Long Beach, 2005, Exhibit 3.6-14, Year 2004 CNEL Contours With 11 Additional Air Carrier and 25 Additional Commuter Flights.

11 Long Beach Airport, Long Beach Airport Noise Office, Noise Abatement Frequently Asked Questions, available at: https://www.longbeach.gov/lgb/community-information/noise-abatement/faq/, accessed March 2, 2022.

12 Ibid.

campus facilities within the existing boundaries of the main campus and the Beachside Village property, no impact would occur related to excessive noise for people residing or working in the project area.

3.8.4 Impact Analysis

The impact analysis below is organized into a program-level analysis and a project-level analysis. For the program-level analysis, the Master Plan Update is evaluated as an overall program of development over a multi-year planning horizon for the CSULB campus, through at least 2035. For the project level analysis, the most impactful near- and mid-term development projects in terms of noise that would be implemented under the Master Plan Update are analyzed, with the analysis focusing on those projects that would be developed near sensitive residential uses.

NOI-1 Would the project result in generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

Program-Level Analysis for Master Plan Update

Construction

Typical activities associated with construction are a highly noticeable, but short-term, noise source. Noise from construction activities is generated by two primary sources: (1) the transport of workers and equipment to construction sites and (2) the noise related to active construction equipment. These noise sources can range from being a nuisance for local residents and businesses to being unbearable for sensitive receptors (i.e., residences, hospitals, senior centers, schools, day care facilities, etc.).

Implementation of the Master Plan Update would result in development within the CSULB main campus and Beachside Village property, which would generate noise during construction activities. Construction associated with development under the Master Plan Update could temporarily increase the ambient noise environment in the vicinity of construction activities. Construction noise levels are dependent upon the specific locations, site plans, and construction details of individual projects. Construction would be localized and would occur intermittently for varying periods of time. Typical construction activities would include site preparation, excavation, grading, backfilling and compaction of soils, installation of utility infrastructure, as needed, and construction of proposed new facilities. Typical maximum noise levels generated by construction equipment likely to be used for development under the Master Plan Update are shown in Table 3.8-9.

Operating cycles of the construction equipment listed in Table 3.8-9 may consist of one or two minutes of full power operation followed by three to four minutes at lower power settings. Other primary sources of acoustical disturbance during construction would be due to random incidents, which would last less than one minute (such as dropping large pieces of equipment or the hydraulic movement of machinery lifts). Noise levels depicted in Table 3.8-9 represent maximum sound levels (L_{max}), which are the highest individual sound occurring during an individual time period. At a distance of 100 feet, construction noise levels would range between approximately 69 dBA and 84 dBA.

Table 3.8-9: Typical Noise Levels for Construction Equipment

Equipment	Acoustical Use Factor[a] (percent)	L_{max} at 50 feet (dBA)	L_{max} at 100 feet (dBA)
Backhoe	40	78	72
Concrete Mixer Truck	40	79	73
Concrete Saw	20	90	84
Crane	16	81	75
Dozer	40	82	76
Excavator	40	81	75
Forklift	20	75	69
Generator	50	81	75
Grader	40	85	79
Loader	40	79	73
Paver	50	77	71
Roller	20	80	74
Tractor	40	84	78
Water Truck	40	75	69
General Industrial Equipment	50	85	79

a. The Acoustical Use Factor expresses the fraction of time in percent that a piece of construction equipment is anticipated to be operating at full power (i.e., the noisiest condition) during construction activities.

Source: Federal Transit Administration, January 2006, Roadway Construction Noise Model *(FHWA-HEP-05-054)*.

During times when multiple pieces of construction equipment are operating at the same time at areas nearest to sensitive receptors, adjacent residential receptors could be exposed to temporary and intermittent noise levels exceeding the daytime construction noise threshold of 75 dBA, which would result in a significant impact. Additionally, while the majority of construction activities are anticipated to occur during daytime hours, generally 7:00 a.m. to 7:00 p.m., Monday through Friday, and between the hours of 9:00 a.m. and 6:00 p.m. on Saturday and Sunday, it is anticipated that some work outside of these hours may be required in order to maintain construction schedules. As such, nighttime construction activities could result in noise levels exceeding the 65 dBA nighttime construction noise level limit established in the CSU construction guidebook. Therefore, Mitigation Measure NOI-A would be required to minimize impacts from construction noise as it would require all construction equipment to be equipped with noise-reducing features (i.e., exhaust mufflers, engine shrouds, etc.), use electrical power when feasible, locate stationary construction equipment far away from the sensitive receptors, reduce idling, and install noise wall or portable barriers when feasible. Additionally, Mitigation Measure NOI-B would require specific techniques to reduce noise levels below 65 dBA during nighttime construction activities. With implementation of Mitigation Measure NOI-A and NOI-B, short-term construction noise impacts associated with development under the Master Plan Update would be less than significant.

Operation

Development under the Master Plan Update has the potential to change the campus outdoor ambient noise environment due to the creation of new stationary and/or mobile noise sources. Stationary noise sources include mechanical equipment, such as rooftop HVAC systems; crowd noise associated student social activities at academic and administrative facilities and campus housing; and parking activities. Mobile noise sources would be associated with vehicular traffic noise on roadways adjacent to the CSULB main campus and Beachside Village property during operation.

Stationary Sources

Mechanical Equipment

The Master Plan Update proposes to renovate, replace, and construct several facilities on the CSULB main campus. Typical mechanical equipment associated with stationary sources includes HVAC units. Actual HVAC activity levels would vary from season to season and day to day, however, noise level reference data for the HVAC units are only available for high activity levels, which occur during daytime hours on a warm summer day. HVAC units for campus facilities typically operate in unoccupied mode throughout the nighttime period, using a temperature threshold for cooling that is unlikely to be triggered during those hours. HVAC related noise levels would be substantially lower during the nighttime hours than during the loudest daytime hour. It is reasonable to expect that, for at least a single daytime hour during warmer times of the year, all or nearly all of the HVAC units on proposed new facilities developed under the Master Plan Update could be operating simultaneously and nearly continuously.

