3.7 Noise

This section describes existing noise conditions within the Project area, sets forth criteria for determining the significance of noise impacts, and estimates the likely noise impacts that would result from operation of the Proposed Project. Issues related to the Project's physical environmental impacts, as identified in response to the Notice of Preparation (NOP) (Appendix 1), were considered in preparing this analysis. Comments included requests to identify noise that may affect nearby school facilities, and concerns about construction noise experienced by adjacent neighborhoods, as well as concerns about potential noise increases from increases in traffic and the removal of trees. Concerns expressed in the comments on the NOP are addressed in the analysis of noise and vibration impacts included herein.

Overview Noise and Sound

A brief description of the noise and vibration concepts and terminology used in this assessment is provided below. Some of these are technical terms used in measuring sound and its effects, which are not easily explained in layman's terms.

- **Sound**. A vibratory disturbance transmitted by pressure waves through a medium such as air or water and capable of being detected by a receiving mechanism, such as the human ear or a microphone. Sound is characterized by various parameters, including the rate of oscillation of sound waves (frequency), the speed of propagation, and the pressure level or energy content (amplitude). In particular, the sound pressure level is the most common descriptor used to characterize the loudness of an ambient (existing) sound level.
- **Noise.** Sound that is loud, unpleasant, unexpected, or otherwise undesirable. Commonly defined as unwanted sound that annoys or disturbs people and potentially causes an adverse psychological or physiological effect on human health.
- **Decibel (dB).** A unitless measure of sound on a logarithmic scale that indicates the squared ratio of sound pressure amplitude to a reference sound pressure amplitude. The reference pressure is 20 micropascals. Although the dB scale is used to quantify sound intensity, it does not accurately describe how sound intensity is perceived by human hearing.
- **A-weighted Decibel (dBA).** An overall frequency-weighted sound level in decibels that approximates the frequency response of the human ear. The dBA scale is the most widely used scale for environmental noise assessments. Table 3.7-1 summarizes typical A-weighted sound levels for different noise sources.
- **Maximum Sound Levels (L_{max}).** The maximum sound level measured during the measurement period.
- **Minimum Sound Level (L_{min}).** The minimum sound level measured during the measurement period.
- **Equivalent Sound Level (L_{eq})**. The equivalent steady-state sound level that, in a stated period of time, contains the same acoustical energy. The 1-hour A-weighted equivalent sound level (L_{eq} 1h) is the energy average of A-weighted sound levels occurring over a 1-hour period.
- **Day-Night Level (L_{dn}).** The energy average of the A-weighted sound levels occurring during a 24-hour period, with a 10 dB penalty added to sound levels between 10:00 p.m. and 7:00 a.m.

- **Community Noise Equivalent Level (CNEL).** The energy average of the A-weighted sound levels occurring during a 24-hour period, with 5 dB added to the sound levels occurring during the period from 7:00 p.m. to 10:00 p.m. and 10 dB added to the sound levels occurring during the period from 10:00 p.m. to 7:00 a.m. L_{dn} and CNEL are typically within 1 dBA of each other and, for all intents and purposes, interchangeable.
- **Vibration Velocity Level (or Vibration Decibel Level, VdB).** The root-mean-square velocity amplitude for measured ground motion expressed in dB.
- **Peak Particle Velocity (PPV).** A measurement of ground vibration, defined as the maximum speed at which a particle in the ground is moving and expressed in inches per second (in/sec).
- **Sensitive Receptor.** Noise- and vibration-sensitive receptors, including land uses where quiet environments are necessary for enjoyment and public health and safety. Residences, schools, motels and hotels, libraries, religious institutions, hospitals, and nursing homes are examples.

Table 3.7-1. Typical A-weighted Sound Levels

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

Source: Federal Transit Administration. 2018. *Transit Noise and Vibration Impact Assessment*. FTA Report 0123. Available: https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/ transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123_0.pdf. Accessed: December 20, 2021.

Human sound perception, in general, is such that a change in sound level of 1 dB cannot typically be perceived by the human ear, a change in sound level of 3 dB is just noticeable, a change of 5 dB is clearly noticeable, and a change of 10 dB is perceived as doubling or halving the sound level. A doubling of actual sound energy is required to result in a 3 dB (i.e., barely noticeable) increase in noise; in practice, this means that the volume of traffic on a roadway would typically need to double to result in a noticeable increase in noise.

The decibel level of a sound decreases (or attenuates) exponentially as the distance from the source of that sound increases. For a point source, such as a stationary compressor or construction equipment, sound attenuates at a rate of 6 dB per doubling of distance. For a line source, such as free-flowing traffic on a freeway, sound attenuates at a rate of 3 dB per doubling of distance. Atmospheric conditions, including wind, temperature gradients, and humidity, can change how sound propagates (or travels) over distance and affect the level of sound received at a given location. The degree to which the ground surface absorbs acoustical energy also affects sound propagation. Sound that travels over an acoustically absorptive surface, such as grass, attenuates at a greater rate than sound that travels over a hard surface, such as pavement. The increased attenuation is typically in the range of 1 to 2 dB per doubling of distance. Barriers, such as buildings and topography, that block the line of sight between a source and receiver also increase the attenuation of sound over distance.

Trees and foliage do to not generally result in perceptible reductions in noise levels unless the foliage is sufficiently dense to completely block the view along the propagation path (Federal Highway Administration 2019). In general, if foliage is less than 10 meters in width, no attenuation occurs. If the foliage is close to 20 meters in thickness and the complete line of sight is blocked between the source and the receiver, attenuation of approximately 1 dB or less would be expected to occur (Federal Highway Administration 2019).

Community noise environments are generally perceived as quiet when the 24-hour average noise level is below 45 dBA, moderate in the 45 to 60 dBA range, and loud above 60 dBA. Very noisy urban residential areas are usually around 70 dBA CNEL. Along major thoroughfares, roadside noise levels are typically between 65 and 75 dBA CNEL. Incremental increases of 3 to 5 dB to the existing 1-hour L_{eq} or CNEL are commonly used as thresholds for an adverse community reaction to a noise increase. However, there is evidence that incremental thresholds in this range may not be adequately protective in areas where noise-sensitive uses are located and CNEL is already high (i.e., above 60 dBA). In these areas, limiting noise increases to 3 dB or less is recommended.[1] Noise intrusions that cause short-term interior levels to rise above 45 dBA at night can disrupt sleep. Exposure to noise levels greater than 85 dBA for 8 hours or longer can cause permanent hearing damage.

[1] Federal Transit Administration. 2018. *Transit Noise and Vibration Impact Assessment*. FTA Report 0123. Available: https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123_0.pdf. Accessed: March 23, 2022.

Existing Conditions

Environmental Setting

The ambient noise environment in the city of Menlo Park is affected by a variety of noise sources, including vehicles, trains, aircraft, and stationary sources. The section that follows describes the existing noise environment and identifies the primary noise sources in the vicinity of the Project Site.

Existing Traffic Noise. Motor vehicles, with their distinctive noise characteristics, are a major source of noise in Menlo Park. The level of noise varies according to factors such as the volume of traffic, vehicle mix (i.e., percentage of cars and trucks), average traffic speed, and distance from the observer. Menlo Park is exposed to noise generated by traffic on US 101, Interstate (I) 280, State Route (SR) 84, El Camino Real, Middlefield Road, Willow Road, Ravenswood Avenue, Santa Cruz Avenue, and Sand Hill Road. Traffic is the main source of noise in the Project area. Primary noise-generating roadways in the vicinity of the Project Site include Willow Road (adjacent to the west), SR 84 (0.12 miles to the North), and O'Brien Drive (0.1 miles to the south and adjacent to the southeast corner) US 101 (adjacent to the southwest) and SR 84 (0.2 mile to the north). However, according to Figure 4.10-2 of the ConnectMenlo EIR which shows traffic noise contours, the Project Site is not within a noise contour of 60 dBA CNEL/L_{dn} or greater associated with US 101 or SR 84. Note that most land uses, including residential uses, are considered compatible with noise levels below this level. For office buildings and commercial uses, noise levels of up to 70 dBA CNEL/L_{dn} are considered to be normally acceptable

Existing Train Noise. Two rail lines traverse Menlo Park, the Dumbarton Rail Corridor and the Caltrain rail line. Although the Rail Corridor is adjacent to the Project Site, it is currently not used and not an active noise source. The Caltrain rail line is active, but the tracks are more than 1.5 miles from the Project Site. Therefore, existing train noise is not a factor in the noise environment in the Project area.

Aircraft Noise. Menlo Park is approximately 6 miles northwest of Moffett Federal Airfield, 14 miles northwest of San José International Airport, 15 miles southeast of San Francisco International Airport, and 18 miles south of Oakland International Airport. In addition, San Carlos Airport is approximately 5.6 miles northwest of the Project Site. The closest airport to the Project Site is Palo Alto Airport, which is approximately 1.75 miles away. According to the ConnectMenlo EIR, although Menlo Park does receive some noise from aircraft at these facilities, Menlo Park (including the Project Site) does not fall within airport land use planning areas, runway protection zones, or the 55 dBA CNEL noise contours (i.e., the lowest noise contour for aircraft noise typically presented) of any of the airports.

Existing Stationary-Source Noise. Stationary sources of noise may occur with all types of land uses. Menlo Park is developed with mostly residential, commercial, and light industrial uses. Stationary sources at commercial and light industrial uses include heating, ventilation, and air-conditioning (HVAC) systems; loading docks; and the machinery required for manufacturing processes. Noise generated by commercial uses is generally brief and intermittent. Industrial uses may generate noise continuously or intermittently, depending on the processes and types of machinery involved. The majority of Menlo Park's limited industrial operations are north of the city and separated from sensitive uses such as residences by rail lines or major roadways. The sound level perceived at a given receptor decreases with distance from the noise source. For uses located near major roads or thoroughfares, noise at noise-sensitive land uses from constant traffic generally exceeds the noise generated by individual and often intermittent noise sources at industrial uses.

Principal Noise Sources in the Project Area

Surrounding Land Uses

The main Project Site is bounded by Willow Road and residential zones to the west, the currently inactive SamTrans rail corridor to the north (Dumbarton Rail Corridor), offices and light industrial operations to the east, and offices and academic establishments to the south. The nearest noise-sensitive uses are the Mid-Peninsula High School, located adjacent to main Project Site's southwest border and Willow Road. The Open Mind School is approximately 90 feet south of the main Project Site, off O'Brien Drive. The nearest residential land uses are approximately 120 feet west of the main Project Site, on the west side of Willow Road. There are light industrial and commercial land uses to the east. The nearest of these is the UPS Costumer Center, approximately 55 feet east of the Project Site perimeter.

In addition, there are residential land uses to the south and west of the Hamilton Avenue Parcels. The nearest residential land use is approximately 25 feet south of the Hamilton Avenue Parcel South.

Existing Noise Levels

The existing ambient noise levels in the Project vicinity are dominated largely by the traffic on major roadways in the area. To quantify existing ambient noise levels in the vicinity of the Project Site, long- (24-hour) and short-term (15-minute) ambient noise measurements were conducted between Tuesday, July 27th, 2021, and Wednesday, July 28th, 2021. Long-term measurements were conducted using Piccolo II Type-2 sound level meters, and short-term measurements were conducted using a Larson Davis LxT Type-1 sound level meter. Weather conditions were clear and sunny when the measurements were conducted, with an average wind speed of 1.7 miles per hour and temperatures ranging from 65 to 79 degrees Fahrenheit.

Monitoring locations were selected to capture noise levels in areas that are sensitive to noise or representative of ambient levels throughout the day and night for areas near the Project Site. Existing noise levels in the Project area vary between measurement locations, as some are located near major roadways while others were conducted in more residential areas. Appendix 3.7 includes the complete dataset of measured noise. The noise measurement locations are shown in Figure 3.7-1, Noise Measurement Locations.

Short-Term Noise Monitoring

Five monitoring locations in and around the Project Site were selected to collect short-term ambient noise data. Short-term noise levels ranged from 55.9 dBA L_{eq} to 73.7 dBA L_{eq}. ST-1 was located along the northwestern border of the Project Site on Willow Road, between Hamilton Avenue and Ivy Drive (1380 Willow Road). The measured L_{eq} for this location was 65.2 dBA during the 15-minute measurement interval. ST-2, located on Willow Road between Hamilton Avenue and Ivy Drive, is adjacent to the southwestern border of the Project Site and is located near Mid-Peninsula High School. The ambient noise level at this location was measured to be 67.3 dBA L_{eq}. The dominant noise source at both ST-1 and ST-2 was vehicle traffic on the adjacent roadways.

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Figure 3.7-1
Noise Measurement Locations

ST-3 was located near the northwest corner of the Open Mind School, near O'Brien Drive. This location is south of the Project Site. The recorded L_{eq} noise level was 55.8 dBA L_{eq} during the 15-minute measurement interval. The overall noise level at this location was dominated by mechanical hum likely from nearby HVAC equipment. ST-4 was located near the southwest corner of O'Brien Drive and University Avenue, southeast of the Project Site. Noise at this location was dominated by light vehicle traffic on the adjacent roadways and was measured to be 55.9 dBA L_{eq}. ST-5 was located on the west side of Willow Road, southwest of the Project Site, south of Ivy Drive and slightly north of O'Brien Drive. Noise levels at this location were measured to be 59.5 dBA L_{eq}. The dominant noise source at this location was traffic noise from the adjacent roadway (e.g., Willow Road). Refer to Table 3.7-2 for a summary of the short-term measurement results.

Long-Term Noise Monitoring

Four long-term monitoring locations near the Project Site were selected to collect long-term ambient noise data. L_{dn} noise levels from the long-term measurements ranged from 59.8 dBA L_{dn} to 77.1 dBA L_{dn}. LT-1, located on Kavanaugh Drive between Clarence Court and Gertrude Court (southeast of the Project Site) had an L_{dn} of approximately 67.9 dBA. LT-2, located on Willow Road between Ivy Drive and Hamilton Avenue (adjacent to the western border of the Project Site) had a measured L_{dn} noise level of 77.1 dBA L_{dn}. LT-3, located on the northwest corner of Alberni Street and Poplar Avenue (south of the Project Site), and had an L_{dn} noise level of 62.0 dBA L_{dn}. LT-4 (located west of the Project Site, on Carlton Avenue, south of Hamilton Avenue) had a L_{dn} noise level of 59.8 dBA L_{dn}. Refer to Table 3.7-3 for a summary of the long-term noise measurement results.

ConnectMenlo Noise Monitoring

In addition to the noise measurements conducted in 2021, the ConnectMenlo EIR included ambient noise monitoring data from various locations within the ConnectMenlo area. Short- and long-term measurements were taken on December 6 and 10, 2012; long-term noise level measurements were taken for a period of 24 hours on December 10 and 11, 2012. For the ConnectMenlo EIR, existing ambient noise levels were measured at 16 locations in the city to document representative noise levels at various locations. The ConnectMenlo EIR measurement locations closest to the Project Site are ST-3 and ST-4, located close to the Project Site (west of the Project Site, along Willow Road). The closest ConnectMenlo long-term measurement location to the Project Site is LT-1, which is located approximately 1.8 miles west of the Project Site. These ConnectMenlo measurement results are presented in Table 3.7-4 below.

Regulatory Setting

Federal Regulations

No federal laws, regulations, or policies for construction-related noise and vibration directly apply to the proposed project. However, the Federal Transit Administration (FTA) has developed general assessment criteria for analyzing construction noise. Although FTA standards are intended for federally funded mass-transit projects, the impact assessment procedures and criteria included in the FTA's *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018) routinely are used to evaluate a variety of projects proposed by local jurisdictions (i.e., not exclusively used for transit projects).

The FTA construction guidelines state that each A-weighted sound level increase of 10 dB corresponds to an approximate doubling of subjective loudness. As a result, a 10-dB increase in the ambient noise level is often used as the threshold to determine if an increase in ambient noise levels because of construction would be considered substantial.

Table 3.7-2. Short-Term Noise Level Measurements in and around the Project Site

Site	Site Description	Measurement Start Time	L_{eq}	L_{max}	L_{min}	Dominant Noise Source
ST-1	1380 Willow Road	07/27/2021 1:32 p.m.	65.2	78.9	54.3	Roadway traffic noise primarily from Willow Road
ST-2	1350 Willow Road	07/28/2021 12:14 p.m.	67.3	79.1	47.5	Roadway traffic noise primarily from Willow Road
ST-3	1215 O'Brien Drive	07/27/2021 2:45 p.m.	55.8	74.3	48.2	Mechanical hum, likely nearby HVAC equipment
ST-4	1530 O'Brien Drive	07/27/2021 2:08 p.m.	55.9	71.5	49.4	Light traffic noise primarily from University Avenue and O'Brien Drive
ST-5	1221 Willow Road	07/28/2021 11:44 a.m.	59.5	72.0	45.4	Roadway traffic noise primarily from Willow Road

Note: See Appendix 3.7 for data.
ST = long-term (15-minute) ambient noise measurement.
All noise levels are reported in A-weighted decibels (dBA).

Table 3.7-3. Long-Term Noise Level Measurements in and around the Project Site

Site	Site Description	Time Period	L_{dn}	CNEL	Highest 1- hour L_{eq}[1] Time of Occurrence	Lowest 1-hour L_{eq}[2] Time of Occurrence	12-hour L_{eq}[3]
LT-1	1439 Kavanaugh Drive	07/27/2021 – 07/28/2021	67.4	67.9	66.8 dBA L_{eq} 07/28/2021, 5:00 p.m.	53.3 dBA L_{eq} 07/28/2021, 3:00 a.m.	64.8
LT-2	1360 Willow Road	07/27/2021 – 07/28/2021	77.1	77.5	75.6 dBA L_{eq} 07/27/2021, 2:00 p.m.	64.0 dBA L_{eq} 07/28/2021, 3:00 a.m.	74.5
LT-3	1125 Alberni Avenue	07/27/2021 – 07/28/2021	61.1	61.9	62.5 dBA L_{eq} 07/27/2021, 3:00 p.m.	44.3 dBA L_{eq} 07/28/2021, 3:00 a.m.	59.3
LT-4	1396 Carlton Avenue	07/27/2021 – 07/28/2021	59.6	60.4	59.8 dBA L_{eq} 07/27/2021, 6:00 p.m.	45.0 dBA L_{eq} 07/28/2021. 2:00 a.m.	57.7

Note: See Appendix 3.7 for data.

LT = long-term (24-hour) ambient noise measurement.

All noise levels are reported in A-weighted decibels (dBA).

[1] Highest L_{eq} is the highest calculated L_{eq} level during a 24-hour period.

[2] Lowest L_{eq} is the lowest calculated L_{eq} level during a 24-hour period.

[3] The 12-hour Leq is based on the hourly Leq noise levels from the hours of 7:00 a.m. to 7:00 p.m.

Table 3.7-4. 2012 ConnectMenlo Noise Measurement Results

Monitoring Site	L_{min}	L_{eq}	L_{max}	CNEL
ST-3	50.6	56.5	60.9	—
ST-4	50.9	59.5	72.3	—
LT-1	—	—	—	67.1

Source: City of Menlo Park. 2016. *ConnectMenlo: General Plan Land Use and Circulation Elements and M-2 Area Zoning Update for the City of Menlo Park EIR.*

State Regulations

Title 24 of the California Code of Regulations, Noise Insulation Standards

California Code of Regulations Title 24, part 2, Sound Transmission, establishes minimum noise insulation standards to protect persons within new hotels, motels, dormitories, long-term care facilities, apartment houses, and dwellings other than single-family residences. Under this regulation, interior noise levels attributable to exterior noise sources cannot exceed 45 dB in any habitable room. The noise metric is either the L_{dn} or the CNEL. Compliance with Title 24 interior noise standards occurs during the permit review process and generally protects a proposed project's users from existing ambient outdoor noise levels. If determined necessary, a detailed acoustical analysis of exterior wall and window assemblies may be required.

California Department of Transportation

Caltrans provides guidelines regarding vibration associated with construction and operation of transportation infrastructure. Table 3.7-5 provides Caltrans' vibration guidelines for potential damage to different types of structures.

Generally, people are more sensitive to vibration during nighttime hours, when sleeping, rather than daytime hours. Numerous studies have been conducted to characterize the human response to vibration. Table 3.7-6 provides Caltrans' guidelines regarding vibration annoyance potential (expressed here as PPV).

Local Regulations

Menlo Park General Plan

The City of Menlo Park (City) General Plan contains general goals, policies, and programs that require local planning and development decisions to consider noise impacts. The Noise and Safety Element sets goals, policies, and implementing programs that work to achieve acceptable noise levels. In addition, the Noise and Safety Element sets land use compatibility noise standards for new developments. The following City General Plan goals, policies, and programs adopted to avoid or minimize environmental impacts are applicable to the project:

Table 3.7-5. Caltrans Vibration Guidelines for Potential Damage to Structures

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

Source: California Department of Transportation, *Transportation and Construction Vibration Guidance Manual,* April 2020, https://dot.ca.gov/-/media/dot-media/programs/environmental-analysis/documents/env/tcvgm-apr2020-a11y.pdf, accessed July 30, 2021.

Note: Transient sources create a single, isolated vibration event (e.g., blasting or the use of drop balls). Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

Table 3.7-6. Caltrans Guidelines for Vibration Annoyance Potential Error! Bookmark not defined.

	Maximum PPV (in/sec)	
Human Response	**Transient Sources**	**Continuous/Frequent Intermittent Sources**
Barely perceptible	0.04	0.01
Distinctly perceptible	0.25	0.04
Strongly perceptible	0.9	0.10
Severe	2.0	0.4

Source: California Department of Transportation, *Transportation and Construction Vibration Guidance Manual,* April 2020, https://dot.ca.gov/-/media/dot-media/programs/environmental-analysis/documents/env/tcvgm-apr2020-a11y.pdf, accessed July 30, 2021.