Proposed development under the Master Plan Update that may include HVAC systems would be the proposed academic and administrative facilities, housing, student and campus support facilities, and enclosed athletic facilities (i.e., facilities that include buildings and not open athletic fields). HVAC systems typically result in noise levels that average 60 dBA at 20 feet from the source.[13] As shown in Table 3.8-7, the nearest sensitive receptors to the CSULB main campus are single-family residences located approximately 145 feet to the east. Additionally, while sensitive residential uses are located adjacent to the northwestern boundary of the Beachside Village property, the Master Plan Update proposes partial renovations of the student residence halls, which are located 140 feet from the nearest sensitive receptors.

At 140 feet, HVAC noise levels would attenuate to 43 dBA. Additionally, new buildings and mechanical equipment would be designed to comply with the most current Title 24 and the California Green Building Standards Code that have the most current noise shielding or noise canceling features, such as parapet walls surrounding stationary noise sources, which would further reduce noise levels from HVAC units. Furthermore, due to advances in technology, the new mechanical equipment would be quieter than the existing systems. Therefore, HVAC noise levels would not exceed the City's 50 dBA threshold for stationary sources during the day or the 45 dBA threshold during the night (refer to Table 3.8-2). Furthermore, HVAC noise levels would be much lower than the existing equivalent (L_{eq}) ambient noise levels in the areas surrounding the CSULB main campus and Beachside Village property (53.0 dBA to 69.4 dBA), as shown in Table 3.8-6. Thus, implementation of the Master Plan Update would not result in noise impacts to nearby receptors from HVAC units, and the nearest receptors would not be directly exposed to substantial noise from on-site mechanical equipment. Impacts would be less than significant with implementation of the Master Plan Update.

Crowd Noise

The Master Plan Update proposes renovation, replacement, and/or new construction of administrative and academic facilities and housing. Some proposed improvements would increase outdoor student gathering spaces. Additionally, increases in campus housing facilities would allow for an increase in student and faculty residents, which could increase the potential for crowd noise associated with outdoor student and campus resident activities. Student and campus resident activities associated with proposed improvements to academic and administrative facilities and housing would be consistent with the existing operations at the

13 Elliot H. Berger, Rick Neitzel, and Cynthia A. Kladden, July 2015, *Noise Navigator Sound Level Database with Over 1700 Measurement Values*.

CSULB main campus and Beachside Village property and would occur in the same locations as similar facilities. Thus, development under the Master Plan Update would generate similar noise levels from outdoor student activities to the existing condition. Furthermore, student gathering spaces are generally concentrated toward the interior of the CSULB main campus and the Beachside Village property and would not be located near sensitive receptors. The nearest sensitive receptors are located approximately 145 feet from the CSULB main campus and approximately 140 feet from the proposed improvements at the Beachside Village property. At 140 feet, crowd noise at the nearest sensitive receptor would be 29 dBA, which would not exceed the 65 dBA CNEL threshold during the day or the City's 45 dBA threshold during the night. Thus, if it were conservatively assumed that student activities would take place at the closest point to the nearest sensitive receptor, the applicable threshold would not be exceeded. Therefore, impacts associated with crowd noise from proposed academic and administrative facilities and housing development under the Master Plan Update would be less than significant.

Parking Activities

Traffic associated with parking lots is typically not of sufficient volume to exceed community noise standards, which are based on a time-averaged scale such as the CNEL scale. However, the instantaneous maximum sound levels generated by a car door slamming, engine starting up, and car pass-bys may be an annoyance to adjacent noise-sensitive receptors. Conversations in parking areas may also be an annoyance to adjacent sensitive receptors. Noise from parking activities is currently generated at the existing surface parking lots and parking structures at the CSULB main campus and at the surface parking lot at the Beachside Village property. As further discussed in Section 3.9, Population and Housing, proposed improvements at the Beachside Village property would result in an overall reduction in the number of student beds at that location. As such, noise associated with parking activity at the Beachside Village property would not increase over existing conditions. Noise generated by parking activities is already existing in parking facilities provided across the CSULB main campus. As discussed in Chapter 2, Project Description, implementation of the Master Plan Update is anticipated to result in a net increase in the on-campus population of 5,466 FTES, FTE employees, auxiliary employees, and faculty/staff household members[14] through the horizon year, many of whom would drive their personal vehicles and park at the CSULB main campus. However, this increase in the total campus population would increase gradually such that parking activities would not be anticipated to substantially change in any given year through the horizon year 2035. Additionally, several mobility and circulation improvements are proposed under the Master Plan Update that would enhance connections to transit services and bicycle and pedestrian facilities and promote the use of non-auto travel modes, which would minimize noise levels associated with parking activities. Therefore, implementation of the Master Plan Update would not result in substantially greater noise levels than currently exist in parking facilities. Therefore, noise impacts from parking activities would be less than significant with implementation of the Master Plan Update.

Mobile Sources

The most prominent sources of mobile traffic noise in the vicinity of the CSULB main campus are along North Bellflower Boulevard, East 7th Street, and State Route 22. As implementation of the Master Plan Update would result in an increased campus population, it would result in some additional traffic on adjacent roadways, thereby potentially increasing vehicular noise in the vicinity of existing land uses. Table 3.8-10 shows the existing traffic noise levels in the "Baseline" scenario in year 2019 compared to the predicted increases in traffic noise levels resulting from

[14] Due to the provision of housing for faculty and staff as part of the Master Plan Update, it is anticipated that a small number of faculty and staff would reside on campus with other members of their household.

implementation of the Master Plan Update in the “Baseline plus Project” scenario. Under the “Baseline” scenario, noise levels at 100 feet from the roadway centerline currently range from approximately 55.7 dBA to 71.8 dBA, with the highest noise levels occurring along State Route 22. The “Baseline Plus Project” scenario noise levels at 100 feet from the roadway centerline would range from approximately 56.4 dBA to 71.9 dBA, with the highest noise occurring along the same roadway segment. As shown in Table 3.8-10, the noise levels would result in a maximum increase of 0.7 dBA with implementation of the Master Plan Update. This increase in noise would occur along East Anaheim Road between Palo Verde Avenue and North Studebaker Road and East Atherton Street between North Bellflower Boulevard and North Studebaker Road. As this noise level increase would be well below the 3.0 dBA threshold, noise impacts from mobile sources would be less than significant with implementation of the Master Plan Update.

Table 3.8-10: Predicted Increases in Traffic Noise Levels

Roadway Segment	Baseline		Baseline Plus Project		Difference in dBA Between Baseline and Baseline Plus Project
	ADT	dBA at 100 Feet from Roadway Centerline	ADT	dBA at 100 Feet from Roadway Centerline	
North Bellflower Boulevard					
Between Interstate 405 and East 23rd Street	31,784	64.8	33,559	65.0	0.2
Between Garford Street and East Atherton Street	22,920	65.3	24,949	65.7	0.4
Between Atherton Street and Beach Drive	22,500	63.9	23,514	64.1	0.2
Between Beach Drive and East 7th Street	23,103	63.0	23,991	63.2	0.2
Palo Verde Avenue					
Between East Stearns Street and East Atherton Street	19,650	62.1	22,237	62.6	0.5
Between East Atherton Street and East Anaheim Road	12,465	60.1	13,733	60.5	0.4
North Studebaker Road					
Between East Willow Street and East Stearns Street	21,183	62.7	22,071	62.9	0.2
Between East Stearns Street and East Atherton Street	17,911	63.0	19,306	63.3	0.3
Between East Anaheim Road and CA-22	24,021	64.2	25,302	64.4	0.2
East Atherton Street					
Between Ximeno Avenue and Clark Avenue	11,191	59.5	12,256	59.9	0.4
Between Clark Avenue and North Bellflower Boulevard	14,914	60.9	16,119	61.2	0.3
Between North Bellflower Boulevard and Merriam Way	14,211	58.1	16,747	58.8	0.7
Between Merriam Way and Palo Verde Avenue	15,396	58.7	18,059	59.4	0.7

Table 3.8-10: Predicted Increases in Traffic Noise Levels

Roadway Segment	Baseline		Baseline Plus Project		Difference in dBA Between Baseline and Baseline Plus Project
	ADT	dBA at 100 Feet from Roadway Centerline	ADT	dBA at 100 Feet from Roadway Centerline	
Between Palo Verde Avenue and N Studebaker Road	7,910	55.8	9,343	56.5	0.7
East Anaheim Road					
Between Palo Verde Avenue and North Studebaker Road	8,339	55.7	9,835	56.4	0.7
East 7th Street					
Between Bellflower Boulevard and East Campus Drive	69,364	67.5	70,632	67.5	0.1
Between East Campus Drive and North Studebaker Road	72,534	69.7	73,891	69.8	0.1
State Route 22					
East of Studebaker Road	100,443	71.8	103,017	71.9	0.1

Notes:

ADT = average daily trips; dBA = A-weighted decibels; CNEL = community noise equivalent level.

"-" = contour is located within the roadway right-of-way.

Roadway noise levels and contours were calculated using the FHWA highway traffic noise prediction model (FHWA RD-77-108) with California Vehicle Noise (CALVENO) Emission Levels.

Sources: Fehr & Peers modeling for the Transportation Impact Analysis for the Master Plan Update (2023); refer to Appendix H, Noise and Vibration Calculations.

Project-Level Analysis for Near- and Mid-Term Development Projects

Construction

As discussed in Section 3.8.3, Methodology, the proposed Faculty and Staff Housing project and New Parkside Housing Village project were selected for detailed construction noise analysis as they represent the worst-case construction noise scenarios due to their construction duration, equipment, and intensity, and the distance to the nearest sensitive receptors. The nearest sensitive receptors to the proposed site of the Faculty and Staff Housing project is the multi-family residential building located approximately 170 feet southeast of the project site. The nearest sensitive receptor to the proposed site of the New Parkside Housing Village is the Discovery Preschool located approximately 670 feet northwest (refer to Table 3.8-7).

The estimated construction noise levels at the nearest noise-sensitive receptors are presented in Table 3.8-11. To present a conservative impact analysis, the estimated noise levels were calculated for a scenario in which all heavy construction equipment (e.g., concrete saws, excavators, and dozers) was assumed to operate simultaneously and be located at the construction area nearest to the affected receptors.

Table 3.8-11: Construction Noise Levels at Adjacent Residential Receptors

Project Name	Distance to the nearest sensitive receptor	Construction Phase (L_{max}, dBA)[a]				
		Demolition	Grading	Building Construction	Paving	Architectural Coating
Faculty and Staff Housing	170 feet	79	74	74	79	67
New Parkside Housing Village	670 feet	67	61	71	67	55

a. These noise levels conservatively assume the simultaneous operation of all heavy construction equipment (e.g., concrete saws, excavators, and dozers) at the same precise location.

Source: Federal Highway Administration, 2006, *Roadway Construction Noise Model (RCNM)*; refer to the Noise and Vibration Calculations in Appendix H.