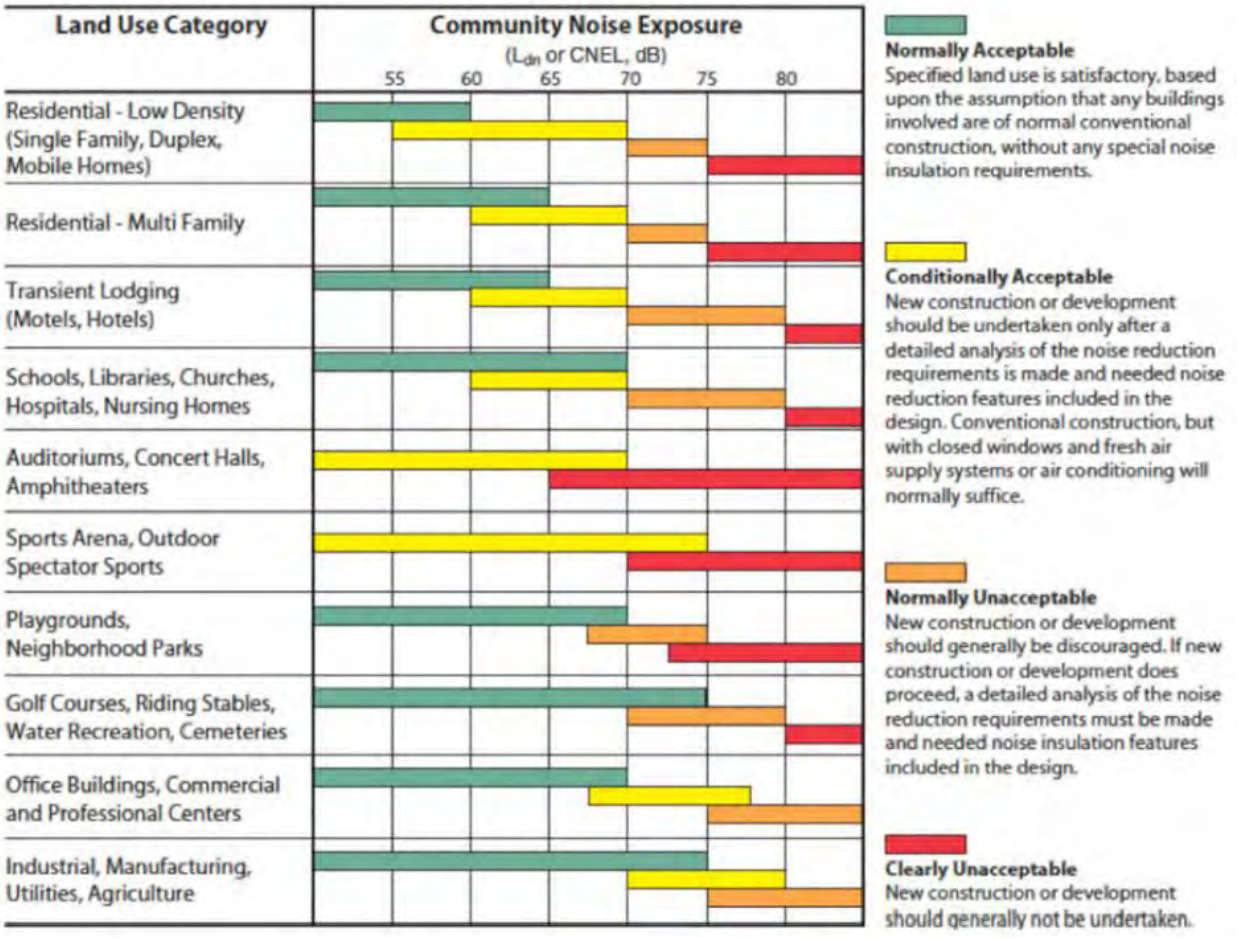
Note: Transient sources create a single, isolated vibration event (e.g., blasting or the use of drop balls). Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

Goal N1: Achieve Acceptable Noise Levels.

Policy N1.1: Compliance with Noise Standards. Consider the compatibility of proposed land uses with the noise environment when preparing or revising community and/or specific plans. Require new projects to comply with the noise standards of local, regional, and building code regulations, including, but not limited to, the City's Municipal Code, Title 24 of the California Code of Regulations, and subdivision and zoning codes.

Policy N1.2: Land Use Compatibility Noise Standards. Protect people in new development from excessive noise by applying the City's Land Use Compatibility Noise Standards for New Development to the siting and required mitigation for new uses in existing noise environments (refer to Table 3.7-7 below)

Table 3.7-7. Land Use Compatibility Noise Standards for New Development



Policy N1.3: Exterior and Interior Noise Standards for Residential Use Areas. Strive to Achieve acceptable interior noise levels and exterior noise levels for backyards and/or common usable outdoor areas in new residential development and reduce outdoor noise levels in existing residential areas where economically and aesthetically feasible.

Policy N1.4: Noise-Sensitive Uses. Protect existing residential neighborhoods and noise-sensitive uses from unacceptable noise levels and vibration impacts. Noise-sensitive uses include, but are not limited to, hospitals, schools, religious facilities, convalescent homes, and businesses with highly sensitive equipment. Discourage the siting of noise-sensitive uses in areas in excess of 65 dBA CNEL without appropriate mitigation, and locate noise-sensitive uses away from noise sources unless mitigation measures are included in development plans.

Policy N-1.5 Planning and Design of New Development to Reduce Noise Impacts. Design residential developments to minimize the transportation-related noise impacts to adjacent residential areas and encourage new development to be site planned and architecturally designed to minimize noise impacts on noise-sensitive spaces. Proper site planning can be effective in reducing noise impacts

Policy N1.6: Noise Reduction Measures. Encourage the use of construction methods, state-of-the-art noise-abating materials and technology, and creative site design, including, but not limited to, open space,

earthen berms, parking, accessory buildings, and landscaping, to buffer new and existing development from noise and reduce potential conflicts between ambient noise levels and noise-sensitive land uses. Use sound walls only when other methods are not practical or when recommended by an acoustical expert.

Policy N1.7: Noise and Vibration from New Non-Residential Development. Design non-residential development to minimize noise impacts on nearby uses. Where vibration impacts may occur, reduce impacts on residences and businesses through the use of setbacks and/or structural design features that reduce vibration to levels at or below the guidelines of the Federal Transit Administration near rail lines and industrial uses.

Policy N1.8: Potential Annoying or Harmful Noise. Preclude the generation of annoying or harmful noise from stationary noise sources, such as construction and property maintenance activity and mechanical equipment.

Policy N1.9: Transportation-Related Noise Attenuation. Strive to minimize traffic noise through land use policies, traffic-calming methods to reduce traffic speed, and law enforcement and street improvements, and encourage other agencies to reduce noise levels generated by roadways, railways, rapid transit, and other facilities.

Policy N1.10: Nuisance Noise. Minimize impacts from noise levels that exceed community sound levels through enforcement of the City's Noise Ordinance. Control unnecessary, excessive, and annoying noises within the city where not preempted by federal and state control through implementation and updating of the Noise Ordinance.

Policy N1.D: Minimize Construction Activity Noise. Minimize the exposure of nearby properties to excessive noise levels from construction-related activity through CEQA review, conditions of approval and enforcement of the City's Noise Ordinance.

Land use compatibility noise standards are included in the City's Noise Element. According to the Noise Element, noise levels up to 60 dBA L_{dn} are considered normally acceptable for single-family residential land uses; noise levels are conditionally acceptable up to 70 dBA L_{dn} for these uses as long as noise insulation features are included in the design to reduce interior noise levels. For multi-family residential and hotel uses, noise levels of up to 65 dBA L_{dn} are considered normally acceptable, with noise levels of 70 dBA L_{dn} considered to be conditionally acceptable. For office buildings and commercial uses, noise levels of up to 70 dBA L_{dn} are considered to be normally acceptable, with noise levels of up to 77.5 dBA L_{dn} considered conditionally acceptable. For schools and churches, playgrounds, and neighborhood parks, noise levels up to 70 dBA L_{dn} are considered normally acceptable; there are no separate conditionally acceptable noise limits for these uses.

Menlo Park Municipal Code

Section 8.06 of the Menlo Park Municipal Code describes noise limitations and exclusions for land uses within Menlo Park. The code concerns noise limits that constitute a noise disturbance, as measured at noise-sensitive (primarily residential) land uses.

The City Municipal Code noise limit for daytime hours (7:00 a.m. to 10:00 p.m.) is 60 dBA as measured from any residential property. The noise limit during nighttime hours (10:00 p.m. to 7:00 a.m.) is 50 dBA. In addition, Section 16.08.095 of the municipal code states noise from roof-mounted equipment, such as HVAC equipment, must not exceed 50 dBA at a reference distance of 50 feet.

There are some exceptions to the noise thresholds contained in Municipal Code Section 8.06. Construction activities occurring between the hours of 8:00 a.m. and 6:00 p.m. Monday through Friday are considered exempt from any quantitative noise limit in the City. Additionally, powered equipment is exempted from

the previously cited limits during daytime hours in lieu of separate standards. Specifically, according to the Municipal Code, noise from the temporary, occasional or infrequent use of powered equipment between the hours of 8:00 a.m. and 6:00 p.m. Monday through Friday shall not exceed 85 dBA at a distance of 50 feet. In addition, note that according to Section 8.06.050 of the City Municipal Code, sound generated by motor vehicles, trucks, and buses operated on streets and highways is also exempted.

Environmental Impacts

This section describes the impact analysis related to noise for the Proposed Project. It describes the methods used to determine the impacts of the Proposed Project and lists the thresholds used to conclude whether an impact would be significant. A summary of the ConnectMenlo EIR impacts and mitigation measures is then provided. As previously discussed in Chapter 1, *Introduction*, the analysis below makes reference to, and tiers from, the ConnectMenlo Final EIR, where appropriate. This section identifies potential impacts of the Proposed Project and, if necessary, any mitigation measures.

Thresholds of Significance

In accordance with Appendix G of the CEQA Guidelines, the Project would have a significant effect if it would result in any of the conditions listed below.

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

Methods for Analysis

Construction Noise

To determine if construction would result in noise impacts, a screening analysis was conducted to determine which subphases of construction would require the loudest equipment and result in the greatest noise levels, based on an equipment list provided by the Project Sponsor. Phase-specific construction noise modeling was conducted for the loudest subphase(s) of construction on the Project Site and within the Hamilton Avenue Parcels, assuming that the three loudest pieces of equipment expected to be used during a given phase of construction would be operating simultaneously and close to one another on the Project Site. Combining the noise level from the two or three loudest pieces of equipment and assuming they are all operating very close to one another and very near the closest offsite sensitive receptor results in a reasonably representative worst-case combined noise level. This analysis was completed for three periods throughout a construction day: typical daytime construction hours of 8:00 a.m. to 6:00 p.m. (during which time construction noise is considered exempt from the local quantitative noise standards of the City's Municipal Code), early morning and evening hours of 7:00 a.m. to 8:00 a.m. and 6:00 p.m. to 10:00 p.m. (prior to the start of or after the end of the daytime construction noise exemption time period), and nighttime hours (10:00 p.m. to 7:00 a.m.). In addition, this analysis was conducted both for offsite noise-sensitive land uses (e.g., existing residential and school uses) and onsite residential land uses that may be occupied during late-stage Project construction.

For off-site improvements that would occur with implementation of the Project, a similar approach of modeling construction noise was used; specifically, noise levels from the three-loudest pieces of equipment were combined to calculate an overall estimated noise level. The distances and noise levels to the nearest receptors are discussed below, and the potential for the combined noise level to substantially exceed the ambient noise levels have been evaluated to determine the significance of noise from the off-site improvements.

In addition to the general noise limits defined in the Municipal Code, and described above, noise from the temporary, occasional or infrequent use of powered equipment between the hours of 8:00 a.m. and 6:00 p.m. Monday through Friday is limited to 85 dBA at a distance of 50 feet. An analysis to determine if equipment proposed for project construction would comply with this threshold is also included.

Despite the City Municipal Code's exemption for daytime construction noise, construction activities could still result in a significant physical impact on the environment. Therefore, construction noise generated during daytime hours is compared to the existing ambient noise level to estimate temporary increases in noise over the existing ambient level. An evaluation is conducted to determine if a 10-dB increase over the existing ambient noise, perceived as a doubling of loudness, would be expected to occur at nearby noise-sensitive land uses. In addition, for construction proposed to occur outside of the daytime exempt hours in the city, an evaluation has been conducted to determine if construction noise would comply with the applicable municipal code noise level limits.

Construction Haul Truck Noise

Haul truck noise was analyzed as part of the construction noise analysis. Details pertaining to the number of haul and vendor trucks per worst-case construction subphase were provided by the Project applicant. Reasonable worst-case daily truck volumes were calculated, and potential noise impacts from the addition of these truck trips to the local roadway network were analyzed. The most daily construction truck trips would occur during the overlap of the demolition and grading/utilities subphases of construction Phase 1.

Haul trucks would either travel south on Willow Road to US 101, or north on Willow Road to Bayfront Expressway to access one of four landfill options. Haul materials from Project construction would be taken to Zanker Recycling, Ox Mountain Sanitary Landfill, Kirby Canyon Landfill, or Dumbarton Quarry (which would only be used for contaminated materials).

Although it is expected that a third of the total haul trucks would access each of the aforementioned landfills (with only contaminated materials accessing the Dumbarton Quarry), this analysis conservatively looks at each haul route and assumes that 100 percent of haul trucks would access that route. Modeling was conducted to estimate daily traffic noise levels with and without the addition of construction vendor and haul truck trips (e.g. a comparison of noise from "baseline" to "baseline plus Project construction truck" conditions) to determine if a 3-dB or "barely perceptible" increase in noise would occur along any analyzed segment as a result of construction truck activity.

Construction Vibration

The evaluation of potential vibration-related effects from construction of the Proposed Project was based on the construction equipment list provided by the Project Sponsor and the estimated construction equipment noise levels contained in both the Federal Transit Administration's Transit Noise and Vibration Impact Assessment (2006) and Caltrans' Transportation and Construction Vibration Guidance Manual (2020). Estimated vibration levels at sensitive uses from construction of the Proposed Project were then compared to the Caltrans damage and annoyance vibration criteria (contained in Tables 3.4-3 and 3.4-4,

presented previously) to determine if a vibration impact would be expected. After this analysis was conducted, estimated vibration levels were compared to the criteria outlined in ConnectMenlo Mitigation Measure NOISE-2a.

Operational Traffic Noise

To determine if the Proposed Project would result in a substantial permanent increase in traffic noise, a ratio analysis was conducted to estimate traffic noise increases based on vehicular traffic data provided by Hexagon Transportation Consultants (the City's Project traffic engineer). Traffic data provided by the City's Project traffic engineer included average daily traffic (ADT), posted speeds, and existing vehicle-mix assumptions (i.e., the proportion of automobiles, trucks, buses, and other vehicles). Traffic volumes for background conditions with and without the Project were then compared to determine if traffic increases associated with the Proposed Project would result in significant traffic noise impacts. Background No-Project conditions assume that all currently approved development projects are built.

For vehicular traffic noise impacts, in areas where the baseline and resulting (baseline plus Project) noise levels do not exceed the "normally acceptable" land use compatibility standard, an increase of more than 5 dB is considered a significant traffic noise increase. In areas where the baseline and resulting (baseline plus Project) noise levels do exceed the "normally acceptable" level based on the land use compatibility chart, a 3 dB or larger increase from baseline to baseline plus conditions is considered a significant traffic noise increase.

Based on the ratio analysis described above comparing background traffic volumes to background plus-Project traffic volumes, a screening assessment is conducted to identify potential traffic noise impacts along roadway segments with existing noise-sensitive land uses that would be exposed to a 3-dB increase in traffic noise attributable to the Project. As a point of reference, a 25 percent increase in traffic volume would result in an approximately 1-dB increase in traffic noise along a given segment, and a 100 percent increase in traffic volume would result in a 3-dB increase in traffic noise. If a 3-dB increase is identified along any segments, additional analysis is conducted to determine if existing and resulting noise levels are in above or below the "normally acceptable" land use compatibility standard. If existing and resulting noise levels are below the land use compatibility standard, a noise increase of up to 5 dB is allowed.

Other Operational Noise Sources

Other potential sources of Project-related operational noise, including mechanical HVAC equipment, emergency generators, loading dock activity, parking structure activity, and activity from the proposed park were also assessed based on information provided by the Project Sponsor. Descriptions of the analysis methodology for these topics are included below.

Mechanical Equipment Noise

Mechanical equipment would be installed throughout the Project Site. Proposed equipment would include rooftop HVAC and building-specific heating plant equipment, as well as equipment located at central energy plants in the North and South Garages. A list of proposed equipment types was provided by the Project applicant. This list included (but was not limited to) equipment such as chillers, various types of pumps, cooling towers, exhaust fans, heat exchangers, air handling units, and boilers.

To evaluate the noise levels resulting from the operation of Project mechanical equipment, acoustical data (i.e., source noise levels) for each equipment type were derived from various sources, including manufacturers' specifications sheets, equipment information provided by the Project applicant, and data from previous noise assessments prepared for similar projects. Modeling was conducted to estimate noise

from individual and combined equipment, as appropriate, based on predicted locations of Project equipment as provided by the Project applicant. Estimated noise levels were then compared to the allowable noise levels in the City of Menlo Park, which are 60 dBA during daytime hours (7:00 a.m. to 10:00 p.m.) and 50 dBA during nighttime hours (10:00 p.m. to 7:00 a.m.), when measured from any residential property. In addition, noise levels from rooftop equipment were compared to the Zoning Ordinance limit of 50 dBA at 50 feet.

Emergency Generator Noise

A total of 13 emergency generators are proposed to be installed with Project implementation. Although operating noise from generators is typically exempt in the case of an emergency, periodic testing of generators is not considered to be exempt. During testing, generator noise must meet the allowable noise levels as established in the City Municipal Code. Final equipment makes and models for the Project have not yet been selected; as a result, this analysis is based on noise levels from representative generator models that are the same size as those proposed under the Project. Estimated generator locations were provided by the Project applicant.

Specific details about generator shielding and attenuation features for Project generators are not known at this time. Therefore, this analysis conservatively presents unattenuated noise levels from emergency generator testing.

Modeling was conducted to estimate noise from each generator based on its estimated location on the Project Site and its size as provided by the Project applicant. Estimated noise levels were then compared to the allowable noise levels in the City of Menlo Park, which are 60 dBA during daytime hours (7:00 a.m. to 10:00 p.m.) and 50 dBA during nighttime hours (10:00 p.m. to 7:00 a.m.), when measured from any residential (or for the purposes of this analysis, noise-sensitive) property (noting that many noise-sensitive land uses are located on residentially zoned property).

Event Noise

The potential for amplified music or speech at events resulting from implementation of the Project to exceed applicable noise limits was analyzed based on information about expected future events provided by the Project applicant and based on source noise data from events expected to be similar to those proposed under the Project.

Dog Park Noise

The potential for the proposed dog park to expose off-site receptors to excessive noise was evaluated by comparing previously collected source noise levels from dog park activity to the local applicable noise thresholds. Noise limits for residential land uses in the City were applied to all noise-sensitive uses, including nearby schools.

Loading Dock Noise

Project loading dock noise was evaluated qualitatively, based on operational truck information and loading dock location information provided by the Project applicant, to determine the potential for a substantial temporary increase in noise to occur at nearby noise-sensitive land uses. A quantitative analysis of loading noise would typically only be necessary if the development was a loading-intensive use (such as a distribution center).

Tram and Shuttle Noise

Potential noise impacts related to Project inter-campus trams and commuter shuttles were evaluated by using the FTA Noise Impact Assessment Spreadsheet (2018) and data provided by the Project applicant, including tram and shuttle routes and estimated speeds and idle times.

Parking Garage Activity Noise

The new parking structures associated with the Project would introduce noises typically associated with parking garages to the Project area. Source noise data from FTA's *Transit Noise and Vibration Impact Assessment Manual* (Federal Transit Administration 2006) were used to analyze parking garage noise as a stationary source of noise. Modeled noise levels were compared to City of Menlo Park noise limits for stationary sources of noise.

Construction Noise and Vibration Effects to Onsite Uses

Although not required by CEQA, this section describes construction noise and vibration effects on the Project's users and residents during Project construction, as onsite residential land uses may be occupied during late-stage Project construction.

Summary of Analysis in the ConnectMenlo EIR

The ConnectMenlo EIR analyzed the impacts listed below that would result from implementing the updates to the Land Use and Circulation Elements and the M-2 Area Zoning Update.[2]

- Construction and operational noise effects were analyzed in the ConnectMenlo EIR as Impact NOISE-1 (pages 4.10-19 to 4.10-24), Impact NOISE-3 (pages 4.10-29 to 4.10-36), and Impact NOISE-4 (pages 4.10-36 to 4.10-37). Impacts were determined to be less than significant with application of mitigation measures as well as compliance with City General Plan goals and policies. Projects that would result in the development of sensitive land uses must maintain an indoor L_{dn} of 45 dBA or less, as required by ConnectMenlo EIR Mitigation Measure NOISE-1a and existing regulations. Projects that could expose existing sensitive receptors to excessive noise must comply with ConnectMenlo EIR Mitigation Measures NOISE-1b, NOISE-1c, and NOISE-4 to minimize both operational and construction-related noise. ConnectMenlo EIR Mitigation Measure NOISE-1b requires stationary noise sources and landscaping and maintenance activities to comply with Chapter 8.06, Noise, of the Menlo Park Municipal Code. ConnectMenlo EIR Mitigation Measures NOISE-1c and NOISE-4 requires development projects in the city to minimize the exposure of nearby properties to excessive noise levels from construction-related activity through CEQA review, conditions of approval and/or enforcement of the City's Noise Ordinance.
- Potential traffic noise effects were discussed in the ConnectMenlo EIR as part of Impact NOISE-3 (pages 4.10-29 to 4.10-36). It was determined that implementation of ConnectMenlo would not result in a substantial permanent increase in ambient noise on any of the identified roadway segments. No mitigation measures were recommended.
- Construction vibration impacts were analyzed in the ConnectMenlo EIR as Impact NOISE-2 (pages 4.10-25 to 4.10-29). The impact was determined to be potentially significant. With implementation of Mitigation Measures NOISE-2a and NOISE-2b, this impact was determined to be reduced to a less-

[2] City of Menlo Park. 2016. *ConnectMenlo: General Plan Land Use and Circulation Elements and M-2 Zoning Update for the City of Menlo Park*. (June 1.) Prepared by Placeworks, Berkeley, CA. Menlo Park, CA. Available: https://www.menlopark.org/1013/Environmental-Impact-Report. Accessed: March 23, 2022.

than-significant level. The analysis concluded that, overall, vibration impacts related to construction would be short term, temporary, and generally restricted to areas in the immediate vicinity of construction activity. However, because project-specific information was not available, the analysis did not quantify construction-related vibration impacts on sensitive receptors. Implementation of Mitigation Measure NOISE-2a would reduce construction-related vibration impacts to a less-than-significant level through preparation of a vibration analysis to assess vibration levels and the use of alternate construction techniques to reduce vibration, if necessary. Specifically, according to Mitigation Measure NOISE-2a from the ConnectMenlo EIR, vibration levels must be limited to a PPV of 0.126 in/sec at the nearest workshop, 0.063 in/sec at the nearest office, and 0.032 in/sec at the nearest residence during daytime hours and 0.016 in/sec at the nearest residence during nighttime hours. Regarding long-term vibration impacts, ConnectMenlo requires projects to comply with Mitigation Measure NOISE-2b, which requires the City to implement best management practices as part of the project approval process.