As shown in Table 3.8-11, adjacent residential receptors could be exposed to temporary and intermittent noise levels up to 79 dBA for the most intensive project, the proposed Faculty and Staff Housing project, which would exceed the Long Beach General Plan construction noise standard of 75 dBA during daytime hours. As previously noted, noise levels presented in Table 3.8-11 are conservative, as these noise levels assume the simultaneous operation of all heavy construction equipment (e.g., concrete saws, excavators, and dozers) at the same time in the same precise location. In reality, construction equipment would be used throughout the project site and would not be concentrated at the point closest to the sensitive receptors. It should also be acknowledged that construction activities would occur during daytime hours, generally 7:00 a.m. to 7:00 p.m., Monday through Friday, and between the hours of 9:00 a.m. and 6:00 p.m. on Saturday and Sunday, to avoid noise disturbances at nearby receptors. However, it is anticipated that work outside these hours may be required in order to maintain construction schedules and minimize any potential road detours. The noise levels shown in Table 3.8-11 would exceed the Long Beach General Plan 75 dBA daytime construction noise level limit and the 65 dBA nighttime construction noise level limit established in the CSU construction guidebook for most construction activities. As such, noise levels resulting from construction activities would be significant. Implementation of Mitigation Measure NOI-A would minimize impacts from construction noise as it would require all construction equipment to be equipped with noise-reducing features, use electrical power when feasible, locate stationary construction equipment far away from the sensitive receptors, reduce idling, and install noise wall or portable barriers when feasible. Mitigation Measure NOI-B requires specific techniques to reduce noise levels below 65 dBA during nighttime construction activities. With implementation of Mitigation Measures NOI-A and NOI-B, noise levels associated with construction of the near- and mid-term development projects would be less than significant.

<u>Operation</u>

Similar to the program-level analysis for the Master Plan Update, the near- and mid-term development projects have the potential to change the campus outdoor ambient noise environment due to the creation of new stationary and/or mobile noise sources. Stationary noise sources include mechanical equipment, or rooftop HVAC systems; crowd noise associated with the proposed Jack Rose Track/Commencement Facilities project and outdoor social activities at the proposed New Parkside Housing Village project and Faculty and Staff Housing project; and parking activities. Mobile noise sources would be associated with vehicular traffic noise on roadways adjacent to the CSULB main campus and Beachside Village property during operation.

Stationary Sources

Mechanical Equipment

Mechanical equipment associated with the near- and mid-term development projects would consist of HVAC units. As previously discussed, HVAC systems typically result in noise levels that average 60 dBA at 20 feet from the source.[15] The nearest sensitive receptors to the near- and mid-term development projects are the single-family residential uses located approximately 140 feet from the proposed Beachside Housing improvements at the Beachside Village property. At 140 feet, HVAC noise levels would attenuate to 43 dBA. The closest sensitive receptors to the remainder of the near- and mid-term development projects are further than 140 feet. At distances greater than 140 feet, noise from HVAC units would attenuate to less than 43 dBA. Additionally, new buildings and mechanical equipment would be designed to comply with the most current Title 24 and the California Green Building Standards Code that have the most current noise shielding or noise canceling features, such as parapet walls surrounding stationary noise sources, which would further reduce noise levels from HVAC units. Furthermore, due to advances in technology, the new mechanical equipment would be quieter than the existing systems. Therefore, HVAC noise levels generated at the near- and mid-term development projects would not exceed the 50 dBA threshold during the day or the 45 dBA threshold during the night (refer to Table 3.8-2). Furthermore, HVAC noise levels would be much lower than the existing equivalent ambient noise levels in the areas surrounding the CSULB main campus and Beachside Village property (53.0 to 69.4 dBA) as shown in Table 3.8-6. Thus, operation of the near- and mid-term development projects would not result in noise impacts to nearby receptors from HVAC units, and the nearest receptors would not be directly exposed to substantial noise from on-site mechanical equipment. Impacts would be less than significant during operation of the near- and mid-term development projects.

Crowd Noise

Near- and mid-term development projects that could include potential crowd noise sources are the proposed Jack Rose Track/Commencement Facilities project and the proposed housing projects that would result in a net increase in campus residents at outdoor gathering spaces at their respective locations, including the proposed New Parkside Housing Village project and the proposed Faculty and Staff Housing project.

Jack Rose Track/Commencement Facilities

Improvements proposed at the existing Jack Rose Track include expanded bleachers on the east side of the facility, permanent flood lighting, and permanent concessions that could double as food venue for academic programs nearby. There is also a need for locker room space for Track and Field and Cross Country. The proposed additional bleachers would add approximately 3,570 more seats than the existing bleachers, for a new total of approximately 5,100 seats, and would generate additional spectator noise from the stadium during sporting and special events, such as commencement. It should be noted that existing noise levels currently generated by events at the Jack Rose Track facility also include the use of a public announcement (PA) system and speakers, which would remain in use following the renovations. As such, noise generated by the existing PA system is anticipated to substantially increase with implementation of the proposed renovations. Additionally, the Jack Rose Track is located on the interior of the CSULB main campus and the nearest sensitive receptor is located approximately 1,270 feet north of this facility. Nonetheless, the increase in crowd noise generated by the additional seating capacity at the Jack

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[15] Elliot H. Berger, Rick Neitzel, and Cynthia A. Kladden, June 2015, *Noise Navigator Sound Level Database with Over 1700 Measurement Values*.