- Aircraft noise from public use airports and private airstrips was discussed in the ConnectMenlo EIR as Impact NOISE-5 (page 4.10-38) and Impact NOISE-6 (page 4.10-38). It was determined that impacts regarding excessive aircraft noise levels would be less than significant and there would be no impact related to public airports or private airstrips.

Impacts and Mitigation Measures

Impact NOI-1a: Construction Noise. Construction of the Proposed Project would generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the Project in excess of standards established in a local general plan or noise ordinance or applicable standards of other agencies. (SU)

Construction Noise

The Proposed Project would consist of two primary construction phases (i.e., Phase 1 and Phase 2) and multiple subphases, such as demolition, grading, utility work, and landscaping improvements, among others. Refer to Appendix 3.7 for the full list of Project construction phases and subphases. In total, the construction period is expected to last approximately 60 months.

Standard construction work hours would be 7:00 a.m. to 10:00 p.m. Monday through Saturday. In addition, construction work is proposed to take place on Sunday, with work hours occurring between 8:00 a.m. and 6:00 p.m. The City of Menlo Park has established typical work hours for construction of 8:00 a.m. and 6:00 p.m., Monday through Friday. During this time, construction activities are exempt from local noise regulations, per Title 8.06.040[a] of the City Noise Ordinance. However, despite the exemption for daytime construction noise, construction activities that are exempt from specified noise limitations in the City Municipal Code could still result in a significant physical impact on the environment. Therefore, construction noise generated during daytime hours is compared to the existing ambient noise level to estimate temporary increases in noise over the existing ambient level.

An analysis is also conducted to determine if individual equipment proposed for use during Project Construction would comply with the 85 dBA at 50 feet threshold for powered equipment used on a temporary, occasional or infrequent basis between the hours of 8:00 a.m. and 6:00 p.m. Monday through Friday. In addition, construction activities taking place outside the standard allowable construction hours of 8:00 a.m. to 6:00 p.m., Monday through Friday would be regulated by noise limits from the City Noise Ordinance of Menlo Park's Municipal Code. In the City, noise is limited to 60 dBA at the nearest residential

property line during daytime hours and 50 dBA at the nearest residential property line during nighttime hours.

Construction equipment proposed for use during Project construction by phase and subphase was provided by the Project applicant. Refer to Appendix 3.7 for the full list of construction equipment proposed for use. To determine if construction would result in noise impacts to nearby sensitive uses, a screening analysis was conducted to determine which subphases of construction would require the loudest equipment, based on the equipment list provided by the Project sponsor. This analysis was completed for three periods throughout a construction day: typical daytime construction hours of 8:00 a.m. to 6:00 p.m. (during which time construction noise is considered exempt from the local noise standards, but a significant increase in ambient noise could occur), early morning and evening hours of 7:00 a.m. to 8:00 a.m. and 6:00 p.m. to 10:00 p.m. (prior to the start of or after the end of the daytime construction noise exemption time period), and nighttime hours (10:00 p.m. to 7:00 a.m.).

Main Project Site Construction Noise Impacts to Offsite Uses

Compliance with Individual Equipment Threshold

As described previously, individual equipment proposed for use during Project construction would be required to comply with the 85 dBA at 50 feet threshold for powered equipment. The noise levels generated by individual pieces of construction equipment planned for use with Project construction activities are shown in Table 3.7-8.

As shown in Table 3.7-8, noise from most individual pieces of equipment proposed for Project construction would not be expected to exceed 85 dBA Leq at a distance of 50 feet, with the exception of the pile driver. An impact pile driver would be required for project construction and would be expected to exceed the City's individual equipment threshold. Although this is greater than the criteria specified in the noise ordinance, this type of equipment is typically used only for a limited time during construction projects. However, because pile drivers would not comply with the City threshold for individual equipment, noise impacts from the use of pile drivers for Project construction would be considered **significant.**

Table 3.7-8. Individual Construction Equipment L_{eq} Noise levels Based on Standard Utilization Rates

	Individual Equipment Noise Levels (dBA) at 50 Feet
Equipment	**dBA L_{eq} [a]**
Aerial Lifts	68
Air Compressor	74
Backhoe	74
Concrete Pump Truck	74
Concrete Mixer Truck	75
Crane	73
Dump Truck	72
Excavator	77
Front-end Loader	75
Generator	78
Gradall	79
Grader	81
Pile Driver (Impact)	94
Paver	74
Pickup Truck	71
Roller	73
Tractor	80

Source: Federal Highway Administration. 2006. *FHWA Roadway Construction Noise Model User's Guide*. FHWA-HEP-05-054. January. Available: https://www.fhwa.dot.gov/ENVIRonment/noise/construction_noise/ rcnm/rcnm.pdf. Accessed: May 18, 2021.

[a] Based on standard estimated utilization rates from FHWA

Daytime Hours (8:00 a.m. to 6:00 p.m.)

The preliminary screening analysis described above indicated that construction subphases involving vertical construction (e.g., phases where building construction would take place, and involve the use of a pile driver etc.) would be the loudest phase proposed during daytime hours for the Project. This analysis assumes that the three loudest pieces of equipment proposed for this construction subphase would operate concurrently and in the same general location on the Project Site. Combined construction noise levels for the construction subphases involving vertical construction (e.g., Office Building 4 2023, North Garage 2022, South Garage 2023) were estimated using the calculation methodology and equipment source noise levels from the Federal Highway Administration's (FHWA's) Roadway Construction Noise Model. The three loudest pieces of equipment proposed for use during these phases with vertical construction include an impact pile driver, gradall, and a compactor. Use of this equipment on the main Project Site could occur as close as 150 feet from the nearest residence, located west of Willow Road. Construction of this subphase could result in a noise level of 85 dBA L_{eq} at this distance. Refer to Table 3.7-9, below for the construction modeling results for this subphase. See below for estimated distances between this construction subphase and the nearest schools.

Table 3.7-9. Estimated Worst-Case Construction Noise for Main Project Site – Subphases with Vertical Construction

Source Data:	Maximum Sound Level (dBA)	Utilization Factor	L_{eq} Sound Level (dBA)
Construction Condition: Phase 1 Office Building 4, 2023[a]			
Source 1: Impact Pile Driver – sound level (dBA) at 50 feet =	101	20%	94.0
Source 2: Gradall – sound level (dBA) at 50 feet =	83	40%	79.0
Source 2: Compactor (Ground) – sound level (dBA) at 50 feet =	83	20%	76.0
Calculated Data			
All Sources Combined – L_{max} sound level (dBA) at 50 feet =			101 L_{max}
All Sources Combined – L_{eq} sound level (dBA) at 50 feet =			94 L_{eq}

Distance between Source and Receiver (feet)	Geometric Attenuation (dB)	Calculated L_{max} Sound Level (dBA)	Calculated L_{eq} Sound Level (dBA)
50	0	101	94
65	-2	99	92
85	-5	97	90
100	-6	95	88
150	**-10**	**92**	**85**
170	-11	91	84
190	**-12**	**90**	**83**
200	-12	89	82
300	-16	86	79
600	-22	80	73
1000	-26	75	68
1200	**-28**	**74**	**67**

Source: Federal Highway Administration. 2006. *FHWA Roadway Construction Noise Model User's Guide*. FHWA-HEP-05-054. January. Available: https://www.fhwa.dot.gov/ENVIRonment/noise/construction_noise/rcnm/rcnm.pdf. Accessed: July 18, 2021.

[a] Representative of other construction subphases with vertical construction activities, such as North Garage 2023, South Garage 2023, Office Building 2 2023, etc.

Notes:

- Geometric attenuation based on a 6 dB per doubling of distance.
- This calculation does not include the effects, if any, of local shielding or ground attenuation from walls, topography, or other barriers that may reduce sound levels further.
- Noise levels are based on source noise levels from the FHWA Roadway Construction Noise Model.

Measured short-term (15-minute) noise levels along Willow Road ranged from 59.5 to 67.3 dBA L_{eq}, during the field survey as shown in Table 3.7-2 (refer to ST-1, ST-2 and ST-5). Note that some of the variation in these measurements likely occurred based on the proximity of the measurement location to Willow Road, with some being located further back from the roadway. The estimated 12-hour average daytime L_{eq} (between 7:00 am and 7:00 p.m.) in this area was measured to be approximately 74.5 and the 24-hour average noise level was measured to be 77.1 dBA L_{dn} (refer to LT-2) as shown in Table 3.7-3. The lowest daytime 1-hour L_{eq} noise level recorded at the long-term measurement location LT-2 was 73.6 dBA Leq, recorded at approximately 12:00 p.m. noon. Based on these measurements, baseline noise levels at residences west of Willow Road are assumed to be in the range of 60 to 74 dBA Leq. Therefore, estimated combined noise levels of up to 85 dBA Leq at the nearest noise sensitive land uses would have the potential to exceed the existing ambient noise level by 11 to 25 dB, depending on the existing ambient noise level at a given receptor. Therefore, the combined noise level of 85 dBA Leq would result in a substantial increase above ambient noise levels at these nearby residences because an increase of more than 10 dB over the ambient noise level (per FTA guidance, and which is perceived as a doubling of loudness) may occur.

In addition to the nearby residential land uses, two schools (the Mid-Peninsula High School and the Open Mind School) are located near the Project Site; these uses would also be considered noise sensitive receptors. The Mid-Peninsula High School is adjacent to the southwest corner of the main Project Site, and the Open Mind school is located approximately 70 feet south of the southeast portion of the Project Site.

Mid-Peninsula High School is located approximately 10 feet from the nearest construction area, and it is located approximately 1,200 feet from areas where the nearest pile driving would take place. The use of an impact pile driver, generator, and trencher during the expected loudest construction subphases could result in estimated noise levels of up to 67 dBA L_{eq} at this school, based on the noise modeling results and based on noise attenuation from distance alone (refer to Table 3.7-9). This school is located close to the measurement locations ST-2 and LT-2. ST-2 had a measured noise level of 67.3 dBA L_{eq} during the 15-minute measurement period, and the lowest 1-hour daytime L_{eq} noise level recorded at LT-2 was 73.6. Therefore, existing ambient noise levels in this area are likely between 67 and 74 dBA L_{eq}. The estimated 67 dBA L_{eq} noise level from daytime pile driving located 1,200 feet from this school would not be expected to result in a 10-dB increase over the ambient level at this receptor.

Regarding the portion of the Project Site located 10 feet from the high school, the loudest expected construction subphase proposed for this area is the grading and utilities subphase. Refer to Table 3.7-10, below, for modeling results for this construction subphase. Modeling demonstrates that the grading and utilities phase (assuming concurrent use of a grader, scrapper, and gradall) could result in a combined noise level of 99 dBA L_{eq} at a distance of 10 feet. Note that construction at this worst-case closest distance to the school would be very short-term, and that most construction activities for the Project would take place much further from this receptor. However, because the ambient noise levels at the school are in the range of 67 to 74 dBA L_{eq}, a combined construction noise level of 99 dBA L_{eq} would result in an approximately 25 to 32 dB increase in noise over the ambient level. Because the temporary noise increase from these activities at close distances (i.e., 10 feet) to the Mid-Peninsula High School could result in a greater than 10-dB noise increase, daytime construction noise impacts at this school are considered significant, and mitigation would be required.

Table 3.7-10. Estimated Construction Noise for Main Site Grading and Utilities (L_{max} and L_{eq})

Source Data:	Maximum Sound Level (dBA)	Utilization Factor	L_{eq} Sound Level (dBA)
Construction Condition: Phase 1 Grading and Utilities			
Source 1: Grader – sound level (dBA) at 50 feet =	85	40%	81.0
Source 2: Scraper – sound level (dBA) at 50 feet =	84	40%	80.0
Source 2: Gradall – sound level (dBA) at 50 feet =	83	40%	79.0
Calculated Data			
All Sources Combined – L_{max} sound level (dBA) at 50 feet =			89 L_{max}
All Sources Combined – L_{eq} sound level (dBA) at 50 feet =			85 L_{eq}

Distance between Source and Receiver (feet)	Geometric Attenuation (dB)	Calculated L_{max} Sound Level (dBA)	Calculated L_{eq} Sound Level (dBA)
10	**14**	**103**	**99**
25	6	95	91
35	**3**	**92**	**88**
50	0	89	85
60	**-2**	**87**	**83**
85	**-5**	**84**	**80**
100	-6	83	79
150	-10	79	75
200	-12	77	73
300	-16	73	69
600	-22	67	63

Source: Federal Highway Administration. 2006. FHWA Roadway Construction Noise Model User's Guide. FHWA-HEP-05-054. January. Available: https://www.fhwa.dot.gov/ENVIRonment/noise/construction_noise/rcnm/rcnm.pdf. Accessed: July 18, 2021.

Notes:

- Geometric attenuation based on a 6 dB per doubling of distance.
- This calculation does not include the effects, if any, of local shielding or ground attenuation from walls, topography, or other barriers that may reduce sound levels further.
- Noise levels are based on source noise levels from the FHWA Roadway Construction Noise Model.
- **Bold** denotes distances to specific noise-sensitive land uses/distances used in this analysis.
- Reference sound levels are at 50 feet. For receivers beyond 50 ft the sound level is attenuated (negative number) relative to the sound level at 50 ft. For receivers at less than 50 ft the sound level is increased relative to the sound level at 50 ft (positive number)

Regarding the Open Mind School, the nearest Project construction area to this school would be the proposed dog park area, which would be located approximately 60 feet north of the school. In addition, the Open Mind school is located 190 feet from areas where the most noise-intensive construction subphases (vertical construction activities involving pile driving) would take place. Noise levels from the use of an impact driver, generator, and trencher at 190 feet for subphases involving vertical construction are expected to reach 83 dBA L_{eq} (refer to Table 3.7-9). For the utilities and grading subphases, which could take place as close as 60 feet from this school, construction noise levels could also reach 83 dBA L_{eq} (refer to Table 3.7-10).

The ambient noise levels near the Open Mind School are represented by ST-3, which had a measured noise level of 55.8 dBA L_{eq} as shown in Table 3.7-2. A combined noise level of 83 dBA L_{eq} from vertical

construction 190 feet from the school, as well as grading and utilities work 60 feet from the school, could therefore result in an approximately 27 dB increase in noise over the ambient noise level, which is substantially more than the 10 dB noise increase threshold. As a result, daytime construction noise impacts from vertical construction at this school would be considered significant, and mitigation would be required.

In addition to construction proposed for the main Project Site, construction for the Hamilton Avenue Parcels could occur as close as 20 feet from residential structures along Willow Road and Carlton Avenue. North of the Hamilton Avenue Parcels are commercial land uses, which are not generally considered to be noise sensitive. The construction subphases for this area predicted to produce the loudest noise levels are subphases involving grading and utilities. The three most noise-intensive pieces of equipment used during these subphases would be an excavator, gradall, and compactor. As shown in Table 3.7-11, combined noise from this activity at a distance of 20 feet (i.e., at the nearest residential land uses) could be up to 90 dBA L_{eq}. Refer to Table 3.7-11 for the construction noise modeling results for this parcel.

Table 3.7-11. Estimated Construction Noise for Hamilton Avenue Parcels Grading and Utilities

Source Data:	Maximum Sound Level (dBA)	Utilization Factor	L_{eq} Sound Level (dBA)
Construction Condition: Hamilton Avenue – Grading and Utilities			
Source 1: Excavator – sound level (dBA) at 50 feet =	81	40%	77.0
Source 2: Gradall – sound level (dBA) at 50 feet =	83	40%	79.0
Source 2: Compactor (Ground) – sound level (dBA) at 50 feet =	83	20%	76.0
Calculated Data			
All Sources Combined – L_{max} sound level (dBA) at 50 feet =			87 L_{max}
All Sources Combined – L_{eq} sound level (dBA) at 50 feet =			82 L_{eq}

Distance between Source and Receiver (feet)	Geometric Attenuation (dB)	Calculated L_{max} Sound Level (dBA)	Calculated L_{eq} Sound Level (dBA)
20	**8**	**95**	**90**
50	0	87	82
100	-6	81	76
150	-10	78	73
200	-12	75	70
300	-16	72	67
600	-22	66	61

Source: Federal Highway Administration. 2006. FHWA Roadway Construction Noise Model User's Guide. FHWA-HEP-05-054. January. Available: https://www.fhwa.dot.gov/ENVIRonment/noise/construction_noise/rcnm/rcnm.pdf. Accessed: July 18, 2021.

Notes:

- Geometric attenuation based on a 6 dB per doubling of distance.
- This calculation does not include the effects, if any, of local shielding or ground attenuation from walls, topography, or other barriers that may reduce sound levels further.
- Noise levels are based on source noise levels from the FHWA Roadway Construction Noise Model.
- **Bold** denotes distances to specific noise-sensitive land uses/distances used in this analysis.

The ambient noise levels at the residences in this area are represented by LT-4, which had a recorded 24-hour noise level of approximately 59-60 dBA L_{dn} as shown in Table 3.7-3, and a lowest 1-hour daytime Leq noise level of approximately 55 dBA Leq (as shown in Appendix 3.7) A combined noise level of 90 dBA

L_{eq} would therefore be 30 to 35 dB above the ambient noise level, and substantially more than the 10 dB allowable noise increase threshold for construction. Therefore, daytime construction noise impacts to these residences south of the Hamilton Avenue Parcels are also considered significant, and mitigation would be required.

This analysis demonstrates that during daytime hours, construction activities at the main Project Site and at the Hamilton Avenue Parcels would temporarily elevate ambient noise levels. Although construction activities associated with the Project would not conflict with the City Municipal Code because of the daytime construction noise exemption, temporary noise increases may exceed 10 dB depending on the construction activity taking place and the proximity to the nearest sensitive use. The increase in noise from construction activities would be substantially greater than ambient noise levels at the nearest noise-sensitive land use, as outlined above. The increases in noise could be more than 30 dB above ambient levels in some cases, which would exceed the 10 dBA noise increase threshold (perceived as a doubling of loudness). Therefore, daytime construction noise could result in a substantial physical effect on the environment despite being exempt from regulation by the City's Municipal Code. Daytime construction noise impacts would be considered **significant,** and mitigation would be required.

Early Morning and Evening Hours (7:00 a.m. to 8:00 a.m., 6:00 p.m. to 10:00 p.m.)

Construction activities that occur between the hours of 7:00 a.m. and 8:00 a.m. as well as 6:00 p.m. and 10:00 p.m. would need to comply with the applicable 60 dBA L_{eq} noise threshold in the City. Construction noise during these non-exempt hours is evaluated and compared to this applicable threshold. The noise increase threshold of 10-dB over the ambient level is also discussed for additional context.

According to the Project applicant, all construction activities that would occur during daytime hours (as described above) could also occur during early morning (7:00 a.m. to 8:00 p.m.) and evening (6:00 a.m. to 10:00 p.m.) hours. Noise during these non-exempt daytime hours is limited to 60 dBA per Title 8.06.040[a] of the City Noise Ordinance.

As shown in Table 3.7-9 presented previously, estimated worst-case noise from vertical construction subphases on the main Project Site could result in noise levels of 85 dBA L_{eq} at the nearest residential land use, located approximately 150 feet away. This noise level could occur during the exempt daytime hours for construction in the City, and during the non-exempt hours of 7:00 a.m. to 8:00 a.m. and 6:00 p.m. to 10:00 p.m. At Mid-Peninsula High School (located approximately 1,200 feet from proposed pile driving locations), noise levels from the expected worst-case construction subphases could be as high as 67 dBA L_{eq}. At the Open Mind School (located approximately 190 feet from areas where pile driving may occur), noise levels from subphases involving pile driving would be approximately 83 dBA L_{eq} based on the modeling results presented above. These noise levels are in excess of the City's 60 dBA threshold that applies during daytime hours when construction is not exempt. In addition, these construction noise levels also demonstrate that an increase of more than 10-dB over ambient noise levels (as described under the analysis of daytime construction noise) could occur. Therefore, noise levels at the nearby school and residential land uses would be expected to exceed the applicable City noise limits and the noise increase threshold of 10-dB over the ambient level. Construction noise impacts during non-exempt daytime hours to these nearby uses from construction on the main Project Site would be considered significant.

Regarding the Hamilton Avenue Parcels, construction activities could occur as close as 20 feet from the nearest residential structures. As discussed previously, combined noise levels from the grading and utilities phase on these parcels could be up to 90 dBA L_{eq} at the nearest residents based on the noise modeling results shown in Table 3.7-11. Therefore, daytime (7:00 a.m. to 10:00 p.m.) construction activities at the Hamilton Avenue Parcels that take place outside of the daytime exempt hours of 8:00

a.m. to 6:00 p.m. would result in noise levels in excess of the 60 dBA threshold at nearby residential land uses. As discussed previously, the noise would also exceed the noise increase threshold of 10-dBA. Construction noise impacts during non-exempt daytime hours to these nearby uses from construction on the Hamilton Avenue Parcels would be considered significant.

Because noise levels from construction on the main Project Site and the Hamilton Avenue Parcels would exceed the allowable daytime noise threshold of 60 dBA during early morning (7:00 a.m. to 8:00 a.m.) and evening (6:00 p.m. to 10:00 p.m.) hours and the FTA noise increase threshold of 10-dBA, construction noise impacts during non-exempt daytime hours would be considered **significant**, and mitigation would be required.

Nighttime Hours (10:00 p.m. to 7:00 a.m.)

Certain construction activities for the Project would occur on the project site during the nighttime hours of 10:00 p.m. to 7:00 a.m. Note that activities would also be proposed for off-site areas during these nighttime hours; noise from these off-site activities is discussed in detail below. Regarding on-site construction noise during nighttime hours, the primary activity expected to occur would be concrete pours.