Rose Track/Commencement Facilities could exceed the threshold of a 3 dBA increase over ambient noise level at the nearest sensitive receptor, resulting in a potentially significant impact. Mitigation Measure NOI-C would require a noise assessment prior to final design and incorporation of all recommended noise reduction measures to reduce noise levels at nearby noise sensitive residential land uses to not cause a 3 dBA increase over ambient noise and exceed the applicable land use compatibility standard during events held at the Jack Rose Track/Commencement Facilities. With implementation of Mitigation Measure NOI-C, impacts from crowd noise during operation of the Jack Rose Track/Commencement Facilities project would be less than significant.

Housing

Of the near- and mid-term development projects involving campus housing, the New Parkside Housing Village project creates the most potential for elevated levels of noise from outdoor gathering spaces located near a sensitive receptor. The New Parkside Housing Village would also create new courtyards that offer students outdoor social areas, which could be used by students to socialize intermittently for outdoor events. Although the existing Parkside Housing Village currently includes student beds and provides outdoor courtyards for student social activities, the proposed New Parkside Housing Village would result in a net increase in student beds of approximately 2,085 beds, as compared to the existing 1,387 beds. As such, the New Parkside Housing Village project would result in a higher concentration of student residents at that location on the CSULB main campus and is, thus, considered the most intensive potential crowd noise source among the mid- and near-term housing projects. The nearest sensitive receptor is the Discovery Preschool located approximately 670 feet northwest of the proposed site of the New Parkside Housing Village. Crowd noise at the nearest sensitive receptor would be 16 dBA, which would not exceed the 65 dBA CNEL threshold during the day or the City's 45 dBA threshold during the night.

Although less intensive with approximately 570 beds, the proposed Faculty and Staff Housing project would develop housing at a distance of approximately 170 feet from the nearest sensitive receptor on a site that does not currently contain housing. Crowd noise at the nearest sensitive receptor would be 28 dBA, which would not exceed the 65 dBA CNEL threshold during the day or the City's 45 dBA threshold during the night.

As further discussed in Section 3.9, Population and Housing, the proposed Hillside College Renovations/Addition project and the Beachside Housing project would result in an overall reduction in the number of student beds at each of their respective locations. As such, crowd noise associated with Hillside College Renovations/Addition Project and the Beachside Housing project would not increase over existing conditions.

As none of the proposed near- or mid-term housing projects would result in crowd noise that would exceed the applicable day- or nighttime thresholds, impacts related to crowd noise would be less than significant.

Parking Activities

As discussed, traffic associated with parking lots is typically not of sufficient volume to exceed community noise standards. However, the sudden maximum sound levels generated by a car door slamming, engine starting up, and car pass-bys may be an annoyance to adjacent noise sensitive- receptors. Conversations in parking areas may also be an annoyance to adjacent sensitive receptors. The only near- or mid-term development project that includes parking is the proposed Faculty and Staff Housing project, which would include two levels of podium parking.

This parking area would be located adjacent to existing Parking Lot E6 near the northwest corner of Palo Verde Avenue and State University Drive. The podium parking levels would be surrounded by screening on the exterior of the building and the entrance to the parking area would be located on the north side of the Faculty and Staff Housing building facing the interior of the CSULB main campus and away from sensitive receptors to the southeast. Both the screening and the location of the parking area entrance would help minimize noise associated with parking activities at the new Faculty and Staff Housing project. Additionally, parking lot noise is currently generated at the adjacent Parking Lot E6. As such, the proposed podium parking at the Faculty and Staff Housing project would not significantly increase parking lot noise over the existing conditions. Therefore, impacts associated with noise from parking activities would be less than significant during operation of the proposed Faculty and Staff Housing project.

<u>Mobile Sources</u>

The evaluation of the potential for increases in noise from mobile sources related to implementation of the Master Plan Update in the program-level analysis determined that impacts would be less than significant. The program-level analysis of mobile noise sources above accounts for all development across the CSULB main campus and the Beachside Village property through the horizon year, as it is based on total population, rather than individual development projects. As such, the near- and mid-term development projects are accounted for in the program-level mobile source noise analysis and would also be expected to have a less than significant impact during operation.

NOI-2 Would the project result in generation of excessive groundborne vibration or groundborne noise levels?

Program-Level Analysis for Master Plan Update

Construction

Project construction can generate varying degrees of groundborne vibration, depending on the construction procedure and the construction equipment used. Operation of construction equipment generates vibrations that spread through the ground and diminish in amplitude with distance from the source. The effect on buildings located in the vicinity of the construction site often varies depending on soil type, ground strata, and construction characteristics of the receiver building(s). The results from vibration can range from no perceptible effects at the lowest vibration levels, to low rumbling sounds and perceptible vibration at moderate levels, to slight damage at the highest levels. Groundborne vibrations from construction activities rarely reach levels that damage structures.

Construction vibration impacts include human annoyance and building damage. Human annoyance occurs when construction vibration rises significantly above the threshold of human perception for extended periods of time. The vibration level at which human annoyance is perceived is 0.2 inch-per-second PPV. Building damage can be cosmetic or structural. Ordinary buildings that are not particularly fragile would not experience any cosmetic damage (e.g., plaster cracks) at distances beyond 30 feet. This distance can vary substantially depending on the soil composition and underground geological layer between vibration source and receiver. In addition, not all buildings respond similarly to vibration generated by construction equipment. The residential structures that make up the sensitive uses near the CSULB main campus and Beachside Village property are non-engineered timber and masonry buildings. For buildings, the FTA architectural damage criterion for continuous vibrations is 0.2 inch-per-second PPV.

Development associated with the Master Plan Update would generate vibration during construction activities. Vibration levels are dependent upon the specific equipment and location of the activities. Construction would be localized and would occur intermittently for varying periods of time. Vibration velocities for typical construction equipment that would be used for development under the Master Plan Update are shown in Table 3.8-12.

Table 3.8-12: Typical Vibration Levels for Construction Equipment

Equipment	Reference peak particle velocity at 25 feet (inch-per-second)	Approximate peak particle velocity at 130 feet (inch-per-second)[a]
Pile driver (impact) – typical	1.518	0.1280
Pile driver (sonic) – typical	0.644	0.0619
Vibratory Roller	0.210	0.0177
Large Bulldozer	0.089	0.0075
Caisson Drilling	0.089	0.0075
Loaded Trucks	0.076	0.0064
Jackhammer	0.035	0.0030
Small Bulldozer	0.003	0.0003

a. Calculated using the following formula:
PPV equip = PPVref x (25/D)1.5
where: PPV (equip) = the peak particle velocity in inch-per-second of the equipment adjusted for the distance
PPV (ref) = the reference vibration level in inch-per-second from Table 7-4 of the FTA Transit Noise and Vibration Impact Assessment Manual
D = the distance from the equipment to the receiver

Source: Federal Transit Administration, September 2018, *Transit Noise and Vibration Impact Assessment Manual*.

The ground-borne vibration generated during construction activities would primarily impact existing sensitive uses that are located near construction activities. Ground-borne vibration decreases rapidly with distance. As indicated in Table 3.8-12, based on the FTA data, vibration velocities from typical heavy construction equipment that would be used during project construction range from 0.003 to 0.089 inch-per-second PPV at 25 feet from source of activity. As shown in Table 3.8-7 in Section 3.8.3, Methodology, above, the closest representative sensitive receptors are located 145 feet from the CSULB main campus and 140 feet from the Beachside Village property. For a conservative analysis, vibration levels were estimated at 130 feet from sensitive receptors. The vibration velocities for construction equipment at a distance of 130 are shown in Table 3.8-12. At 130 feet from construction equipment, vibration levels would be below the 0.2 inch-per-second PPV threshold for human annoyance and building damage. Additionally, while heavy-duty trucks would travel through roadways adjacent to the CSULB main campus and the Beachside Village property during construction, according to the FTA, it is unusual for vibration from sources such as buses and trucks to be perceptible, even in locations close to major roads. Therefore, vibration impacts during construction activities associated with development under the Master Plan Update would be less than significant.

Operation

Implementation of the Master Plan Update would involve renovation of existing buildings, demolition and replacement of existing buildings in the same physical location, and construction of some new buildings, all of which would be consistent with the existing university facilities. As such, development under the Master Plan Update would not introduce new land uses to the CSULB main campus or Beachside Village property that could result in perceptible groundborne vibration. Therefore, impacts would be less than significant during operation.

Project-Level Analysis for Near- and Mid-Term Development Projects

Construction

Construction activities associated with the proposed near- and mid-term development projects would result in impacts similar to the program-level impacts of implementation of the Master Plan Update. Construction activities and equipment associated with the near- and mid-term development projects would generate vibration. Vibration levels are dependent upon the specific equipment and location of the activities. Construction would be localized and would occur intermittently for varying periods of time. Vibration velocities for typical construction equipment that would be used for construction of the near- and mid-term development projects are shown in Table 3.8-12.

The ground-borne vibration generated during construction activities would primarily impact existing sensitive uses that are located near construction activities associated with the near- and mid-term development projects. Ground-borne vibration decreases rapidly with distance. The closest sensitive receptors to the near- and mid-term development projects are located 145 feet from the CSULB main campus and 140 feet from the Beachside Village property. As shown in Table 3.8-12, construction equipment vibration levels would not exceed the 0.2 inch-per-second PPV threshold for human annoyance or building damage. Additionally, while heavy-duty trucks would travel through roadways adjacent to the CSULB main campus and the Beachside Village property during construction, according to the FTA, it is unusual for vibration from sources such as buses and trucks to be perceptible, even in locations close to major roads. Therefore, vibration impacts during construction of the near- and mid-term development projects would be less than significant.

Operation

The near- and mid-term development projects include replacement, renovation, and new development projects consistent with existing university uses. The near- and mid-term development projects would not introduce new land uses that could result in perceptible groundborne vibration. Therefore, impacts would be less than significant impact during operation.

3.8.5 Mitigation Measures

The following mitigation measures would be required to reduce noise and vibration impacts during construction and operation.

NOI-A The following measures shall be implemented to minimize construction noise:

1. Construction activity shall generally be limited to the daytime between the hours of 7:00 a.m. and 7:00 p.m., Monday through Friday, and between the hours of 9:00 a.m. and 6:00 p.m. on Saturday and Sunday. Construction activities shall be prohibited on Federal holidays. Loud construction (e.g., asphalt removal, large-scale grading operations) shall not be scheduled on Sundays or during finals week and preferentially shall be scheduled during school breaks, summer/winter break, etc.
2. All construction equipment shall be properly maintained and equipped with noise-reducing air intakes, exhaust mufflers, and engine shrouds in accordance with manufacturers' recommendations. Equipment engine shrouds shall be closed during equipment operation.

3. Electrical power, rather than diesel equipment, shall be used to run compressors and similar power tools and to power any temporary structures, such as construction trailers.
4. All stationary construction equipment (e.g., electrical generators, pumps, refrigeration units, and air compressors) and equipment staging areas shall be located as far as feasible from occupied residences adjacent to the CSULB main campus and the Beachside Village property or the Discovery Preschool located 5550 East Atherton Street.
5. When anticipated construction activities are expected to occur less than 140 feet from an existing off-campus residential land use, one or more of the following techniques shall be employed to keep noise levels below a threshold of 75 dBA at potentially affected sensitive receptors:
    a. Reduce construction equipment and vehicle idling and active operation duration.
    b. Install or erect on-site a temporary, solid noise wall (or acoustical blanket having sufficient mass, such as the incorporation of a mass-loaded vinyl skin or septum) of adequate height and horizontal extent so that it linearly occludes the direct sound path between the noise-producing construction process(es) or equipment and the sensitive receptor(s) of concern.
    c. Where impact-type equipment is anticipated onsite, apply noise-attenuating shields, shrouds, portable barriers or enclosures, to reduce the magnitudes of generated impulse noises.