Equipment that may be used during nighttime concrete pour activities would generally include concrete mixer trucks and concrete pump trucks. Construction noise modeling was conducted for nighttime concrete pour activities, based on the assumption that the three loudest pieces of equipment expected to be used during a given phase of construction would be operating simultaneously and close to one another in a given construction area. Nighttime construction noise levels were estimated using the Federal Highway Administration's Roadway Construction Noise Model calculation methods.

The nearest off-site sensitive land use to the Proposed Project site that would be occupied during nighttime hours are the residential land uses located west of Willow Road. Use of this equipment on the main Project Site could occur as close as 150 feet from the nearest residence, located west of Willow Road. Refer to Table 3.7-12, below for the modeling results from potential nighttime concrete pour activities that may occur on the Project site.

Table 3.7-12. Noise from Potential Nighttime Concrete Pours (L_{max} and L_{eq})

Source Data:	Maximum Sound Level (dBA)	Utilization Factor	L_{eq} Sound Level (dBA)
Construction Condition: Nighttime Concrete Pour			
Source 1: Concrete mixer truck – sound level (dBA) at 50 feet =	79	60%	76.8
Source 2: Concrete pump truck – sound level (dBA) at 50 feet =	81	60%	78.8
Source 2: Concrete pump truck – sound level (dBA) at 50 feet =	81	60%	78.8
Calculated Data:			
All Sources Combined – L_{max} sound level (dBA) at 50 feet =			85 L_{max}
All Sources Combined – L_{eq} sound level (dBA) at 50 feet =			83 L_{eq}

Distance Between Source and Receiver (feet)	Geometric Attenuation (dB)	Calculated L_{max} Sound Level (dBA)	Calculated L_{eq} Sound Level (dBA)
50	0	85	83
100	-6	79	77
150	**-10**	**76**	**73**
200	-12	73	71
250	-14	71	69
300	-16	70	67
400	-18	67	65
500	-20	65	63

Notes:

- Geometric attenuation based on 6 dB per doubling of distance.
- 60% utilization assumed (greater than standard 20% to 40% rates) because nighttime concrete pours may involve a greater than 20 to 40% usage rate for equipment.
- This calculation does not include the effects, if any, of local shielding or ground attenuation from walls, topography, or other barriers that may reduce sound levels further.
- **Bold** denotes distance(s) used in this analysis

As shown in Table 3.7-12, nighttime concrete pour activities could result in noise levels of approximately 73 dBA L_{eq} at a distance of 150 feet. Therefore, based on the modeling results presented above, noise levels from nighttime construction activities would be expected to exceed the allowable nighttime noise threshold of 50 dBA at the nearest sensitive land use. In addition, based on the lowest 1-hour nighttime L_{eq} noise level recorded at LT-2, noise level in this area could be as low as 64.0 dBA L_{eq} (recorded at 3:00 a.m.). Construction noise of 73 dBA would add to this background noise level to create an overall noise level of approximately 74 dBA L_{eq}, which is 10-dB over this lowest measured nighttime ambient noise level of 64 dBA L_{eq}. Note that most concrete pour activities would occur further from the edge of the project site than this distance. As a result, it is likely that noise increases may be less than the 10-dB threshold. However, because the potential exists for a 10-dB increase over ambient to occur, and because construction noise would likely exceed the quantitative 50 dBA nighttime noise threshold, Project site construction noise impacts during the nighttime hours of 10:00 p.m. to 7:00 a.m. would be considered **significant**, and mitigation would be required.

Off-site Improvements Construction Noise Impacts

Willow Road Tunnel and Elevated Park Construction (Nighttime Hours of 10:00 p.m. to 7:00 a.m.)

The Willow Road Tunnel area is located within the Caltrans right of way. Similarly, a portion of the Elevated Park would be constructed over a Caltrans' right of way. Therefore, most construction for these project elements would take place during nighttime hours because it would require road closures and is therefore difficult (or potentially infeasible) to conduct during daytime hours. Specifically, activities related to the construction of the Willow Road Tunnel and Elevated Park within the SamTrans and Caltrans right of ways, northwest of the main Project Site, would likely be primarily conducted from 10:00 p.m. to 7:00 a.m.

For the Willow Road Tunnel construction activities in this area may include installation/removal of detours, traffic shifts, tunnel shoring, and restoration of Willow Road. It is anticipated that installation/removal of detours would take place over 16 nights, traffic shift activities would take place for

4 nights, tunnel shoring would take up to approximately 45 nights, and the restoration of Willow Road would take 14 nights.

Equipment that may be used during the nighttime construction activities for the Willow Road Tunnel include excavators, hoe rams, loaders, grinders, jackhammers, pavers, rollers, light plants, off-haul trucks, utility trucks, highway striping machines, arrow boards, compressors, auger rigs, generators, vibratory impact hammer, impact pile driver, and cement silos.

For the portion of the Elevated Park that spans Willow Road, construction activities in this area may include the installation/removal of detours, traffic shifts, temporary lane closures, shoring and public protection measures to support the erection of the overhead structure. This section of the Elevated Park is expected to take no longer than six months, with approximately two to three months of the construction expected to occur at night to avoid risks associated with working above active traffic. The work anticipated to occur at night includes the erection of the Elevated Park's structural steel, steel welding, and installation of architectural cladding. Equipment that may be used during the nighttime construction of this section of the Elevated Park includes crawler cranes, high-capacity forklifts, welders, a Nelson stud welder, air compressors, generators, semi-trucks, concrete pumps, concrete trucks, elevated lifts, and light towers.

Noise from these night-time construction activities would be regulated by the nighttime noise limits defined in the City Municipal Code of 50 dBA as measured from the nearest residential property line during the hours of 10:00 p.m. to 7:00 a.m. In addition, noise from this work is analyzed to determine if a 10-dB or greater increase over the ambient noise level would occur at the nearest sensitive uses. Construction noise modeling was conducted for these nighttime activities, based on the assumption that the three loudest pieces of equipment expected to be used during a given phase of construction would be operating simultaneously and close to one another in a given construction area. The loudest nighttime construction activity expected to occur is the Tunnel Shoring for the Willow Road Tunnel. Nighttime construction noise levels were estimated using the Federal Highway Administration's Roadway Construction Noise Model calculation methods.

The nearest sensitive land use to the proposed nighttime construction area near the SamTrans right of way are the multi-family residences located at 777 Hamilton Avenue. These residences are approximately 480 feet southwest of the closest potential nighttime construction areas within the SamTrans right of way. Additionally, there are multi-family residences approximately 550 feet south of this proposed construction area along Willow Road. The loudest construction subphase that would occur in the SamTrans and Caltrans Corridors is tunnel shoring, during which would include the use of a vibratory hammer and impact pile driver. Refer to Table 3.7-13, below for the modeling results from the tunnel shoring activity proposed for the SamTrans and Caltrans Corridors.

Table 3.7-13. Estimated Worst-Case Construction Noise for Nighttime Construction Activities (L_{max} and L_{eq})

Source Data:	Maximum Sound Level (dBA)	Utilization Factor	L_{eq} Sound Level (dBA)
Construction Condition: Tunnel Shoring			
Source 1: Vibratory Pile Driver [a] – Sound level (dBA) at 50 feet =	101	20%	94.0
Source 2: Pile Driver – Sound level (dBA) at 50 feet =	101	20%	94.0
Source 3: Auger Drill Rig – Sound level (dBA) at 50 feet =	84	20%	77.0
Calculated Data			
All Sources Combined – L_{max} sound level (dBA) at 50 feet =			106 L_{max}
All Sources Combined – L_{eq} sound level (dBA) at 50 feet =			99 L_{eq}

Distance between Source and Receiver (feet)	Geometric Attenuation (dB)	Calculated L_{max} Sound Level (dBA)	Calculated L_{eq} Sound Level (dBA)
50	0	104	97
100	-6	98	91
150	-10	95	88
200	-12	92	85
250	-14	90	83
300	-16	88	82
480	**-20**	**84**	**77**
550	**-21**	**83**	**76**
610	-22	82	75
800	-24	80	73
1200	-28	76	69

Federal Highway Administration. 2006. *FHWA Roadway Construction Noise Model User's Guide*. FHWA-HEP-05-054. January. Available: https://www.fhwa.dot.gov/ENVIRonment/noise/construction_noise/rcnm/rcnm.pdf. Accessed: August 18, 2021.

Notes:

- Geometric attenuation based on a 6 dB per doubling of distance.
- This calculation does not include the effects, if any, of local shielding or ground attenuation from walls, topography, or other barriers that may reduce sound levels further.
- Noise levels are based on source noise levels from the FHWA Roadway Construction Noise Model.
- **Bold** denotes distances used in this analysis.

As shown in Table 3.7-13, tunnel shoring could result in noise levels of approximately 77 dBA L_{eq} at a distance of 480 feet. The nearest single-family residence is located 550 feet away from construction activities in the SamTrans Corridor. At this distance, noise levels from tunnel shoring could be as high as 76 dBA L_{eq}.

Based on the modeling results presented above, noise levels from nighttime construction activities within Willow Road would be expected to exceed the allowable nighttime noise threshold of 50 dBA. In addition, based on the lowest 1-hour nighttime L_{eq} noise level recorded at LT-4 (the closest measurement to the nearest residential land uses), nighttime noise level in this neighborhood could be as low as 45.0 dBA L_{eq} (recorded at 2:00 a.m.). Therefore, nighttime construction noise would also likely result in a noise increase of more than 10-dB over ambient noise nighttime levels. Construction noise impacts during the nighttime hours of 10:00 p.m. to 7:00 a.m. would be considered **significant**, and mitigation would be required.

Intersection Improvements

As noted in Chapter 2, *Project Description*, certain off-site transportation improvements would be constructed to serve the Proposed Project. Such improvements would include modifications to lane configurations, signalizing intersections, traffic signal coordination, lane striping, curb ramps, and median construction. Off-site transportation improvements could include the following intersections and roadways:

- Marsh Road and Bayfront Expressway (modify lane configuration)
- Chilco Street and Hamilton Avenue (signalize intersection)
- Willow Road Corridor (traffic signal coordination)
- Willow Road and Ivy Drive (median construction/lane striping)
- O'Brien Drive and Kavanaugh Drive (signalize intersection/curb ramps/lane striping)
- Adams Drive and O'Brien Drive (signalize intersection/curb ramps/lane striping)

Improvements at these roadways would require construction equipment and trucks, such as pick-up, dump, and utility trucks; trucks equipped with traffic control signage and paint-striping equipment; truck-mounted cranes and auger drills; and backhoes. These trucks and equipment would typically operate in the intersections during daytime hours for periods ranging from one week up to two months. For the Willow Road corridor improvements, no physical modifications would be made to the roadway infrastructure, and thus no noise would be generated from this specific roadway improvement.[3] At the other locations, noise could potentially affect nearby noise-sensitive receptors.

To evaluate the noise levels from the roadway improvements, construction noise modeling was conducted to estimate the combined noise level for the three loudest pieces of equipment expected to be used for a given construction activity. As noted above, this approach assumes that equipment would be operating simultaneously and in close proximity to the other equipment.

At each intersection, the nearest sensitive land uses are located at a different distance from the intersection, and from potential construction areas. The L_{eq} noise levels at various and increasing distances from construction activity are shown in Table 3.7-14, below. To indicate the distances where sensitive land uses are located from each intersection, the noise level values are bolded and underlined.

As shown in Table 3.7-14, some intersections have noise-sensitive land uses located in the immediate proximity (i.e. 15 feet), such as single-family residences and a school near the intersection of Chilco Street and Hamilton Avenue, while other intersections do not have noise-sensitive land uses nearby. For those intersections where noise-sensitive land uses are closer, the resulting noise levels from construction activities could result in an a substantial increase over ambient noise levels.

[3] The improvements along the Willow Road corridor would be limited to changes in the traffic controller software to modify timing of traffic signals.

Table 3.7-14. Reasonable Worst-Case Construction Noise for Off-Site Intersection Improvement Construction Activities (L_{max} and L_{eq})

Distance from Source to Receptor (feet)	Marsh Road & Bayfront Expressway (dBA Leq)	Chilco Street & Hamilton Avenue (dBA Leq)	Willow Road & Ivy Drive (dBA Leq)	O'Brien Drive & Kavanaugh Drive (dBA Leq)	Adams Drive & O'Brien Drive (dBA Leq)
15	86	**87**	88	88	88
40	77	**79**	79	80	80
75	72	73	**74**	74	74
100	69	71	71	72	72
125	67	69	69	**70**	70
150	66	67	68	68	68
170	65	66	**67**	67	67
230	62	64	64	**65**	65
290	60	62	62	63	**63**
300	60	61	62	62	62
400	57	59	59	60	60
550	55	**57**	57	58	58
600	54	55	56	56	56
750	52	**53**	54	54	54
830	**51**	52	53	53	53
900	50	52	52	53	53
1,000	49	51	51	52	52

Notes:

- Geometric attenuation based on a 6 dB per doubling of distance.
- This calculation does not include the effects, if any, of local shielding or ground attenuation from walls, topography, or other barriers that may reduce sound levels further.
- Noise levels are based on source noise levels from the FHWA Roadway Construction Noise Model.
- **Bold and underlined text** denotes the noise levels at the distances used in this analysis (as shown in the first column).
- Please refer to Appendix 3.7 for more information.

As shown in Table 3.7-2, ambient noise levels in the Project area during the short-term measurements ranged from approximately 56 to 67 dBA L_{eq}. In addition, the highest recorded 1-hour daytime Leq noise levels ranged from approximately 60 to 76 dBA Leq. LT-4, located in the neighborhood west of the Project Site and further removed from major thoroughfares (such as Willow Road), has a lowest daytime 1-hour Leq noise level of approximately 55 dBA L_{eq} (as shown in Appendix 3.7).

Near the intersection of Chilco Street and Hamilton Avenue, noise from construction activities could be up to 87 L_{eq} at the nearest residence and 79 L_{eq} at the nearby preschool. Based on the ambient noise levels in the overall project vicinity, and the lowest daytime LEQ noise level recorded at LT-4 (of approximately 55 dBA L_{eq}), these noise levels may intermittently or temporarily result in a 10-dB or greater increase in noise over the ambient level in the area. These elevated noise levels would occur temporarily and intermittently, depending on the precise construction activity taking place on a given day. In addition, note that the total construction interval for this intersection would be up to two months. In addition, although noise levels at this location could be more than 10 dB greater than the existing ambient noise level, construction noise in this area would only be generated during daytime hours when people are less sensitive to noise and when construction noise is exempt from the local Municipal Code noise standards.

Overall, temporary and intermittent construction at this intersection may result in an increase in noise of 10-dB or greater over the ambient, but because of the short-term nature of the work, this increase would not be considered substantial. Temporary construction noise impacts at the intersection of Chilco Street and Hamilton Avenue would be considered less than significant.

At the other intersections, the construction equipment and trucks would result in less noticeable noise at the nearest noise-sensitive land use. For example, at Willow Road and Ivy Drive, noise at Mid-Peninsula High School could be up to 74 L_{eq}; however, the measured noise level near this location was 67 L_{eq} (see measurement data for ST-1 in Table 3.7-3). As such, construction at Willow Road and Ivy Drive may result in noise that is greater than the ambient levels, but the increase would be unlikely to exceed 10-dB over the ambient level; as a result, the increase would not be considered substantial. Additionally, the construction-related noise at this intersection is expected to only occur for two weeks.

At O'Brien Drive and Kavanaugh Drive, construction noise at the nearest residence is estimated to be up to 70 L_{eq}. The measured noise near this location was 67 L_{dn}, with a lowest daytime 1-hour L_{eq} recorded during the long-term measurement interval of 63 dBA L_{eq} (see measurement data for LT-1 in Table 3.7-3 and additional details in Appendix 3.7). Consequently, the construction-related noise at this intersection is unlikely to result in noise that is 10-dB or more over the ambient noise level. Increases in noise at this location from intersection construction activity would not be considered substantial. Additionally, construction activity (and the associated noise) at this intersection is expected to only occur for three weeks.

At Marsh Road and Bayfront Expressway and at Adams Drive and O'Brien Drive, noise-sensitive land uses are not located near these intersections.[4] Based on the estimated construction noise levels at these locations and based on the estimated existing ambient noise levels, noise from construction would not result in substantially temporary increases in noise of 10-dB or greater as a result of the distances between proposed activities and noise-sensitive land uses.

Based on the analysis included above, construction noise impacts during intersection improvement construction would result in less than significant noise impacts based on the estimated noise levels from these temporary construction activities, and as a result of the short-term nature of the construction work required for these improvements; impacts related to a substantial temporary increase in noise from construction from intersection improvement construction would be considered **less than significant**.

Hamilton Avenue Recycled Water and Wastewater Line Upsize

Water and wastewater infrastructure would also be upgraded as part of the Project, which would include the installation of a recycled water and wastewater line. The path for these water/wastewater lines would be about 4,500 feet in length, primarily along Hamilton Avenue and Chilco Street. However, the line would also cross over the Caltrans-operated Willow Road. The route along Hamilton Avenue and Chilco Street would require construction equipment and trucks as close as 15 feet to the fence lines of existing residences.

Construction of this water and wastewater line would require construction crews to excavate the roadway, construct the infrastructure, and then re-cover and pave the surface. Because Willow Road is a roadway maintained by Caltrans, the segment of construction work within that portion of the roadway would likely need to occur at night to adhere to Caltrans requirements coordinated in conjunction with overall Willow Road improvements. It is anticipated that nighttime work along Willow Road would occur for a continuous six-week period. All other construction work would occur during daytime hours. Construction activities are expected to progress at a rate of 50 to 150 feet per day, depending on the conditions of the roadway. Therefore, construction would not occur on back-to-back days or nights at the

[4] As shown in Table 3.7-12, the nearest noise-sensitive land use is 830 feet from the intersection.

exact same location and would not be located adjacent to the same individual receptors throughout the duration of construction. Total construction for the water and wastewater line would occur for approximately six to eight months.

The equipment required for this work would involve typical construction equipment and trucks, and the three loudest pieces of equipment would be an excavator, a vibratory roller, and a finish roller. The concurrent operation of these three loudest pieces of equipment has been modeled, and the estimated combined noise levels, by distance, are shown in Table 3.7-15.

Table 3.7-15. Estimated Worst-Case Construction Noise for Recycled Water and Wastewater Line Construction

Source Data:	Maximum Sound Level (dBA)	Utilization Factor	L_{eq} Sound Level (dBA)
Construction Condition: Recycled Water and Wastewater Line			
Source 1: Tracked Excavator – sound level (dBA) at 50 feet =	81	40%	77.0
Source 2: Vibratory Roller – sound level (dBA) at 50 feet =	80	20%	73.0
Source 3: Finish Roller – sound level (dBA) at 50 feet =	80	20%	73.0
Calculated Data			
All Sources Combined – L_{max} sound level (dBA) at 50 feet =			85 L_{max}
All Sources Combined – L_{eq} sound level (dBA) at 50 feet =			80 L_{eq}

Distance between Source and Receiver (feet)	Geometric Attenuation (dB)	Calculated L_{max} Sound Level (dBA)	Calculated L_{eq} Sound Level (dBA)
15	**10**	**96**	**90**
25	**6**	**91**	**86**
50	**-4**	**82**	**76**
100	**-6**	**79**	**74**
150	**-10**	**76**	**70**
200	-12	73	68
250	**-14**	**71**	**66**
300	**-16**	**70**	**64**
400	-18	67	61
500	-20	65	60
600	-22	64	58
700	-23	62	57
800	-24	61	55
900	-25	60	54
1,000	-26	59	54

Source: Federal Highway Administration. 2006. *FHWA Roadway Construction Noise Model User's Guide*. FHWA-HEP-05-054. January. Available: https://www.fhwa.dot.gov/ENVIRonment/noise/construction_noise/rcnm/rcnm.pdf. Accessed: July 18, 2021.

Notes:

- Geometric attenuation based on a 6 dB per doubling of distance.
- This calculation does not include the effects, if any, of local shielding or ground attenuation from walls, topography, or other barriers that may reduce sound levels further.
- Noise levels are based on source noise levels from the FHWA Roadway Construction Noise Model.
- **Bold** denotes distances used in this analysis.

As shown in Table 3.7-15, the resulting noise levels from construction activities could result in a 10-dB or greater increase over ambient noise levels, because noise could be up to 90 L_{eq} assuming a worst-case distance of 15 feet to the nearest noise-sensitive use. In actuality, the distance to the construction

equipment would be greater most of the time, but 15 feet is a reasonable worst-case distance. As noted above, construction activity for the feeder line would progress at a rate of approximately 50 to 150 feet per day, which would limit the amount of time that any single receptor would be exposed to worst-case construction noise, so no single receptor would be exposed to construction noise for the entire six- to eight-month construction period.

At noise measurement site LT-4, which is generally representative of the noise levels in the Hamilton Avenue corridor, measured noise was 59.6 L_{dn}, as shown in Table 3.7-3. In addition, the lowest 1-hour daytime Leq noise level was approximately 55 dBA L_{eq} (as shown in Appendix 3.7). Thus, a construction noise level of 90 L_{eq} at 15 feet during daytime hours would be 35 dB greater than the lowest daytime ambient Leq noise level recorded and may therefore result in a substantial increase in noise (of more than 10 dB). At distances of 50 to 150 feet from the construction equipment, which is the anticipated daily rate of construction, the noise level would be 80 to 70 L_{eq}. This range of noise would be 15 to 25 dB more than the lowest daytime ambient 1-hour Leq noise level recorded at LT-4. However, this substantial increase would only occur temporarily and intermittently, depending on the precise construction activity taking place on a given day and the proximity between individual receivers and construction work. Because work would progress 50 to 150 linear feet per day, very loud construction noise at an individual receptor is unlikely to occur for many days in a row, as equipment would be moving linearly away from individual receptors as overall construction progress is made.

Construction activities would also pass by the All Five Preschool at a distance as close as 25 feet and Bellehaven Elementary School at a greater distance of 250 feet. At these distances, noise would be 86 L_{eq} (at All Five Preschool) and 66 dBA L_{eq} (at Bellehaven Elementary School), respectively. As discussed above, although this noise level may represent a more than 10-dB increase in noise at All Five Preschool, this increase would not be considered substantial due to the temporary nature of the construction work (and because work would be moving linearly away from the school, and not take place for an extended period of time in very close proximity to the school). At Bellehaven Elementary School, estimated construction noise of 66 dBA L_{eq} might be noticeable, but would not be considered substantial due to the temporary nature of the work, and because a 10-dB increase over the ambient level would not be expected to occur.

For construction work within Willow Road, nighttime construction work would occur at greater distances from noise-sensitive land uses; note that, construction efforts would be coordinated with other Willow Road Improvements. The closest residence to the Willow Road and Hamilton Avenue intersection where nighttime work will occur is approximately 300 feet. At this distance, estimated combined construction noise based on the assumptions above would be 64 L_{eq}. The lowest 1-hour nighttime Leq noise level at LT-4 was 45.0 dBA Leq (as shown in Appendix 3.7). Therefore, nighttime construction noise in this area would likely be 10-dB or more than the existing ambient noise level, and greater than the allowable nighttime noise threshold of 50 dBA.

Short-term and temporary construction noise generated during daytime hours for the water line work may intermittently result in noise that is 10-dB or greater over the existing ambient level; however, most work would be limited to daytime hours when people are less sensitive to noise. In addition, work at any given location would be very temporary, since construction would progress linearly at a rate of 50 to 150 feet per day. However, because some of the construction work for this activity would take place during nighttime hours, nighttime construction for the waterline work could result in substantial temporary increases in noise over the existing ambient noise levels. Therefore, nighttime construction noise impacts from the water and wastewater line construction would be considered **significant** (noting that work during daytime hours would result in less-than-significant impacts)**,** and mitigation would be required.

PG&E Substation Improvements and Feeder Line Installation

To provide electrical service at the Project Site, upgrades to an existing substation and up to four new distribution feeders (conduits) are proposed. The path for the distribution feeders would be about 1.5 miles along the Bayfront Expressway and Willow Road or University Avenue to reach Willow Village. While the potential route along Bayfront Expressway and Willow Road is not in close proximity to noise-sensitive land uses, the potential route along University Avenue would require construction equipment and trucks as close as 15 feet to the fence lines of existing residences, and at least approximately 25 feet from existing residential structures.

Construction at the PG&E substation would occur north of Bayshore Expressway, near the Dumbarton Bridge, and would require typical construction equipment, such as backhoes, loaders, and crew, pick-up, and dump trucks. Construction activity at the substation would occur for approximately five months and would typically occur during the daytime hours, but nighttime work might occasionally be required. There are no noise-sensitive land uses in the vicinity of the substation location,[5] so construction activity at the substation would not be expected to result in noise levels substantially greater (i.e., more than 10-dB above) the ambient noise level at the nearest sensitive land uses.

This improvement would require construction crews to excavate the roadway, install the feeder line, and then re-cover and pave the surface. Because University Avenue is a roadway maintained by Caltrans, construction work would likely need to occur at night to adhere to Caltrans requirements. It is anticipated that construction activities would progress at a rate of 75 feet per day, and total construction for the feeder line would occur for approximately 11 months (moving linearly along the alignment). The equipment required for this work would involve typical construction equipment and trucks, and the three loudest pieces of equipment expected to be used simultaneously would be an excavator, a vibratory roller, and a finish roller. The concurrent operation of these three loudest pieces of equipment has been modeled, and the results, by distance, are shown in Table 3.7-16.

As shown in Table 3.7-16, the resulting noise levels from construction activities could result in a combined noise level of up to 86 L_{eq}, assuming a worst-case distance of 25 feet (the distance to the nearest residential structure). This construction would therefore result in a 10-dB or greater increase over the estimated daytime existing ambient noise level (based on the noise level measured at ST-4 of 55.9 dBA L_{eq}). However, as noted above, construction activity for the feeder line would progress at a rate of approximately 75 feet per day, which would limit the amount of time that any single receptor would be exposed to worst-case construction noise. As a result, no single receptor would be exposed to construction noise for the entire 11-month construction period. In addition, a large portion of the 11-month construction duration would take place within Bayfront Expressway and would not be located near residential or noise-sensitive land uses.

[5] The nearest residences to the substation location, in East Palo Alto, are more than 3,000 feet from where construction would occur.

Table 3.7-16. Estimated Worst-Case Construction Noise for PG&E Feeder Line Construction

Source Data:	Maximum Sound Level (dBA)	Utilization Factor	L_{eq} Sound Level (dBA)
Construction Condition: Feeder Line Construction			
Source 1: Tracked Excavator – sound level (dBA) at 50 feet =	81	40%	77.0
Source 2: Vibratory Roller – sound level (dBA) at 50 feet =	80	20%	73.0
Source 3: Finish Roller – sound level (dBA) at 50 feet =	80	20%	73.0
Calculated Data			
All Sources Combined – L_{max} sound level (dBA) at 50 feet =			85 L_{max}
All Sources Combined – L_{eq} sound level (dBA) at 50 feet =			80 L_{eq}

Distance between Source and Receiver (feet)	Geometric Attenuation (dB)	Calculated L_{max} Sound Level (dBA)	Calculated L_{eq} Sound Level (dBA)
15	**10**	**96**	**90**
25	**6**	**91**	**86**
75	**-4**	**82**	**76**
100	-6	79	74
150	-10	76	70
200	-12	73	68
250	-14	71	66
300	-16	70	64
400	-18	67	61
500	-20	65	60
600	-22	64	58
700	-23	62	57
800	-24	61	55
900	-25	60	54
1,000	-26	59	54

Source: Federal Highway Administration. 2006. *FHWA Roadway Construction Noise Model User's Guide*. FHWA-HEP-05-054. January. Available: https://www.fhwa.dot.gov/ENVIRonment/noise/construction_noise/rcnm/rcnm.pdf. Accessed: July 18, 2021.

Notes:

- Geometric attenuation based on a 6 dB per doubling of distance.
- This calculation does not include the effects, if any, of local shielding or ground attenuation from walls, topography, or other barriers that may reduce sound levels further.
- Noise levels are based on source noise levels from the FHWA Roadway Construction Noise Model.
- **Bold** denotes distances used in this analysis.

At noise measurement site ST-4, which is generally representative of the noise levels along University Avenue, measured noise during the daytime measurement interval was 55.9 L_{eq}, as shown in Table 3.7-2. Thus, a construction noise level of 86 dBA L_{eq} at 35 feet would be more than 10-dB greater than the estimated daytime ambient noise level in this area. However, this increase would only occur temporarily and intermittently, depending on the precise construction activity taking place on a given day and the proximity between individual receivers and construction work. Because work would progress at a rate of approximately 75 feet per day, very loud construction noise at an individual receptor is unlikely to occur for many days in a row, as equipment would be moving linearly away from individual receptors as overall construction progress is made. At a distance of 75 feet from the construction equipment, the noise level would be reduced to 76 dBA L_{eq}. Although temporary noise increases during daytime hours may exceed

10-dB and may therefore be noticeable, daytime noise impacts from this work would not be considered substantial due to the temporary nature of the work in any given location.

Note that much of this work would be required to take place during nighttime hours due to University Avenue being a Caltrans-maintained roadway; the estimated noise levels from this construction would exceed the allowable nighttime noise threshold of 50 dBA, and would be expected to result in an at least 10-dB increase over the ambient level based on the daytime estimated ambient noise level cited above. Because construction would occur during the nighttime hours, the construction work for the feeder line could result in noise that could result in sleep disturbance. For these reasons, construction noise impacts during nighttime hours from the PG&E feeder line construction would be considered significant. Construction activities would also pass by Costano Elementary School, but, during the nighttime hours, school would not be in session, and construction would not affect students at the school.

Because construction noise of the PG&E feeder line would result in substantial temporary increases in noise during nighttime hours at the nearest noise-sensitive land uses (noting that work during daytime hours would result in less-than-significant impacts), impacts would be considered **significant**, and mitigation would be required.

Construction Noise Conclusion

ConnectMenlo Mitigation Measure NOISE-1c states that the property owner/developer shall be responsible for requiring contractors to implement specific measures to reduce construction-related noise. Project construction would be required to comply with these measures, as feasible. However, Project construction would not be limited to the daytime hours between 8:00 a.m. to 6:00 p.m. on Monday through Friday, as outlined in the first bullet of the original ConnectMenlo mitigation measure. Although implementation of this mitigation measure would reduce construction noise, it would not be expected to reduce construction noise impacts to offsite receptors to less than significant levels.

Implementation of Mitigation Measures NOI-1.1 and NOI-1.2 would reduce noise and would reduce the severity of construction noise impacts from the Project Site and the Hamilton Avenue Parcels during daytime, early morning, and evening hours. For example, locating equipment as far as possible from noise-sensitive uses and equipping equipment with mufflers and sound control devices would reduce noise. Shrouding or shielding individual equipment with noise levels in excess of 85 dBA at 50 feet would also help reduce noise. In addition, Project Mitigation Measure NOI-1.1 includes the installation of a temporary construction noise barrier along the perimeter of the main Project Site and potentially on the Hamilton Avenue Parcels in areas where construction would occur near residential or school land uses. These construction noise barriers would reduce construction noise effects to the nearby residences and schools. However, in order for temporary noise barriers to be effective, they must block the full line-of-sight between the noise source and the receiver, which may not be feasible in all locations for all construction activities due to the proximity between the source and the receiver, or due to the types of equipment being used (e.g., pile drivers). In addition, installing a temporary construction noise barrier may not reduce noise from all activities to below significance criteria at the nearest receptors, even if noise is somewhat reduced. Further, regarding pile drivers and the individual equipment noise threshold (85 dBA at 50 feet), it may be infeasible or result in safety concerns to utilize noise shielding around individual pile drivers during operation. For the aforementioned reasons, these measures may not reduce noise sufficiently in all instances and all locations to prevent a noise increase of 10 dB or more relative to ambient noise levels, or to reduce construction noise outside of the standard daytime hours such that compliance with applicable Municipal Code noise limits is achieved. In addition, individual pile driver equipment noise may also not be reduced to below the 85 dBA threshold at 50 feet. Therefore, construction noise impacts from

construction at the main Project Site and the Hamilton Avenue Parcels would be ***significant and unavoidable*** with mitigation during daytime, early morning, evening, and nighttime hours.

Implementation of ConnectMenlo Mitigation Measure NOISE-1c and Project Mitigation Measure NOI-1.1 would also reduce the amount of construction noise experienced by nearby noise-sensitive receptors from off-site intersection improvement activities from construction of the Willow Road Tunnel, and from the nighttime PG&E feeder line and waterline construction work. While this mitigation measure would reduce construction noise effects to offsite noise-sensitive uses during nighttime hours, it may not be possible in all times and at all locations to reduce noise levels to less-than-significant levels. For example, locating equipment as far as possible from noise-sensitive uses and equipping equipment with mufflers and sound control devices would reduce noise, but may not reduce the noise increase sufficiently due to the close proximity of residences to the off-site improvement work areas. Further, it is likely infeasible to construct temporary noise barriers around the off-site linear construction work areas for the water line or feeder line, or within the SamTrans/Caltrans right-of-way for the Willow Village Tunnel and other short-term intersection improvement work. Therefore, and although off-site improvement construction would be relatively short-term, construction noise impacts from these off-site improvements to noise-sensitive land uses during nighttime hours would be ***significant and unavoidable.***

In conclusion, even with the implementation of all feasible mitigation measures, construction noise impacts from Project Site construction, Hamilton Avenue Parcels construction, and off-site improvement construction would be ***significant and unavoidable*** with mitigation***.***

Modified ConnectMenlo Mitigation Measure NOISE-1c.[6]

> Project applicants for all development projects in the city shall minimize the exposure of nearby properties to excessive noise levels from construction-related activity through CEQA review, conditions of approval and/or enforcement of the City's Noise Ordinance. Prior to issuance of demolition, grading, and/or building permits for development projects, a note shall be provided on development plans indicating that during on-going grading, demolition, and construction, the property owner/developer shall be responsible for requiring contractors to implement the following measures to limit construction-related noise:
>
> - All internal combustion engines on construction equipment and trucks are fitted with properly maintained mufflers, air intake silencers, and/or engine shrouds that are no less effective than as originally equipped by the manufacturer.
> - Stationary equipment such as generators and air compressors shall be located as far as feasible from nearby noise-sensitive uses.
> - Stockpiling is located as far as feasible from nearby noise-sensitive receptors.
> - Limit unnecessary engine idling to the extent feasible.
> - Limit the use of public address systems.
> - Construction traffic shall be limited to the haul routes established by the City of Menlo Park.

[6] ConnectMenlo Mitigation Measure NOISE-1c has been modified to remove the limitation on construction activity to the daytime hours of 8:00 a.m. to 6:00 p.m. Monday through Friday because certain off-site improvement work (i.e., work in Caltrans and SamTrans right of way) would only be allowed to occur outside of the daytime hours. In addition, given the project scale and build out, work would need to occur outside of these standard daytime hours to reduce the total length (i.e., number of years) of the construction duration.

Project Mitigation Measure NOI-1.1: Construction Noise Control Plan to Reduce Construction Noise.

The Project applicant and/or the contractor(s) shall obtain a permit to complete work outside the exempt/standard construction hours outlined in the City of Menlo Park Municipal Code, which may be incorporated into the conditional development permit for the Proposed Project. In addition, the applicant and/or contractor(s) shall develop a construction noise control plan to reduce noise levels and comply with Municipal Code daytime (during non-exempt hours) and nighttime noise standards to the extent feasible and practical, subject to review and determination by the Community Development Department. The plan shall also include measures to reduce noise levels such that a 10-dB increase over the ambient noise level does not occur at nearby noise-sensitive land uses, such as schools and residences to the extent feasible and practical (as determined by the City). Finally, the plan shall include measures to reduce pile driving noise such that noise from this equipment does not exceed 85 dBA L_{eq} at a distance of 50 feet, as feasible.

The plan shall demonstrate that, to the extent feasible and practical, noise from construction activities that occur daily between 7:00 and 8:00 a.m. or between 6:00 p.m. and 10:00 p.m. will comply with the applicable City of Menlo Park noise limit of 60 dBA at the nearest existing residential or noise-sensitive land use, and construction activities that occur between 10:00 p.m. and 7:00 a.m. will comply with the applicable City noise limit of 50 dBA at the residential or noise-sensitive land use. The plan shall also demonstrate that, to the extent feasible and practical (as determined by the City), noise from construction activities during all hours will not result in a 10-dB increase over the ambient noise level at the nearest noise-sensitive land uses, and that pile driving noise would not exceed 85 dBA Leq at a distance of 50 feet. This Noise Control Plan shall be approved by the City prior to the issuance of building permits to confirm the precise noise minimization strategies that will be implemented and to document that strategies will be employed to the extent feasible and practical.

Measures to help reduce noise from construction activity to these levels shall be incorporated into this plan and may include, but are not limited to, the following:

- To the extent feasible and practical, plan for the noisiest construction activities to occur during daytime hours when the quantitative standards are less stringent, existing ambient noise levels are generally louder, and when people are less sensitive to noise.
- Require all construction equipment be equipped with mufflers and sound control devices (e.g., intake silencers and noise shrouds) that are in good condition (at least as effective as those originally provided by the manufacturer) and appropriate for the equipment.
- Maintain all construction equipment to minimize noise emissions.
- Locate construction equipment as far as feasible from adjacent or nearby noise-sensitive receptors.
- Require all stationary equipment be located to maintain the greatest possible distance to the nearby existing buildings, where feasible and practical.
- Require stationary noise sources associated with construction (e.g., generators and compressors) in proximity to noise-sensitive land uses to be muffled and/or enclosed within temporary enclosures and shielded by barriers, to the extent feasible and practical, which can reduce construction noise by as much as 5 dB.
- Install noise-reducing sound walls or fencing (e.g. temporary fencing with sound blankets) around noise-generating equipment, to the extent feasible and practical, where no perimeter wall is provided pursuant to Mitigation Measure NOI-1.2.

- Prohibit idling of inactive construction equipment for prolonged periods during nighttime/non-standard hours (i.e., more than 2 minutes).
- Provide advance notification in the form of mailings/deliveries of notices to surrounding land uses regarding the construction schedule, including the various types of activities that would be occurring throughout the duration of the construction period.
- Provide the name and telephone number of an on-site construction liaison through on-site signage and on the notices mailed/delivered to surrounding land uses. If construction noise is found to be intrusive to the community (i.e., if complaints are received), the construction liaison shall take reasonable efforts to investigate the source of the noise and require that reasonable measures be implemented to correct the problem.
- Use electric motors rather than gasoline- or diesel-powered engines to avoid noise associated with compressed air exhaust from pneumatically powered tools during nighttime hours, to the extent feasible and practical (as determined by the City). Where the use of pneumatic tools is unavoidable, an exhaust muffler on the compressed air exhaust could be used; this muffler can lower noise levels from the exhaust by about 10 dB. External jackets on the tools themselves could be used, which could achieve a reduction of 5 dB.

Project Mitigation Measure NOI-1.2: Construction of Temporary Noise Barrier along Project Perimeter.

Regarding the main Project site, the Project contractor(s) shall install an 8-foot-high temporary noise barrier along the complete length of the western and southern perimeter (e.g., areas near residential and school land uses), and along the southernmost 500 feet of the eastern perimeter of the main Project Site. As project buildout occurs, removal and/or adjustment in the location of the perimeter noise barrier may occur because either the construction of project buildings (completion of core and shell) in alignment with said perimeter barrier and therefore the perimeter barrier is not needed, or preparation of an acoustical analysis indicates the balance of the construction activities will not result in construction noise that exceeds the allowable limits.

Regarding the Hamilton Avenue Parcel South, a similar noise barrier shall be installed around the southern, western and northern perimeters as well as the southernmost 100 feet of the eastern perimeter of the Hamilton Avenue Parcel South, unless the Project Sponsor can demonstrate, through an acoustical analysis, that construction noise at this site would not exceed the allowable limits. The decision regarding the necessity of this barrier and location(s) shall be subject to review and approval of the City based on evidence and analyses providing by the applicant team.

Regarding the Hamilton Avenue Parcel North, a similar noise barrier shall also be constructed along the southern and western perimeters, and the easternmost 100 feet of the northern perimeter of the Hamilton Avenue Parcel North, unless the Project Sponsor can demonstrate, through an acoustical analysis, that construction noise at this site would not exceed the allowable limits. The decision regarding the necessity of this barrier and location(s) shall be subject to review and approval of the City based on evidence and analyses providing by the applicant team.

The barriers shall be constructed of material that has an acoustical rating of at least 26 STC (Sound Transmission Class). This can include a temporary barrier constructed with plywood supported on a wood frame, sound curtains supported on a frame, or other comparable material.

Construction Noise Impacts to Onsite Land Uses Daytime Hours (8:00 a.m. to 6:00 p.m.)

Although not required by CEQA, this section describes construction noise effects on the Project's users and residents during Project construction, as onsite residential land uses may be occupied during late-

stage Project construction. As a part of the construction schedule, construction on portions of the Project Site would be completed by late in the year 2025 while other portions would still be under construction. During this time, some of the Project's onsite residential uses (including the proposed on-site hotel) might be occupied. Therefore, there may be a period where there are onsite noise-sensitive land uses during Project construction. It is anticipated that residential occupancy might occur as early as the end of August 2025. Parcels 2, 3, 4, 5, 6, and 7 would contain residential buildings. It is anticipated that onsite residential (including the hotel) buildings could be located as close as 35 feet from late-stage onsite construction.

Construction activities that might occur while onsite sensitive uses are occupied include tenant improvements (of Parcels 3, 4, 5, 6, and 7), landscaping (of Parcels 2, 3, 4, 5, 6, and 7), and core and shell (for Parcels 4 and 5) subphases of construction. Refer to Appendix 3.7 for a list of the equipment proposed for use during these construction subphases.

Modeling was conducted based on the methodologies described previously to estimate reasonable worst-case noise levels from these construction subphases. Based on the modeling results, combined construction noise at a reference distance of 50 feet for the tenant improvement, landscaping, and core and shell construction activities could be in the range between 80 to 82 dBA L_{eq}. Table 3.7-17 identifies the combined noise level, in terms of L_{eq}, from operation of the three loudest pieces of construction equipment for specified phases at various distances between operational onsite sensitive land uses and continued onsite construction activities.

Table 3.7-17. Construction Noise Levels during Onsite Occupancy by Subphase

Distance from Source (feet)	Tenant Improvements dBA L_{eq}	Landscaping dBA L_{eq}	Core and Shell dBA L_{eq}
25	88.0	86.3	88.1
35	**85.1**	**83.4**	85.2
50	82.0	80.3	82.1
85	77.4	75.7	**77.5**
90	76.9	75.2	77.0
100	76.0	74.3	76.1
150	72.5	70.8	72.6
200	70.0	68.3	70.1

Notes:
- Geometric attenuation based on 6 dB per doubling of distance.
- This calculation does not include the effects, if any, of local shielding.
- L_{eq} noise is presented in dBA units, which approximate the frequency response of the human ear.
- The three loudest pieces of equipment for each phase are as follows:
  - Tenant Improvements: dump truck, generator, and Gradall.
  - Landscaping: excavator, backhoe, and front-end loader.
  - Core and Shell: generator, Gradall, and crane

Tenant improvements and landscaping could occur within 35 feet of an onsite sensitive land use (residential). At this distance, noise levels from tenant improvements could be as high as 85 dBA L_{eq} and noise levels from landscaping activities could be as high as 83 dBA L_{eq}, based on the construction noise modeling results. Core and shell activities could occur within 85 feet of the nearest onsite sensitive land use, resulting in noise levels are high as 76 dBA L_{eq} at the nearest onsite sensitive land use.

The analysis above demonstrates that during daytime hours, construction activities at the main Project Site have the potential to result in a temporary increase in ambient noise levels at nearby onsite residential land uses. During daytime hours, construction activities associated with the Project would not conflict with the City Municipal Code because of the daytime construction noise exemption. Specifically, between the hours of 8:00 a.m. and 6:00 p.m., construction noise is not restricted by the quantitative noise limits in the City. In addition, as future residences do not currently exist, and a comparison to the existing ambient would not be appropriate. Therefore, because construction activities on the Project Site occurring concurrent with Project operation would be temporary in nature, and would not conflict with the City code, construction noise impacts to onsite uses during daytime hours would be ***less than significant.***

Early Morning and Evening Hours (7:00 a.m. to 8:00 a.m., 6:00 p.m. to 10:00 p.m.)