NOI-B If nighttime construction is required, noise levels shall not exceed 65 dB L_{max} when measured at the construction site boundary between the hours of 7:00 p.m. and 7:00 a.m. One or more of the following techniques shall be employed:

1. The construction contractor shall limit haul truck deliveries to the same hours specified for construction activities (between the hours of 7:00 a.m. and 7:00 p.m., Monday through Friday, and between the hours of 9:00 a.m. and 6:00 p.m. on Saturday and Sunday). The haul route exhibit shall design delivery routes to minimize the exposure of sensitive land uses or residential dwellings to delivery truck-related noise.
2. The on-site speed limit for all vehicles and construction equipment shall be limited to 15 mph on any construction site.

NOI-C Jack Rose Track/Commencement Facilities Crowd Noise: To minimize operational noise levels generated during events at the Jack Rose Track, a noise assessment shall be conducted by a qualified acoustical engineer or noise specialist to evaluate potential increases in noise levels associated with crowd noise from events at the proposed Jack Rose Track/Commencement Facilities project, including the collection of new ambient noise measurements. The assessment shall be conducted prior to final design. All recommended noise reduction measures shall be incorporated into the design to reduce increases in existing operational noise levels at nearby noise-sensitive land uses to not cause a 3 dBA increase over ambient noise levels and exceed the applicable land use compatibility standard. Such measures may include, but are not limited to, the incorporation of structural shielding and revised placement for amplified sound system speakers.

3.8.6 Level of Significance After Mitigation

Implementation of Mitigation Measures NOI-A, NOI-B, and NOI-C would ensure that noise impacts during construction and operation would be less than significant.

3.8.7 Cumulative Impacts

Cumulative impacts are defined as the direct and indirect effects of a proposed project which, when considered alone, would not be deemed a substantial impact, but when considered in addition to the impacts of related projects in the area, would be considered cumulatively considerable. "Related projects" refers to past, present, and reasonably foreseeable probable future projects, which would have similar impacts to the proposed project.

Short-term Construction Noise

The CSULB main campus and Beachside Village property are located within an existing highly-urbanized area that is fully developed. Construction activities associated with development under the Master Plan Update would be intermittent and temporary and would be spread across the planning horizon to 2035. Additionally, few improvements are proposed at the CSULB main campus boundaries, with the majority of activities taking place on the interior of the main campus. Short-term construction noise is a localized activity and would affect only land uses that are immediately adjacent to a specific project site. Mitigation Measures NOI-A and NOI-B would be implemented to reduce construction noise impacts associated with development under the Master Plan Update to less than significant. As such, construction activities associated with development under the Master Plan Update are not anticipated to combine with construction noise from related projects in the surrounding area. Furthermore, related project would be required to comply with City of Long Beach and other applicable requirements for construction noise limits. Therefore, implementation of the Master Plan Update would not contribute to cumulatively significant noise impacts during construction.

Long-term Operational Noise

Cumulative stationary noise sources would generally be less than significant with compliance with the City's Noise Ordinance. However, as traffic noise tends to be the main source of noise at the CSULB main campus and Beachside Village property and surrounding areas, the analysis below considers whether the increase in traffic noise would be noticeable and significant per the applicable criteria shown below.

Mobile Source

A project's contribution to a cumulative traffic noise increase would be considered significant if the combined effect exceeds the perception level (i.e., auditory level increase) threshold. The combined effect compares the "Cumulative With Project" condition to "Existing" conditions. This comparison accounts for the traffic noise increase generated by a project combined with the traffic noise increase generated by related projects in the project vicinity. The following criterion has been utilized to evaluate the combined effect of the cumulative noise increase.

- <u>Combined Effects</u>. The cumulative with project noise level ("Cumulative With Project") would cause a significant cumulative impact if a 3.0 dB increase over existing conditions occurs and the resulting noise level exceeds the applicable exterior standard at a sensitive use.

Although there may be a significant noise increase due to implementation of the Master Plan Update in combination with other related projects (combined effects), it must also be demonstrated that implementation of the Master Plan Update has an incremental effect. In other words, a significant portion of the noise increase must be due to implementation of the Master Plan Update. The following criterion has been utilized to evaluate the incremental effect of the cumulative noise increase.

- Incremental Effects. The "Cumulative With Project" causes a 1.0 dBA increase in noise over the "Cumulative Without Project" noise level.

A significant cumulative impact would result only if both the combined and incremental effects criteria have been exceeded. Noise is a localized phenomenon and reduces as distance from the source increases. Consequently, only the Master Plan Update and development in the general vicinity would contribute to cumulative noise impacts. Table 3.8-13, Cumulative Traffic Noise Levels, provides traffic noise effects along roadway segments in the project vicinity for "Existing," "Cumulative Without Project," and "Cumulative With Project" conditions, including incremental and net cumulative impacts. As indicated in Table 3.8-13, noise levels would not exceed the combined effects criterion of 3.0 dBA or the incremental effects criterion of 1.0 dBA. Therefore, there would not be any roadway segments that would be subject to significant cumulative impacts, as they would not exceed both the combined and incremental effects criteria. Therefore, implementation of the Master Plan Update, in combination with cumulative background traffic noise levels, would result in less than significant cumulative impacts.

The mobile source noise analysis is inherently cumulative as the Master Plan Update is a long-term planning document for CSULB as a whole. As indicated in Table 3.8-10 and Table 3.8-13, development assumed under the Master Plan Update would not generate a significant audible noise level increase along any of the roadway segments. Thus, implementation of the Master Plan Update would result in a less than significant cumulative noise impact.

Table 3.8-13 Cumulative Traffic Noise Levels

Roadway Segments	Existing: *dBA at 100 Feet from Roadway Centerline*	Cumulative (2035) Without Project: *dBA at 100 Feet from Roadway Centerline*	Cumulative (2035) With Project: *dBA at 100 Feet from Roadway Centerline*	Combined Effects: *Difference In dBA Between Existing and Cumulative With Project*	Incremental Effects: *Difference in dBA Between Cumulative Without Project and Cumulative With Project*	Cumulatively Significant Impact?
North Bellflower Blvd						
Between Interstate 405 and East 23rd Street	64.8	64.6	64.8	0.0	0.2	No
Between Garford Street and East Atherton Street	65.3	65.1	65.5	0.1	0.4	No
Between Atherton Street and Beach Drive	63.9	63.7	63.9	0.0	0.2	No
Between Beach Drive and East 7th Street	63.0	62.8	63.0	0.0	0.2	No
Palo Verde Ave						
Between East Stearns Street and East Atherton Street	62.1	61.6	62.2	0.1	0.6	No
Between East Atherton Street and East Anaheim Road	60.1	59.9	60.3	0.2	0.4	No
North Studebaker Road						
Between East Willow Street and East Stearns Street	62.7	62.8	63.0	0.3	0.2	No
Between East Stearns Street and East Atherton Street	63.0	62.8	63.2	0.2	0.3	No
Between East Anaheim Road and CA-22	64.2	63.9	64.1	-0.1	0.2	No
East Atherton Street						
Between Ximeno Avenue and Clark Avenue	59.5	59.5	59.9	0.3	0.4	No

Table 3.8-13 Cumulative Traffic Noise Levels

Roadway Segments	Existing: *dBA at 100 Feet from Roadway Centerline*	Cumulative (2035) Without Project: *dBA at 100 Feet from Roadway Centerline*	Cumulative (2035) With Project: *dBA at 100 Feet from Roadway Centerline*	Combined Effects: *Difference In dBA Between Existing and Cumulative With Project*	Incremental Effects: *Difference in dBA Between Cumulative Without Project and Cumulative With Project*	Cumulatively Significant Impact?
Between Clark Avenue and North Bellflower Boulevard	60.9	60.7	61.1	0.2	0.3	No
Between North Bellflower Boulevard and Merriam Way	58.1	57.8	58.6	0.5	0.8	No
Between Merriam Way and Palo Verde Avenue	58.7	58.5	59.2	0.6	0.7	No
Between Palo Verde Avenue and North Studebaker Road	55.8	56.1	56.8	1.0	0.7	No
East Anaheim Road						
Between Palo Verde Avenue and North Studebaker Road	55.7	55.5	56.2	0.5	0.7	No
East 7th Street						
Between Bellflower Boulevard and East Campus Drive	67.5	67.4	67.5	0.1	0.1	No
Between East Campus Drive and North Studebaker Road	69.7	69.6	69.7	0.0	0.1	No
State Route 22						
East of Studebaker Road	71.8	71.6	71.7	0.0	0.1	No

Notes:
dBA = A-weighted decibels
Roadway noise levels and contours were calculated using the FHWA highway traffic noise prediction model (FHWA RD-77-108) with California Vehicle Noise (CALVENO) Emission Levels.
Sources: Fehr & Peers modeling for the Transportation Impact Analysis for the Master Plan Update (2023); refer to Appendix H, Noise and Vibration Calculations.

Stationary Sources

New stationary noise sources associated with development under the Master Plan Update would include HVAC systems, crowd noise, and parking activities. HVAC systems included in new facilities would generally replace existing systems. Additionally, due to advances in technology, the new mechanical equipment would be quieter than the existing systems. Thus, mechanical equipment noise from HVAC systems would not contribute to a cumulatively considerable noise impact.

Crowd noise associated with proposed housing improvements under the Master Plan Update would not generate noise levels exceeding the measured ambient noise levels at nearby noise sensitive receptors. Proposed improvements at the Jack Rose Track/Commencement Facilities would include increased seating capacity, which could lead to increased crowd noise at nearby sensitive receptors during events. Crowd noise associated with events at the Jack Rose Track/Commencement Facilities would be minimized through implementation of Mitigation Measure NOI-C, requiring a noise assessment and incorporation of noise reduction measures. Additionally, there are no related projects that could combine with development under the Master Plan Update to generate significant sources of crowd noise. As such, implementation of the Master Plan Update, taking into account related projects, would not contribute to a cumulatively considerable crowd noise impact.

Parking noise associated with development under the Master Plan Update would be similar to existing parking activities at the CSULB main campus and the Beachside Village property. Additionally, there are no significant parking facilities that could combine with development under the Master Plan Update. Therefore, implementation of the Master Plan Update would not contribute to a cumulatively considerable noise impact from parking activities.

In addition, all new stationary noise sources proposed in the vicinity would be required to comply with the provisions and noise standards contained in the City's Noise Ordinance and other applicable noise regulations. Therefore, impacts related to cumulative stationary noise exposure would be less than significant.

Short-term and Long-term Vibration

As discussed above, development under the Master Plan Update would not generate substantial groundborne vibration during construction or operation. Groundborne vibration generated from cumulative development projects would be reviewed on a project-by-project basis and required to minimize ground-borne vibration pursuant to City of Long Beach policies and other applicable regulations. Therefore, implementation of the Master Plan Update would not contribute to a cumulatively significant vibration impact.