All construction activities that would occur during daytime hours (as described above) could also occur during early morning (7:00 a.m. to 8:00 p.m.) and evening (6:00 p.m. to 10:00 p.m.) hours. Noise during these hours is limited to 60 dBA per Title 8.06.040[a] of the City Noise Ordinance.

As shown in Table 3.7-17, above, noise from the loudest Project construction subphase proposed to occur during onsite occupancy (tenant improvements) could result in noise levels of up to 85 dBA L_{eq} at the nearest onsite residential or hotel land use (approximately 35 feet away). Should these activities take place outside of the daytime exempt hours for construction noise in the City of 8:00 am. to 6:00 p.m., noise levels from the Project Site construction would exceed the allowable daytime noise threshold of 60 dBA during early morning (7:00 a.m. to 8:00 a.m.) and evening hours (6:00 p.m. to 10:00 p.m.). Construction noise impacts during early morning and evening hours to onsite land uses would be considered **significant**, and mitigation would be required.

ConnectMenlo Mitigation Measure NOISE-1c states that the property owner/developer shall be responsible for requiring contractors to implement specific measures to reduce construction-related noise. Project construction would be required to comply with these measures, as feasible. However, Project construction would not be limited to the daytime hours between 8:00 a.m. to 6:00 p.m. on Monday through Friday, as outlined in the first bullet of this mitigation measure. In addition, although this implementation of this mitigation measure would reduce construction noise, it would not be expected to reduce construction noise impacts to onsite receptors to less than significant levels.

Mitigation Measure NOI-1.1, described previously, includes measures to reduce noise from construction activity during non-exempt hours for construction noise. While this mitigation measure would reduce construction noise effects to offsite as well as onsite noise-sensitive uses, it may not be possible to reduce noise levels during all non-daytime construction activities to less-than-significant levels. For example, locating equipment as far as possible from noise-sensitive uses and equipping equipment with mufflers and sound control devices would reduce noise, but might not reduce noise to below significance criteria. Therefore, construction noise impacts to onsite land uses during early morning (7:00 a.m. to 8:00 a.m.) and evening hours (6:00 p.m. to 10:00 p.m.) would be ***significant and unavoidable.***

Nighttime Hours (10:00 p.m. to 7:00 a.m.)

Of the construction phases that are anticipated for nighttime hours, none are expected to occur while onsite residential buildings and the hotel are occupied. For this reason, nighttime construction noise impacts to onsite sensitive land uses would not occur.

Construction Haul and Vendor Truck Noise

Project construction would involve the use of haul trucks to move excavated materials, and vendor trucks to deliver materials to the Project Site. Based on the data provided by the Project applicant, up to 386 one-way vendor and haul truck trips could occur on a worst-case day (when the demolition and grading/utilities subphases of construction Phase 1 overlap). Note that during most of the Project construction window, there would be substantially fewer truck trips. However, construction truck noise from a reasonable worst-case day is analyzed to provide a conservative assessment.

There are two main routes that lead to the four landfill/quarries that have been identified by the Project applicant. The main routes involve the trucks either traveling south on Willow Road to US 101, or traveling north on Willow Road and then traveling east on Bayfront Expressway (CA 84). This analysis does not evaluate haul truck noise on highways because traffic noise from highways such as US 101 or CA 237 are generally already high; the introduction of Project haul trucks, even during reasonable worst-case days, would not likely influence the existing noise level. The construction truck noise analysis focuses on potential noise impacts along nearby surface streets.

The temporary addition of up to 386 haul trucks trips per day on these roadway segments was analyzed to determine if construction truck activity would result in substantial increases to the ambient noise levels at nearby noise sensitive land uses. The City of Menlo Park does not specify noise thresholds pertaining to construction haul truck noise. Therefore, per the approach for the assessment of traffic noise impacts, in areas where the baseline noise levels do not exceed the "normally acceptable" land use compatibility standard, an increase of more than 5 dB is considered a significant construction truck noise increase. In areas where the baseline noise levels do exceed the "normally acceptable" level based on the land use compatibility chart, a 3 dB or larger increase is considered a significant construction truck noise increase.

Note that a 3-dB increase over existing traffic noise levels is generally considered to be "barely perceptible." Modeling was conducted to estimate daily traffic noise levels with and without the addition of construction haul truck trips. (e.g., a comparison of noise from "baseline" to "baseline plus Project Construction truck" conditions). Table 3.7-18 shows estimated traffic noise levels along the roadway segments under "baseline" and "baseline plus Project construction truck" conditions based on the assumptions described above.

As shown in Table 3.7-18, noise increases due to haul and vendor truck activity would not be expected to result in a greater than 3 dB increase, or a "barely perceptible" increase, in traffic noise along any of the analyzed segments, and the aforementioned 3- and 5-dB increase thresholds would not be exceeded. The greatest increase in noise is expected to be 0.8 dB. Therefore, noise impacts related to construction haul truck activity would be ***less than significant.***

Table 3.7-18. Baseline and Baseline plus Project Haul Truck Noise Levels

Roadway	Segment	Baseline Traffic Noise Levels (dBA L_{dn})	Baseline plus Construction Truck Noise Levels (dBA L_{dn})	Delta dB
Bayfront Expressway	Between Willow Road and University Avenue	74.0	74.4	0.3
Bayfront Expressway	East of University Avenue	75.4	75.7	0.3
Willow Road	Between Bayfront Expressway and Hamilton Avenue	69.8	70.5	0.7
Willow Road	Between Hamilton Avenue and Ivy Drive	69.9	70.6	0.7
Willow Road	Between Ivy Drive and O'Brien Drive	69.7	70.5	0.8
Willow Road	Between O'Brien Drive and Newbridge Street	70.6	71.0	0.4
Willow Road	Between Newbridge Street and the US 101 NB Ramps	71.5	72.0	0.4

Note:
Reasonable worst-case haul truck volume assumed 386 one-way truck trips per day.
The modeling distance used for noise levels was set to 50 feet.

Impact NOI-1b: Operational Noise. Operation of the Proposed Project would generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the Project in excess of standards established in a local general plan or noise ordinance or applicable standards of other agencies. (LTS/M)

Operational Noise

Operational Traffic Noise

The Proposed Project could result in increased traffic noise in the project vicinity. To determine if the Proposed Project would result in a substantial permanent increase in traffic noise levels, a ratio analysis was conducted based on average daily trip (ADT) traffic data provided by Hexagon Transportation Consultants. Traffic volumes for baseline and baseline plus-Project conditions were compared to determine if traffic increases associated with the Proposed Project would result in significant traffic noise impacts.

Traffic noise increases can be estimated based on a ratio analysis that compares baseline traffic volumes to baseline plus-Project traffic volumes, because potential increases in traffic noise directly coincide with increases in ADT on a given segment. For example, a doubling of traffic (e.g., from 100 to 200 vehicles on a given segment) would result in a 3 dB change in the noise level. In general, human sound perception is such that a change in sound level of 1 dB cannot typically be perceived by the human ear, a change of 3 dB is barely noticeable, a change of 5 dB is clearly noticeable, and a change of 10 dB is perceived as doubling or halving the sound level as it increases or decreases, respectively. Per the standard approach for the assessment of traffic noise impacts, in areas where the baseline and resulting (baseline plus project) noise levels do not exceed the "normally acceptable" land use compatibility standard, an increase of more than 5 dB is considered a significant traffic noise increase. In areas where the baseline and resulting (baseline plus project) noise levels do exceed the "normally acceptable" level based on the land use compatibility

chart, a 3 dB or larger increase from baseline to baseline plus conditions is considered a significant traffic noise increase.

Most segments analyzed in the traffic noise analysis would be exposed to a 0 to 9 percent Project-related increase in traffic volumes, with many experiencing no increase at all as a result of the Project. However, some segments would experience a greater increase in traffic volumes as a result of Project implementation. Refer to Table 3.7-19 for a summary of the traffic noise ratio analysis. This table only shows modeling results for segments with Project-related increases in traffic of 10 percent or more, which correlates to an increase in noise of less than 0.4 dB. An increase of less than 25 percent attributable to the Project correlates to an increase in noise of less than 1 dB, noting that a 3 dB increase is necessary before a traffic noise increase is considered to be "barely perceptible." Refer to Appendix 3.7 for the full results of the traffic noise analysis.

Based on the ratio analysis, three roadway segments may experience an increase of 3 dB or more as a result of the Project. The three segments are:

- O'Brien Drive East of Adams Drive
- O'Brien Drive West of Adams Drive
- O'Brien Drive West of University Avenue

Note that, although Project-related traffic noise increases along these segments were modeled to exceed 3 dB, there are no noise-sensitive land uses located along these segments. Specifically, commercial and light industrial land uses are located along O'Brien Drive both west and east of Adams Drive (and west of University Avenue), which are considered compatible with noise levels of up to 70 dBA L_{dn} (for office and commercial) and 75 dBA L_{dn} (for industrial) and are not considered to be "noise-sensitive." In addition, existing daytime noise levels in this area (based on the noise measurement conducted at ST-3) are in the range of 56 dBA L_{eq}. Therefore, a 5-dB increase would be allowed along these roadway segments before a significant impact would be identified, and no increase of greater than 3.8-dB was modeled to occur. The Open Mind School is located further to the west along O'Brien Drive. However, the Project-related traffic noise increase along this segment (O'Brien Drive north of Kavanaugh Drive) was determined to be below 3 dB. Therefore, because Project-related traffic increases would not result in traffic noise increases in excess of thresholds along segments with noise-sensitive land uses, Project traffic noise impacts would be ***less than significant.***

Table 3.7-19. Baseline Traffic Volume Increases Associated with Project Trips

Roadway	Segment	Average Daily Traffic Volumes			Approximate dB Increase from Project Implementation
		Baseline ADT	Baseline plus Project ADT	Percentage Increase	
Bayfront Expressway	East of Marsh Road	41,750	46,491	11%	0.5
Marsh Road	North of US 101 Ramps	30,560	34,094	12%	0.5
Bayfront Expressway	East of Chrysler Drive	36,835	41,729	13%	0.5
Bayfront Expressway	West of Chrysler Drive	43,420	48,161	11%	0.4
Bayfront Expressway	East of Chilco Street	36,060	40,704	13%	0.5
Bayfront Expressway	West of Chilco Street	36,820	41,714	13%	0.5
Bayfront Expressway	East of MPK 21	34,447	37,737	10%	0.4
Facebook Way	South of Bayfront Expressway	6,670	8,024	20%	0.8
Bayfront Expressway	West of Facebook Way	35,865	40,509	13%	0.5
Chilco Street	South of Constitution Drive	7,630	8,711	14%	0.6
Chilco Street	North of Hamilton Avenue	5,225	6,313	21%	0.8
Chilco Street	South of Hamilton Avenue	3,815	4,724	24%	0.9
Hamilton Avenue	West of Chilco Street	2,050	2,251	10%	0.4
Willow Road	South of Bayfront Expressway	21,665	23,757	10%	0.4
Willow Road	North of Hamilton Avenue	21,735	23,827	10%	0.4
Willow Road	South of Hamilton Avenue	20,845	26,966	29%	1.1
Willow Road	North of Ivy Drive	22,195	25,800	16%	0.7
O'Brien Drive	East of Willow Road	8,026	9,455	18%	0.7
Willow Road	South of O'Brien Drive	28,260	33,165	17%	0.7
Willow Road	North of Newbridge Street	27,795	32,705	18%	0.7
Willow Road	South of Newbridge Street	34,387	39,625	15%	0.6
Willow Road	North of US 101 NB Ramps	35,427	40,665	15%	0.6
US 101 NB Ramps	West of Willow Road	4,857	6,335	30%	1.1
US 101 SB Ramps	West of Willow Road	15,967	17,681	11%	0.4
Bay Road	West of Willow Road	8,551	9,409	10%	0.4
O'Brien Drive	North of Kavanaugh Drive	6,116	10,753	76%	2.4
Kavanaugh Drive	East of O'Brien Drive	2,872	4,710	64%	2.1
O'Brien Drive	South of Kavanaugh Drive	8,391	10,157	21%	0.8

Roadway	Segment	Average Daily Traffic Volumes			Approximate dB Increase from Project Implementation
		Baseline ADT	Baseline plus Project ADT	Percentage Increase	
O'Brien Drive	**East of Adams Drive**	**4,174**	**9,921**	**138%**	**3.7**
O'Brien Drive	**West of Adams Drive**	**5,856**	**11,605**	**98%**	**3.0**
O'Brien Drive	**West of University Avenue[a]**	**3,954**	**9,579**	**142%**	**3.8**
Notre Dame Avenue	East of University Avenue	1,195	1,461	22%	0.8
Runnymede Street	West of University Avenue	3,534	4,038	14%	0.6
Cooley Avenue	North of Donohoe Street	7,311	8,056	10%	0.4

Source: Hexagon Transportation Consultants —refer to Appendix 3.7.
Note: **Bolded** text indicates data mentioned in report.

Mechanical Equipment Noise

South Garage Central Energy Plant

A central energy plant is proposed for the Project's South Garage. Mechanical equipment used to run this facility would include an estimated five chillers, four condenser water pumps, four chilled water pumps, and four cooling towers. The makes and models of all equipment, as well as the ultimate quantities of proposed equipment, have not yet been finalized. This analysis is based on the best estimates available at the time of EIR preparation. The proposed chillers and water pumps would be located indoors and surrounded by solid walls. Cooling towers would be located within a walled enclosure on top of the garage. The enclosure height would match the height of the towers, with an opening on top to release water vapor. Noise generated by equipment located in a mechanical room would be attenuated somewhat by the walls of the room. A conservative assumption of 5 dB of reduction was applied to all equipment located inside this room, though noise may be further reduced by the walls. Noise from equipment located behind a screened enclosure may be reduced slightly by the screen but is typically not substantially reduced unless the screen is solid. Since details of the screen are not known at this time, a reduction is not applied to noise sources located on the roof behind the screened enclosure.

Chillers, such as the approximately five proposed for the central energy plant, can produce noise levels of up to approximately 69 dBA at 50 feet[7]. Pumps, such as the proposed condensing water pumps and chilled water pumps, can produce noise levels of approximately 78 dBA at a distance of 50 feet[8]. The proposed cooling tower can produce noise levels of approximately 57 dBA at 50 feet[9]. Based on these source noise levels, combined noise from five chillers, four condenser water pumps, four chilled water pumps, and four cooling towers at a distance of 50 feet could be up to approximately 82 dBA, conservatively assuming all equipment was operational simultaneously and relatively close to one another. Note that it is possible that equipment would not all be operating simultaneously, and actual noise levels would be reduced. However, these combined noise levels are presented to ensure a conservative analysis.

The nearest off-site sensitive land use to the South Garage is Open Mind School. The proposed rooftop mechanical equipment on the South Garage could be located as close as 225 feet from this building (though as a result of the height of the South Garage, it would likely be located further away). Based on the source noise levels cited above, combined noise from this equipment at a distance of 225 feet would be approximately 69 dBA. The nearest residences to equipment in the South Garage are located approximately 400 feet away. At this distance, mechanical equipment noise could be as high as approximately 64 dBA. As described previously, stationary noise sources are regulated by Chapter 8.06 of the Menlo Park Municipal Code which states daytime noise levels are limited to 60 dBA and nighttime noise levels are limited to 50 dBA. In addition, noise levels from rooftop equipment in the City are limited to 50 dBA at 50 feet. For these reasons, and based on the currently proposed equipment, mechanical equipment noise from the South Garage central energy plant may exceed the daytime and nighttime thresholds outlined in the City Municipal Code, as well as the rooftop equipment noise threshold. Impacts from mechanical equipment noise at the South Garage would be considered **significant**, and mitigation would be required.

[7] Trane. 2019. Sound Pressure Levels and attenuation for CVHF 1070 Centrifugal Water-Cooled Chillers: 60 Hz and 50 Hz.

[8] Federal Highway Administration. 2006. *FHWA Roadway Construction Noise Model User's Guide*. FHWA-HEP-05-054. January. Available: https://www.fhwa.dot.gov/ENVIRonment/noise/construction_noise/rcnm/rcnm.pdf.

[9] Baltimore Aircoil Company. 2020. Cooling Tower Selection Report for S3E-142412S Series 3000.

North Garage Central Energy Plant

The North Garage of the Project Site would also contain a central energy plant with Project implementation. At this time, it is expected that this central energy plant would include two to four water-cooled chillers, four to six ice storage tanks, two glycol chilled water pumps, two to four heat pumps, two to three heating water pumps, four to six cooling towers, two condenser water pumps, two to four heat exchangers, one fuel oil tank, two fuel oil pumps, one battery storage unit, and three medium voltage substations. All equipment would be located internally within the North Garage, except for the cooling towers, which would be enclosed on the top level of the garage with an open top to release water vapor. A conservative assumption of 5-dB of reduction was applied to all equipment located inside this room, though noise may be further reduced by the walls. Noise from equipment located behind a screened enclosure may be reduced slightly by the screen but is typically not substantially reduced unless the screen is solid. Since details of the screen are not known at this time, a reduction is not applied to noise sources located on the roof behind the screened enclosure.

Chillers, such as the four proposed for the central energy plant, can produce noise levels of up to 69 dBA at 50 feet [10]. An ice storage tank (which often requires pumps) is assumed to have similar noise levels to that of a chiller, in the range of 69 dBA at 50 feet[11]. Pumps, such as the proposed Glycol chilled water pumps, chilled water pumps, heat pump, heating water pumps, condensing water pumps, and fuel oil pumps can each produce noise levels of approximately 78 dBA at a distance of 50 feet [12]. The proposed cooling tower can produce noise levels of approximately 57 to 59 dBA at 50 feet. The proposed heat exchanger can produce noise levels of 34 dBA at 50 feet[13]. The battery storage equipment can produce approximately 57 dBA at 50 feet[14] An MV Substation could produce an approximate noise level of approximately 59 dBA L_{eq} at 50 feet[15]. Based on these source noise levels, combined noise from four chillers, six ice storage tanks, two glycol chilled water pumps, three chilled water pumps, four heat pumps, three heating water pumps, six cooling towers, two condensing water pumps, four heat exchanges, two fuel oil pumps, one battery storage, and three MV substations at a distance of 50 feet could be up to 101 dBA, assuming all equipment was operational simultaneously and relatively close to one another.

The nearest off-site sensitive land use to the North Garage central energy plant is Open Mind School. The Project building would be located approximately 1,080 feet from the school. As a conservative worst-case, this analysis assumes the proposed rooftop mechanical equipment could be located 1,080 feet from this building (though as a result of the height of the North Garage, it would likely be located further away). Note that there would also be many intervening buildings, and noise would likely be attenuated (from the noise levels presented below) as a result of shielding from these buildings. This attenuation is conservatively not accounted for in this analysis.

[10] Trane. 2019. Sound Pressure Levels and attenuation for (CVHF 1070) Centrifugal Water-Cooled Chillers: 60 Hz and 50 Hz.

[11] Trane. 2019. Sound Pressure Levels and attenuation for (CVHF 1070) Centrifugal Water-Cooled Chillers: 60 Hz and 50 Hz.

[12] Federal Highway Administration. 2006. *FHWA Roadway Construction Noise Model User's Guide*. FHWA-HEP-05-054. January. Available: https://www.fhwa.dot.gov/ENVIRonment/noise/construction_noise/rcnm/rcnm.pdf.

[13] PAE Engineers. 2021. *Willow Village Mixed-Use Development – Equipment Summary (Preliminary)* (for REYQ432TYDN). September 9.

[14] Tesla. 2020. *MEGAPACK Specification.*

[15] ICF. 2019. *Streamview Substation Rebuild and Expansion Project – Environmental Noise Report*.

Based on the source noise levels cited above, noise from this equipment at a distance of 1,080 feet would be approximately 74 dBA. The nearest residences to the North Garage central energy plant would be located approximately 1,250 feet away. At this distance, mechanical equipment noise could be as high as approximately 73 dBA, without accounting for shielding/attenuation from intervening buildings. As described previously, stationary noise sources are regulated by Chapter 8.06 of the Menlo Park Municipal Code which states daytime noise levels are limited to 60 dBA and nighttime noise levels are limited to 50 dBA. In addition, noise levels from rooftop equipment in the City are limited to 50 dBA at 50 feet. Even if shielding from intervening buildings would reduce noise from the North Garage central energy plant (e.g., by 10 or more dB), noise levels could still exceed the daytime and nighttime criteria described above, as well as the rooftop equipment noise threshold. Further, since final equipment has not been selected, it is possible that there would be more equipment than evaluated here, or that individual equipment noise levels would be louder than cited above. For these reasons, mechanical equipment noise from the North Garage central energy plant may exceed the daytime and nighttime thresholds outlined in the City Municipal Code, as well as the rooftop equipment noise threshold. Impacts from mechanical equipment noise at the North Garage would be considered **significant**, and mitigation would be required.

Other Project Buildings

The Project would include residential and mixed residential-retail buildings (referred to as mixed-use buildings) and office buildings, which would require various heating, cooling, and ventilation equipment. The proposed hotel, located in Town Square District, would include similar equipment. The mixed-use buildings would be closer to noise-sensitive offsite land uses than the office buildings or proposed hotel. In addition, the mixed-use buildings would require more mechanical equipment per building than the office buildings and hotel. Therefore, mechanical equipment from the mixed-use buildings located closest to offsite receptors is the focus of this analysis.

Parcel 2 is the nearest of these mixed-use parcels to existing residential land uses, with an estimated minimum of 150 feet between the residences located west of Willow Road and rooftop mechanical equipment for Parcel 2. Parcel 5 is the closest of these parcels to the Open Mind School, where equipment could be as close as 200 feet away. Parcel 6 is the closest to Mid-Peninsula High School; mechanical equipment could be as close as 290 feet from the school.

The proposed mixed-use buildings that would require the most mechanical equipment are located on Parcel 2. This parcel would require 24 Variable-refrigerant Flow (VRF) air cooled condensing units, 48 scavenger fans, five garage exhaust fans, four direct outside air system (DOAS) units, one grease exhaust fan, one vapor exhaust fan, eight hot water heating pumps, two air cooled heat pump boilers, and six air source heat pump water heaters. Although this rooftop equipment may be screened or enclosed, specific details of a mechanical room or equipment screen are not known at this time. Unattenuated noise levels are presented in this analysis.

VRF air cooled condensing units, such as the 24 proposed for the parcel two, can produce noise levels of up to approximately 33 dBA at 50 feet.[16] Scavenger fans could produce noise levels as high as 51 dBA at 50 feet.[17] The proposed garage exhaust systems could produce noise levels of approximately 56 dBA at 50 feet.[18] DOAS units, like the ones specified by the Project applicant, could produce noise levels of

[16] PAE Engineers. 2021. *Willow Village Mixed-Use Development – Equipment Summary (Preliminary)* (for REYQ432TYDN). September 9.

[17] PAE Engineers. 2021. *Willow Village Mixed-Use Development – Equipment Summary (Preliminary)* (for USF-18). September 9.

[18] PAE Engineers. 2021. *Willow Village Mixed-Use Development – Equipment Summary (Preliminary)* (for Custom Fan Array). September 9

approximately 62 dBA at 50 feet.[19] The specified grease exhaust fans would be expected to produce noise levels of 53 dBA at 50 feet.[20] Vapor exhaust fans would produce noise levels of approximately 48 dBA at 50 feet.[21] It is estimated that hot water heating pumps could produce noise levels as high as 78 dBA at 50 feet.[22] An air-cooled heating pump boiler, such as the one proposed for the project, could produce noise levels of approximately 54 dBA at 50 feet.[23] Finally, an air source heat pump water heater is expected to produce noise levels of approximately 65 dBA at 50 feet.[24] Parcel 2 has two buildings and based on these source noise levels, combined noise from one of these buildings was modeled to be approximately 84 dBA at 50 feet.

Parcel 2 is the closest mixed-use parcel to existing residential land uses. It is also the most equipment intensive of all mixed-use parcels. This building could be as close as 150 feet from the nearest residential land uses (west of Willow Road). With mechanical equipment located on the roof, it would likely be slightly farther than this distance from the nearest residences. However, a 150-foot distance is conservatively used in this analysis. Based on distance attenuation alone, combined mechanical equipment noise from a single Parcel 2 building (at a distance of 150 feet) could be as high as approximately 73 dBA.

Parcel 5 is the nearest mixed-use Parcel the to Open Mind School. This parcel is proposed to have 22 VRF Air cooled condensing units, two scavenger fans, two garage exhaust fans, four DOAS units, one grease exhaust fan, one vapor exhaust fan, eight hot water heating pumps, two air cooled heat pump boilers, and five air source heat pump water heaters. Like Parcel 2, parcel 5 will have two buildings which will utilize this equipment. The equipment could be as close as 200 feet from Open Mind School. Mechanical equipment at this distance could produce noise levels as high as approximately 72 dBA.

The closest Parcel to the Mid-Peninsula High School is Parcel 6, the equipment for which could be as close as 300 feet from this school. Parcel 6 is proposed to have 22 VRF Air cooled condensing units, two scavenger fans, two garage exhaust fans, four DOAS units, one grease exhaust fan, one vapor exhaust fan, eight hot water heating pumps, two air cooled heat pump boilers, and five air source heat pump water heaters. At a distance of 300 feet, noise levels from the specified mechanical equipment could be approximately 69 dBA.

As described previously, stationary noise sources are regulated by Chapter 8.06 of the Menlo Park Municipal Code which states daytime noise levels are limited to 60 dBA and nighttime noise levels are limited to 50 dBA. In addition, noise levels from rooftop equipment in the City are limited to 50 dBA at 50 feet. Therefore, based on the currently proposed equipment, mechanical equipment noise from the Project's mixed-use parcels could exceed the daytime and nighttime thresholds outlined in the City Municipal Code, as well as the rooftop equipment noise threshold. Impacts from mechanical equipment noise at individual Project buildings would be considered significant, and mitigation would be required.

Modeling indicates that noise from Project mechanical equipment could result in noise levels in excess of applicable thresholds. Mitigation Measure NOISE-1b from the ConnectMenlo EIR in combination with Project Mitigation measure NOI-1.3 would ensure noise from Project mechanical equipment would

[19] DPSA031

[20] PAE Engineers. 2021. *Willow Village Mixed-Use Development – Equipment Summary (Preliminary)* (for USF-24). September 9

[21] PAE Engineers. 2021. *Willow Village Mixed-Use Development – Equipment Summary (Preliminary)* (for USF-13). September 9

[22] Federal Highway Administration. 2006. *FHWA Roadway Construction Noise Model User's Guide*. FHWA-HEP-05-054. January. Available: https://www.fhwa.dot.gov/ENVIRonment/noise/construction_noise/rcnm/rcnm.pdf.

[23] Aermec Air Conditioning. UNKNOWN YEAR. Reversible heat pumps high efficiency – Technical Manual (for NRK700).

[24] PAE Engineers. 2021. *Willow Village Mixed-Use Development – Equipment Summary (Preliminary)* (for CxA-25). September 9

comply with the noise limits outlined in Chapter 8.06 of the Menlo Park Municipal Code. Therefore, impacts from Project mechanical equipment noise would be ***less than significant with mitigation***.

ConnectMenlo Mitigation Measure NOISE-1b.

> Stationary noise sources and landscaping and maintenance activities shall comply with Chapter 8.06, Noise, of the Menlo Park Municipal Code.

Project Mitigation Measure NOI-1.3: Mechanical Equipment Noise Reduction Plan.

> To reduce potential noise impacts resulting from Project mechanical equipment, including heating, cooling, and ventilation equipment, the Project applicant shall conduct a noise analysis to estimate noise levels of Project-specific mechanical equipment based on the final selected equipment models and design features. In addition to the analysis, a Mechanical Equipment Noise Reduction Plan shall be created to ensure noise levels of equipment, once installed, are below the applicable criteria described below. The Noise Reduction Plan shall include any necessary noise reduction measures required to reduce Project-specific mechanical equipment noise to less-than-significant levels. The plan shall also demonstrate that with the inclusion of selected measures, noise from equipment would be below the significance thresholds. Feasible noise reduction measures to reduce noise below the significance thresholds include, but are not limited to, selecting quieter equipment, utilizing silencers and acoustical equipment at vent openings, siting equipment farther from the roofline, and/or enclosing all equipment in a mechanical equipment room designed to reduce noise. This analysis shall be conducted and the results and final Noise Reduction Plan shall be provided to the City prior to the issuance of building permits for each building.
>
> The noise analysis and Noise Reduction Plan shall be prepared by persons qualified in acoustical analysis and/or engineering. The Noise Reduction Plan shall demonstrate with reasonable certainty that noise from mechanical equipment selected for the Project, including the attenuation features incorporated into the Project design, will not exceed the City of Menlo Park's property plane threshold of 60 dBA during daytime hours or 50 dBA during nighttime hours at nearby noise-sensitive land uses, as well as the 50 dBA at 50 feet threshold that applies to rooftop equipment in the City.
>
> The Project applicant shall incorporate all feasible methods to reduce noise identified above and other feasible recommendations from the acoustical analysis and Noise Reduction Plan into the building design and operations as necessary to ensure that noise sources meet applicable requirements of the respective noise ordinances at receiving properties.

Emergency Generator Noise

Emergency generators installed as part of the proposed Project would result in the generation of audible noise during testing. The Project would include 13 emergency generators located throughout the main Project Site. Noise from the operation of emergency generators during an emergency is typically considered to be exempt from local noise limits. However, even though the testing of emergency generators is a short-term (e.g., less than 1 hour) and intermittent process (usually once or twice per month), noise resulting from generator testing must comply with local noise limits for operational equipment noise. Generator testing is typically conducted on a monthly or biweekly basis for periods of 15 to 30 minutes. A similar testing schedule is expected for the Proposed Project.

In the City of Menlo Park, noise must comply with section 8.06.030 of the City Municipal Code, which includes maximum allowable noise levels as measured at the receiving residential property. Noise during daytime hours (7:00 a.m. to 10:00 p.m.) in the City is generally limited to 60 dBA, and noise during nighttime hours (10:00 p.m. to 7:00 a.m.) is generally limited to 50 dBA. Note that Section 8.06.040(b) of the Municipal Code also states that noise from powered equipment used on a temporary, occasional, or infrequent basis during the hours of eight 8:00 a.m. to 6:00 p.m. Monday through Friday shall be limited to 85 dBA at a distance of 50 feet from the source during the hours of 8:00 a.m. and 6:00 p.m. Testing of the Project emergency generators would take place during the weekday daytime hours listed above. Therefore, this analysis assesses the potential for generator testing noise to exceed the 85 dBA threshold at a distance of 50 feet, and the daytime residential property line (or sensitive use property line) threshold of 60 dBA.

Final equipment makes and models for the Project have not yet been selected, so this analysis is based on noise levels from generators of the same size as proposed for the Project and based on estimated generator locations (noting that these may change slightly prior to Project implementation). Specific details about generator shielding and attenuation features for Project generators are not known at this time. Since the type and sound rating of future generator attenuation features is unknown, this analysis conservatively presents unattenuated noise levels from emergency generator testing.

Hotel Generator

A 600-kW generator would be installed at the hotel with Project implementation. Although the exact make and model of the proposed hotel generator is not known at this time, noise levels from an example 600 kW generator (a Cummins 600DQCA 600 kW generator) are used in this analysis. This generator would be located on the basement level of the hotel and approximately 30 feet east of Willow Road. a Cummins 600 kW generator produces an estimated noise level of 99.7 dBA at 50 feet (combined exhaust and engine noise) without accounting for attenuation associated with mufflers or weather/sound enclosures. Note that the overall noise level is dominated by noise from the exhaust; although the generator would be located internal to the hotel building, the exhaust would need to exit the building and noise would be audible external to the building.

The nearest sensitive receptors to the proposed hotel generator location are the residential land uses along the west side of Willow Road. The nearest residence is located approximately 465 feet from the proposed generator location. At a distance of 465 feet, noise from generator testing would reduce to approximately 80 dBA, based on distance alone. Noise would be further reduced by intervening structures and buildings; however, it is difficult to quantify this reduction, so it is conservatively assumed noise at these residences could be up to the 80 dBA level described above. As described previously, noise from temporary and intermittent generator testing in the city is limited to 85 dBA at 50 feet or 60 dBA at the nearest sensitive receptor during daytime hours. Noise levels at 50 feet (99.7 dBA) and at the nearest receptor (80 dBA) would exceed these allowable limits. Therefore, noise from the testing of this generator may exceed the applicable City criteria, and noise impacts would be considered **significant**.

North Garage Generators

Two 750 kW generators are proposed in the North Garage. Although the exact make and model of the proposed North Garage generators are not known at this time, noise levels from an example 750 kW generator (a Cummins 750DQCB 750 kW generator) are used in this analysis. These generators would be located inside the North Garage, approximately 220 feet northwest of Adams Court. These generators individually produce an estimated noise level of 100.7 dBA at 50 feet (combined exhaust and engine noise) without accounting for attenuation associated with mufflers or weather/sound enclosures. Although it is unlikely that generators would be tested at the same time, combined noise levels from the simultaneous testing of these generators would be approximately 3 dB louder.

The nearest sensitive receptor to the North Garage is the Open Mind School, along the west side of O'Brien Drive and is located approximately 1,100 feet from the proposed generator location. At a distance of 1,100 feet, noise from the testing of one of the 750 kW generators would be approximately 74 dBA. Note that there would be multiple intervening buildings (e.g., two office buildings and the South Garage) located between the north garage and the Open Mind School once the Project Site has been developed. With the presence of the intervening buildings located between these generators and the nearby Open Mind School, it is unlikely that generator testing from the north garage generators would be audible at the school. However, as described previously, because the precise reduction in noise cannot be quantified at this time, unattenuated noise levels are compared to the applicable local thresholds.

Because noise from generator testing would exceed the City's criterion of 60 dBA at the nearest sensitive receptor during daytime hours, and because generator noise at a distance of 50 feet would exceed the 85 dBA threshold for powered equipment, noise impacts from the testing of the North Garage generators would be considered **significant**.

South Garage Generators

According to the Project applicant, the South Garage will include two 1,750 kW generators. Although the exact make and model of the proposed South Garage generators are not known at this time, noise levels from example 1,750 kW generators (Cummins 750DQCB 750 kW generators) are used in this analysis. These generators individually produce an estimated noise level of 96.9 dBA at 50 feet (combined exhaust and engine noise) without accounting for attenuation associated with mufflers or weather/sound enclosures. Although it is unlikely that generators would be tested at the same time, combined noise levels from the simultaneous testing of these generators would be approximately 3 dB louder.

The nearest sensitive receptor to the South Garage is the Open Mind School, located along the west side of O'Brien Drive. This receptor is located approximately 210 feet from the proposed generator location. At a distance of 210 feet, noise from testing one of the generators would be reduced to approximately 84 dBA.

Because noise from generator testing would exceed the City's criterion of 60 dBA at the nearest sensitive receptor during daytime hours, and because generator noise at a distance of 50 feet would exceed the 85 dBA threshold for powered equipment, noise impacts from the testing of the South Garage generators would be considered **significant**.

Residential/Mixed Use Generators

With Project implementation, each of the six residential/mixed-use buildings would have an emergency backup generator. Parcel 2 would have a 1,000-kW generator. It is assumed the 1,000-kW generator would be similar to a Cummins DQFAH 1,000 kW generator. Parcels 4 and 5 would all have a 500-kW generator. Although the make and model have not yet been selected, it is assumed that this generator

would to be similar to a Cummins 500DFEK 500 kW generator for the purposes of this analysis. In addition, with Project implementation, Parcel 3 would have a 750-kW generator, Parcel 6 would have a 250-kW generator, and Parcel 7 would have a 150-kW generator. Although the make and models of these generators have also not been selected, it is assumed the 750-kW generator would be similar to a Cummins 750DQCB 750 kW generator, the 250-kW generator would be similar to a Cummins 250DQDAA 250 kW generator, and the 150-kW generator would be similar to a Cummins C150D6D 150 kW generator.

Regarding the 1,000-kW generator, the Parcel 2 generator would be located approximately 330 feet from the nearest noise-sensitive land uses, which are the residential uses located along the west side of Willow Road, west of the Project Site. This generator produces an estimated noise level of 100.2 dBA at 50 feet (combined exhaust and engine noise) without accounting for attenuation associated with mufflers or weather/sound enclosures. At a distance of 330 feet (the distance to the nearest residence from the Parcel 2 generator), noise from the testing of this generator would reduce to approximately 85 dBA.

Regarding the 500-kW generators, the Parcel 4 500-kW generator would be located approximately 490 feet from these same uses. In addition, the Parcel 5 500-kW generator would be located approximately 345 feet from the Open Mind School. This generator produces an estimated noise level of 101.5 dBA at 50 feet (combined exhaust and engine noise) without accounting for attenuation associated with mufflers or weather/sound enclosures. At a distance of 490 feet (the distance to the nearest residence from the Parcel 4 generator), noise the testing of this generator would reduce to approximately 82 dBA. At a distance of 345 feet (the distance to the Open Mind School from the Parcel 5 generator), noise from generator testing would reduce to approximately 85 dBA Because noise from the testing of the Parcel 2, 4 and 5 500-kW generators would exceed the City's criterion of 60 dBA at the nearest sensitive receptors during daytime hours, and because generator noise at a distance of 50 feet would exceed the 85 dBA threshold for powered equipment, noise impacts from the testing of this generator would be considered **significant**.

With Project implementation, Parcel 3 would have a 750-kW generator located approximately 510 feet east of Willow Road. Although the make and model have not been selected, it is assumed this generator would be similar to a Cummins 750DQCB 750 kW generator. According to the specification details for this generator, it would produce an estimated noise level of approximately 101 dBA at 50 feet (combined exhaust and engine noise) without accounting for attenuation associated with mufflers or weather/sound enclosures. The nearest sensitive receptor is a residential land use, along the west side of Willow Road and is located approximately 660 feet from the proposed generator location. At a distance of 660 feet, noise from generator testing would reduce to approximately 78 dBA. Because noise from the testing of this 750-kW generator would exceed the City's criterion of 60 dBA at the nearest sensitive receptor during daytime hours, and because generator noise at a distance of 50 feet would exceed the 85 dBA threshold for powered equipment, noise impacts from the testing of this generator would be considered **significant**.

In addition, Project Parcel 6 would include a 250-kW generator which would likely be similar to a Cummins 250DQDAA 250-kW generator. This generator produces an estimated noise level of 88.8 dBA at 50 feet (combined exhaust and engine noise) without accounting for attenuation associated with mufflers or weather/sound enclosures. The nearest sensitive receptor is Mid-Peninsula High School, along the East side of Willow Road and is located approximately 520 feet from the proposed generator location. In addition, the Open Mind School is located approximately 620 feet from this proposed generator location. At a distance of 520 feet, noise from generator testing would reduce to approximately 69 dBA; at a distance of 620 feet, noise would generator testing would be approximately 67 dBA. Because noise from the testing of this 250-kW generator would exceed the City's criterion of 60 dBA at the nearest sensitive receptor during daytime hours, and because generator noise at a distance of 50 feet would exceed the 85

dBA threshold for powered equipment, noise impacts from the testing of this generator would be considered **significant**.

Project Parcel 7 would include a 150-kW generator. For the purposes of this analysis, it is assumed that this generator would be similar to a Cummins C150D6D 150-kW generator. This generator produces an estimated noise level of 69.9 dBA at 50 feet (combined exhaust and engine noise) without accounting for attenuation associated with mufflers or weather/sound enclosures. The nearest sensitive receptor to the proposed Parcel 7 generator location is the Open Mind School, located approximately 525 feet from the proposed generator location. At a distance of 525 feet, noise from generator testing would reduce to approximately 50 dBA. As described previously, noise from generator testing in the city is restricted to 60 dBA at the nearest sensitive receptor during daytime hours; noise from generator testing is also compared to the 85 dBA threshold at 50 feet for powered equipment. Therefore, noise from the testing of the Parcel 7 150-kW generator would not exceed the applicable City noise criteria; noise impacts for this generator would be considered less than **significant**.

Southwestern Public Park Generator (for West Bay District Sanitary Pump Station)

With Project implementation, a 500-kW generator would be installed near the southwest corner of the Project site to serve the West Bay District Sanitary Pump Station. Although the make and model have not yet been selected, it is assumed that this generator would to be similar to a Cummins 500DFEK 500 kW generator for the purposes of this analysis. This generator produces an estimated noise level of 101.5 dBA at 50 feet (combined exhaust and engine noise) without accounting for attenuation associated with mufflers or weather/sound enclosures.

The 500-kW generator would be located approximately 25 to 50 feet from the nearby Mid-Peninsula High School, and approximately 200 feet from the nearest residential land uses located west of Willow Road. At a distance of 25 feet, unattenuated generator noise could be up to approximately 108 dBA Leq. At 200 feet, unattenuated generator noise could be up to approximately 90 dBA Leq. Because noise from the testing of this generator would exceed the City's criterion of 60 dBA at the nearest sensitive receptors during daytime hours, and because generator noise at a distance of 50 feet would exceed the 85 dBA threshold for powered equipment, noise impacts from the testing of this generator would be considered **significant**.

Hamilton Avenue Parcel North Generator

With Project implementation, a 150-kW generator would be installed near the northwest corner of the Hamilton Avenue Parcel North. Although the make and model have not yet been selected, it is assumed that this generator would be similar to a Cummins C150D6D 150 kW generator. This generator produces an estimated noise level of 69.9 dBA at 50 feet (combined exhaust and engine noise) without accounting for attenuation associated with mufflers or weather/sound enclosures.

The nearest sensitive receptor to the proposed Hamilton Avenue Parcel North generator location are residential land uses located over 400 feet to the south. At a distance of 400 feet, noise from generator testing would reduce to approximately 52 dBA. As described previously, noise from generator testing in the city is restricted to 60 dBA at the nearest sensitive receptor during daytime hours; noise from the testing of this generator would not be expected to exceed this limit at nearby sensitive uses. However, noise from generator testing is also compared to the 85 dBA threshold at 50 feet for powered equipment. This generator would also not exceed this applicable City noise criteria. Therefore, noise impacts for this generator would be considered **less than significant**.

Generator Noise Conclusion

Based on the generator noise analyses conducted above, generator noise from multiple Project generators would have the potential to exceed the allowable limits in the City. In addition, because the final generator makes and models, as well as generator noise attenuation features and actual locations (and therefore, distances from sensitive receptors), have not been finalized, actual noise levels could be louder, or quieter, than the estimated levels presented above at the nearest sensitive land uses. Because generator noise during testing would likely be in excess of the applicable City noise limits, noise impacts from emergency generator testing would be considered significant, and mitigation would be required.

Project Mitigation Measure NOI-1.4 requires the preparation of a Noise Reduction Plan that includes effective attenuation features. To result in meaningful attenuation from shielding, all walls, enclosures or screens surrounding generators must be solid with no holes or gaps. Attenuation also varies based on the type of material used for the walls or screens. In addition, exhaust noise from generators is not always mitigated by enclosures, because the exhaust may need to be piped to the exterior of the building or enclosure. To reduce exhaust noise, mufflers or critical grade silencers might be needed. Mitigation Measure NOISE-1b from the ConnectMenlo EIR in combination with Project Mitigation Measure NOI-1.4 would ensure noise from emergency generators during testing would comply with the noise limits outlined in Chapter 8.06 of the Menlo Park Municipal Code. Therefore, noise impacts from Project emergency generator testing would be ***less than significant with mitigation***.

ConnectMenlo Mitigation Measure NOISE-1b.

> Stationary noise sources and landscaping and maintenance activities shall comply with Chapter 8.06, Noise, of the Menlo Park Municipal Code.

Project Mitigation Measure NOI-1.4: Emergency Generator Noise Reduction Plan (All Parcels).

> Prior to approval of a building permit for each building, the Project applicant shall conduct a noise analysis to estimate noise levels from the testing of Project-specific emergency generators, based on the actual generator makes and models proposed and the actual selected attenuation features. Based on the results of the analysis, a Noise Reduction Plan shall be created to ensure noise levels of generator testing are below the applicable Code requirements. The results, methods, and final Noise Reduction Plan shall be provided to the City prior to the issuance of building permits. The analysis shall account for proposed noise attenuation features, such as specific acoustical enclosures and mufflers or silences, and the final Noise Reduction Plan shall demonstrate with reasonable certainty that proposed generator(s) will not exceed the City of Menlo Park noise thresholds of 60 dBA at the nearest noise-sensitive use during daytime hours, and/or 85 dBA at 50 feet for powered equipment, whichever is lower. Acoustical treatments may include, but are not limited to:
>
> - Enclosing generator(s);
> - Installing relatively quiet model generator(s);
> - Orienting or shielding generator(s) to protect noise-sensitive receptors to the greatest extent feasible;
> - Installing exhaust mufflers or silencers;
> - Increasing the distance between generator(s) and noise-sensitive receptors; and/or
> - Placing barriers around generator(s) to facilitate the attenuation of noise.

In addition, all Project generator(s) shall be tested only between the hours of 7:00 a.m. and 10:00 p.m. Because no nighttime testing of generators will be allowed, compliance with the 50-dB nighttime noise threshold in the City need not be demonstrated.

The Project applicant shall incorporate sufficient recommendations from the acoustical analysis into the building design and operations to ensure that noise sources meet applicable requirements of the noise ordinance.

Amplified Music and Sound from Events

Many Campus District events would take place internal to buildings in event buildings within the meeting and collaboration spaces, and in private gardens under the atrium, though some events may take place in the outdoor meeting and collaboration spaces, as well as at the visitor's center north of the elevated park. Smaller events may take place at the publicly accessible park in the southwest portion of the main Project Site and in the Town Square (and amplified background music may be present at these events). Most Campus District events would be small, with up to 15 medium-sized (1,000 to 2,500 attendees) and 10 large (2,500 to 5,000 attendees) events per year. Some of these events would take place internal to buildings, but this analysis conservatively assumes that up to 25 medium- to large-sized events could take place outdoors in the outdoor open space in the northern portion of the Project Site per year. The nearest of these open space areas is located approximately 700 feet from the nearest noise-sensitive land uses, which are the multi-family residential land uses located along Willow Road, west of the main Project Site. Note that events taking place internal to buildings would not be expected to elevate ambient noise levels in the Project vicinity. Regarding outdoor events, these events could involve amplified music or speech. However, these events would be limited to the daytime hours of 7:00 a.m. to 10:00 p.m.

Noise levels from smaller events where amplified speech would occur would be generally lower than noise levels from amplified live or recorded music. For example, noise from human speech being amplified by a single loud speaker has been measured in the range of approximately 56 to 58 dBA L_{eq} at 100 feet,[25] whereas noise from a small live band, which included a guitar and vocalists, with a single amplifier has been measured to be approximately 65 dBA L_{eq} at 100 feet.[26] Larger concert-type events could generate higher noise levels.

Noise measurements were obtained from a previous study involving an outdoor live music venue.[27] A blues band with full amplification performed at the venue; it is anticipated that this would be representative of the louder events that might occur at the main Project Site. Noise levels were measured at 200 feet from the front of the center of the stage during the live performance and found to be approximately 79.1 dBA L_{eq}. This equates to approximately 85 dBA at 100 feet.

Based on these estimated noise levels, noise from these events at a distance of 700 feet (the distance to the nearest noise-sensitive land use) would be approximately 41 dBA for amplified human speech, 48 dBA for amplified noise from a small band, and 68 dBA for noise from a larger concert. Therefore, it is possible that noise levels from events may exceed the City of Menlo Park's daytime (7:00 a.m. to 10:00 p.m.) noise limit of 60 dBA. Note that smaller events are unlikely to result in noise levels greater than this limit.

[25] Wedding Noise: Noise measured at approximately 140 feet from an individual officiating over a wedding (single speaker) was measured to be between approximately 55 and 56 dBA L_{eq}, equating to a noise level of 58 to 59 dBA L_{eq} at 100 feet.

[26] Acoustic Band Noise: Noise measured at approximately 73 feet from a small live band with a single amplifier that included a guitar and vocals was measured to be 67.5 dBA L_{eq}, equating to 64.8 dBA L_{eq} at 100 feet.

[27] Measurements were obtained at the Irvine Regional Park Amphitheater which has a permanent band shell for live music or entertainment.

In the City of Menlo Park, a special event application must be filed if a proposed event would meet one or more of the following criteria:

- Any city street or lane closures
- Any event impacting traffic or intersections
- Any noise exceeding Municipal Code 8.06.030 (noise ordinance): Sound measured from subject site to any residential property:
    - 10 p.m. to 7 a.m. - 50 dBA
    - 7 a.m. to 10 p.m. - 60 dBA
- Attendance is expected to exceed 150 people and you will be using outdoor public space
- Community events (i.e., block parties - not for private or exclusive residential use)
- Events needing Police regulation, monitoring or control
- Events occurring for more than one day
- Generate a crowd of spectators sufficient in size to obstruct, delay or interfere with the normal flow of pedestrian, vehicular traffic, or city facilities
- Parking needs that will exceed the capacity of the venue
- Use of any city street, sidewalk, or other right of way

Although most of these criteria would not be met (for example, events would be private and would not use an outdoor public space, parking needs would be sufficiently met by Project parking structures, etc.), it is possible that some of these criteria would be met for some events. Specifically, it is possible that the larger events could result in noise levels in excess of the City Municipal Code noise standards. It is anticipated that the Campus District events would be regulated through the conditions in the conditional development permit, and it is not anticipated that individual special events permits would be required for each event.

For all events proposed at the Project Site that would not meet the aforementioned criteria (e.g., should noise levels be below the allowable levels, should events be small and not result in traffic delays or interferences, etc.) an event permit would not be necessary; impacts related to amplified music or speech for smaller and quieter events would be less than significant. In addition, all events that might meet one or more of the criteria described above (including a potential exceedance of the quantitative noise criteria in the City) would be required to obtain an event permit and must comply with the stipulations of the permit (which may be incorporated into the conditional development permit), which would include compliance with the applicable Municipal Code Noise standards or measures to reduce noise effects from the event. Because any larger-sized events with amplified music or speech would comply with the requirements of the applicable permit, noise from such events would comply with local regulations. Impacts from amplified music or speech at events would be ***less than significant***.

Dog Park Noise

The proposed dog park would generate new sources of noise associated with dog and human activity. Dogs at dog parks generally bark only occasionally while playing. The type of persistent barking that is often associated with dogs left at home rarely occurs in supervised dog parks. Dog park noise also varies depending on the number of dogs and people present. In general, the exact number of dogs and their

barking patterns would vary during the day of the week and hour of the day. Note that the proposed dog park would be open from sunrise to sunset, so it would not be operational during nighttime hours.

Based on previously conducted publicly available CEQA noise analyses, dog park noise has been measured to be up to appropriately 58 dBA at a distance of 25 feet or 52 dBA L_{eq} at 50 feet when there were approximately 5 to 11 dogs present in a given dog park.[28] In addition, it was also measured to be as quiet as approximately 35.5 dBA L_{eq} at La Paws Dog Park in the City of Mission Viejo for a separate CEQA noise analysis.[29] Note that this reference noise level measurement at the dog park included people talking, dogs running, playing fetch, chasing each other, growling, barking and dog owners talking on cell phones.

The dog park would be located at least 100 feet from the nearby Open Mind School and over 450 feet from the nearest offsite residence. Assuming that dog park noise levels could be between 35.5 dBA L_{eq} and 52 dBA L_{eq} at a distance of 50 feet, noise at a distance of 100 feet would be reduce to between approximately 30 dBA Leq and 46 dBA Leq. At a distance of 450 feet, noise would be approximately 20 decibels lower than the estimated noise levels reported at 50 feet.

In the City of Menlo Park, noise is limited to 60 dBA as measured from any residential property during the daytime hours of 7:00 a.m. to 10:00 p.m. Although the Open Mind School is not a residential property, noise levels at the nearby school and the residence from dog park activity would be well below this maximum allowable level in the City. Noise from the proposed dog park would be ***less than significant***.

Loading Dock Activity

The Campus District would include five primary loading docks at office buildings with major food service facilities (Buildings O1, O5, and O6 in the Conceptual District Plan). As depicted in the Conceptual District Plan, it is currently anticipated that Buildings O2, O3, and O4 would be serviced from on-street loading zones or connected to the primary Type A loading docks in adjacent buildings. It is currently anticipated that the Campus District would generate an average of 60 deliveries per day total, including trucks of various sizes, including mostly small delivery vans, with some full-size delivery trucks. These deliveries would occur for the grocery store (15 to 20 per day) and restaurant uses (daily for baked goods in van-type vehicles, twice per week for major supplies), as well as other on-site uses. The deliveries would be spread out between the primary loading docks and loading zones described above. Truck loading and unloading activity noise is assessed qualitatively to determine the potential for a substantial temporary increase in noise at nearby residential land uses; a quantitative analysis of loading noise would only be necessary if the development was a loading-intensive use (such as a distribution center).

With regard to loading dock noise, most Project loading docks would be located internal to the Campus District, and would not involve active loading and unloading activities close to offsite receptors. A number of intervening structures would exist between most of the loading docks and the nearest noise-sensitive uses. The temporary loading and unloading activities at the Project office buildings would typically be short term and intermittent throughout the day, occurring only during daytime hours (when people are less sensitive to noise). In addition, the Project Site is currently developed with commercial and light industrial/warehousing uses which involve daily deliveries. Therefore, Project implementation would not result in a large-scale increase in this activity at the site. Sixty deliveries are expected to occur on a given day, with many of those being van deliveries as opposed to heavy duty truck deliveries. Spread out over the primary loading docks and zones, and spread out over a given day, temporary and short-term

[28] GEPermit. *Noise Technical Report for the Beyer Community Park*, San Diego, California. April 2019.

[29] Urban Crossroads. *MorningStar Senior Living Noise Impact Analysis*, City of Mission Viejo. November 2, 2019.

increases in noise from Project loading activity would not be considered substantial Impacts from loading dock noise at the Project Site would be ***less than significant.***

Parking Garage Noise

The Project Site would include worker parking within parking structures in the northeastern and southeastern corners of the main Project Site (North Garage and South Garage), as well as below grade of Building O7. The parking structures are proposed to provide between 3,200 parking spaces and 3,700 parking spaces, including approximately 486 stalls for electric vehicles. Note that underground parking would not be expected to result in noise that could affect off-site receptors. However, parking garages can result in the generation of noise that can affect off-site receptors. Noise sources in parking areas include moving vehicles, along with doors closing, cars starting, tires squealing, and other automotive noises occurring.

The nearest noise-sensitive uses to the North and South Garages are the Open Mind School and the single-family residences located along Kavanaugh Drive. The North Garage is located over 1,100 feet from the Open Mind School and over 1,200 feet from the nearest residence. The South Garage is located closer to these uses, at distance of approximately 210 feet to the Open Mind School and 380 feet to the nearest residence.

Intervening buildings block the line of sight between the North Garage and the nearby receptors. In addition, due to the distance between the North Garage and these sensitive uses, noise from this garage would not be expected to be audible at the nearby school homes. The analysis of parking garage noise focuses on the potential for activity at the South Garage to result in excessive noise at the nearby school or residences.

This analysis assumes that approximately half of the Campus District's up to 3,700 parking spaces would be located in the South Garage (or up to 1,850 spaces), and that the same number of vehicles (up to 1,850) could enter or exit the South Garage during a peak hour. According to the FTA's *Transit Noise and Vibration Impact Assessment Manual* (Federal Transit Administration 2006), 1,000 cars in a peak activity hour would generate a Sound Equivalent Level (SEL) of 92 dBA at 50 feet. This value was converted to an hourly L_{eq} (average) noise level, resulting in an estimated noise level of 56.5 dBA L_{eq} at a distance of 50 feet. This value was then used to calculate the L_{eq} noise level of an estimated 1,850 vehicles per daytime hour utilizing the garage. At a distance of 210 feet (the distances to the Open Mind School), the noise level from this many vehicles operating within a parking garage could be up to 44 dBA L_{eq}, based on the information discussed above. At a distance of 380 feet, the distance to the nearest residence, this noise level would be reduced to approximately 39 dBA L_{eq}. In the City of Menlo Park, noise is limited to 60 dBA as measured from any residential property during the daytime hours of 7:00 a.m. to 10:00 p.m. Although the Open Mind School is not a residential property, noise levels at the nearby school and residence from parking garage activity would be well below this maximum allowable level in the City. Noise from parking garage activity would be ***less than significant***.

Shuttle and Tram Noise

An existing inter-campus tram system connects the main Project Site to Meta's East Campus and West Campus as well as the Menlo Gateway Campus, Jefferson Place Campus, and Commonwealth Corporate Center. Meta operates a total of five tram lines between the campuses. Three of the existing routes serve the Willow Campus. The tram service currently includes 45 vehicles; thirty of the vehicles are electric vehicles and fifteen are Ford Transits. Meta plans to have 100 percent electric vehicles within 5 years. With Project implementation, the inter-campus tram would continue to operate on the Project Site to

provide inter-campus and intra-campus connections for workers. In addition, the existing commuter shuttles (bringing workers from throughout the bay area to the Meta campuses) would also continue to operate on the Project Site. While on the Project Site, trams and shuttles would maintain a maximum speed of 25 miles per hour.

The main Project Site would include approximately six stops within the Campus District for the inter-campus tram. Trams already operate on local roadways to provide the inter-campus shuttle service, and the increase in trams on the local roadways would be relatively minor. In addition, fewer trams would operate on Willow Road after Project implementation because tram access to the Project Site would be provided from the West Campus via a tunnel under Willow Road. The tram is anticipated to access the main Project Site via the Willow Road Tunnel, with a proposed stop in the vicinity of the intersection at North Loop Road, and travel east on North Loop Road, with a stop near the Elevated Park to access the Meeting and Collaboration Space. The tram would continue east on North Loop Road and transition into the transit hub within the Northern Garage, providing office campus access for workers. It would also travel south on East Loop Road to the South Garage, with a stop at the transit hub. The tram would then travel north on Main Street to access two anticipated stops on Main Street. The tram would turn right on West Street and return to the Willow Road Tunnel access lanes.

Although a fixed tram schedule at the Project tram stops has not been determined at this time, trams and shuttles can unload and load commuters in less than 3 minutes. Therefore, as an expected maximum, up to 20 trams or shuttles vehicles per hour would be expected to drop off and pick up workers at each on-campus tram stop during peak periods.

Shuttles or trams on the roadways would not be expected to result in substantial noise increases over existing conditions, due to the fact that the roads upon which the shuttles operate are already busy, and because of the relatively low volume of trams/shuttles that would operate during a given hour. In addition, note that Section 8.06.050 of the City Municipal Code includes an exemption for sound generated by motor vehicles, trucks, and buses operated on streets and highways. However, idling at the tram and shuttle stations would generate noise. Although there would likely only be one shuttle or tram idling at a given stop at a given time, this analysis conservatively assumes that up to two shuttles or trams would idle at a given time. To provide a conservative analysis, source data from the idling of busses was used in this model (even though most of the existing trams are electric, and more would be electric in the future).

Two buses idling concurrently at the loading zone could result in noise levels of approximately 48 dBA L_{eq} at a distance of 100 feet, without accounting for any attenuation that may be achieved through shielding from buildings (FTA Noise Impact Assessment Spreadsheet, 2018). The off-site sensitive uses would be well over 100 feet from proposed on-site tram stops. For example, the South Garage transit stop would be over 350 feet from the Open Mind School and over 550 feet from the nearest residence. At a distance of 350 feet, two idling buses could result in a noise level of approximately 34 dBA; at a distance of 550 feet, two idling buses could result in a noise level of approximately 29 dBA Leq (without accounting for shielding from intervening structures). In the City of Menlo Park, noise as measured from any residential property during the daytime hours of 7:00 a.m. to 10:00 p.m. is limited to 60 dBA; during the nighttime hours of 10:00 p.m. to 7:00 a.m., is limited to 50 dBA (noting that most shuttle and tram activity would take place during daytime hours). Although the Open Mind School is not a residential property, noise levels at the nearby school (e.g., 34 dBA Leq) and at the nearest residence (e.g., 29 dBA, without accounting for attenuation from shielding) from shuttle and tram idling activity would be well below these maximum allowable levels in the City. Noise from on-campus tram and shuttle activity would be ***less than significant***.

Impact NOI-2: Generation of excessive groundborne vibration or groundborne noise levels (Significant and Unavoidable with Mitigation)

Construction of the proposed Project would involve the use of construction equipment that could generate ground-borne vibration. Typical vibration levels associated with heavy-duty construction equipment at a reference distance of 25 feet and other distances are shown in Table 3.7-20 below. The most vibration-intensive construction equipment expected to be used for the Project are a pile driver, and an excavator (which produce vibration levels similar to a large bulldozer). Project-specific analyses were conducted to approximate vibration levels at nearby off-site and on-site sensitive uses during Project construction. These analyses are included below.

Construction Vibration Impacts to Offsite Land Uses

Damage to Structures

Project construction for the main Project Site (east of Willow Road), could occur as close as 150 feet from the nearest off-site residential structures located west of Willow Road. All structures in this neighborhood would likely be categorized either as "new residential structures" or as "older residential structures" under the Caltrans Vibration Guidelines for Potential Damage to Structures (refer to Table 3.7-5, presented previously). For the purposes of this analysis, it is conservatively assumed that all residential structures in this area would all fall under the "older residential structure" category. The damage criterion for structures in this category is a PPV of 0.3 in/sec. As shown in Table 3.7-20,, the most vibration-intensive equipment proposed for Project construction (including a pile driver and an excavator) could result in vibration levels in the range of 0.006 PPV in/sec (for a large bulldozer or excavator) to 0.103 PPV in/sec (for a pile driver) at the nearest residential use across Willow Road, located at 150 feet. Using the damage threshold for older residential structures, these estimated vibration levels are below the Caltrans maximum allowable PPV vibration level for continuous/frequent intermittent sources of vibration.

In addition to residential structures, Mid-Peninsula High School, located near the southwest corner of the main Project Site, and Open Mind School, located near the southeast corner of the Project Site, could be affected by vibration from Project construction. These structures would likely fall under the "modern commercial/industrial" category based on their age and style. The applicable Caltrans damage criterion for this type of structure is 0.5 PPV in/sec. Finally, numerous commercial buildings are located approximately 100 feet to the east of the main Project Site. These structures would also fall under the category of "modern commercial/industrial" structures, with an applicable damage criterion of 0.5 PPV in/sec.

Construction activities near the Mid-Peninsula High School located near the southwest corner of the Project Site would include both building construction of structures within Parcel 6, and the construction of the park along Willow Road, immediately north of this high school. Project construction associated with the use of pile drivers would occur over 1,200 feet away from the school. The estimated PPV vibration level at this distance is 0.005 in/sec, which is well below the Caltrans damage criterion modern industrial/commercial buildings of 0.5 in/sec. With regard to the public park located north of the high school, the most vibration-intensive equipment proposed for use in this area would be an excavator. For this analysis, a large bulldozer is considered to produce similar vibration levels to those of an excavator. At a distance of 10 feet, the estimated closest distance between the school and the construction activities for the park, a large bulldozer would produce a PPV vibration level of 0.352 in/sec. This is also below the damage threshold of 0.5 PPV in/sec for this building type.

Table 3.7-20. Vibration Source Levels for Construction Equipment

Equipment	PPV at 10 Feet	PPV at 15 feet	PPV at 20 Feet	PPV at 25 Feet	PPV at 100 Feet	PPV at 150 Feet	PPV at 190 Feet
Pile Driver (Impact)	6.000	3.266	2.121	1.518	0.190	0.103	0.072
Pile Driver (Vibratory)	2.901	1.579	1.026	0.734	0.092	0.050	0.035
Large bulldozer [a]	0.352	0.191	0.124	0.089	0.011	0.006	0.004
Loaded trucks [b]	0.300	0.164	0.106	0.076	0.010	0.005	0.004
Small bulldozer [c]	0.012	0.006	0.004	0.003	0.000	0.000	0.000

Source: Federal Transit Administration, *Transit Noise and Vibration Impact Assessment*, FTA Report No. 0123, 2018, https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123_0.pdf, accessed October 10, 2021.

[a] Representative of an excavator, gradall

[b] Representative of semi-trucks, and dump trucks.

[c] Representative of a backhoe and front-end loader

Open Mind School is located near the southeast corner of the main Project Site. Project construction could occur as close as 190 feet of this school. Pile driving would be the most vibration-intensive equipment proposed for use in this area. Using the data shown in Table 3.7-20, resulting estimated PPV vibration levels from the use of a pile driver at a distance of 190 feet would be 0.072 PPV in/sec. This vibration level is below the Caltrans vibration threshold for damage of 0.5 PPV in/sec for modern commercial/industrial structures, such as the school.

In addition to the nearby buildings described above, a UPS customer center is located approximately 100 feet to the east of the proposed North Garage. This building would also be categorized as a modern industrial/commercial. The most vibration-intensive equipment proposed for use in this area is also a pile driver. At a distance of 100 feet, vibration form a pile driver would be in the range of 0.190 PPV in/sec, which is below the applicable 0.5 PPV in/sec damage criterion for modern commercial/industrial structures.

Based on the analysis presented above, construction activities on the main Project Site would result in vibration levels below the applicable damage criteria at all nearby off-site structures. Vibration-related damage impacts from the main Project Site to off-site structures would be less than significant.

In addition to construction at the main Project Site, Project construction would also occur at the Hamilton Avenue Parcels. Construction activities in this area could take place as close as 25 feet from residential structures along Willow Road and Carlton Avenue. All structures in this neighborhood would likely be categorized as "older residential structures" by Caltrans vibration guidelines for the purpose of this assessment. The damage criterion for structures in this category is a PPV of 0.3 in/sec. The most vibration-intensive equipment proposed for use at this site include loaded trucks, excavators, backhoes, and front-end loaders., An excavator generally produces a similar vibration level as a large bulldozer. Similarly, a backhoe and bobcat would generally produce vibration levels similar to a small bulldozer. Vibration levels for this equipment are used for the modeling of vibration for the purposes of this analysis. At a distance of 25 feet, loaded trucks and small bulldozers would produce PPV vibration levels of 0.076 in/sec and 0.003 in/sec, respectively. An excavator would produce a PPV vibration level of approximately 0.89 in/sec. These estimated vibration levels are well below the damage threshold for older residential structures of 0.3 PPV in/sec. Vibration-related damage impacts to off-site residences from the Hamilton Avenue Parcels would be less than significant.

Based on the assessment presented above, vibration-related damage impacts from Project construction to nearby residential, school, and commercial/industrial buildings would be ***less than significant.***

Vibration-Related Annoyance - Daytime Construction

Regarding annoyance-related vibration impacts, humans are typically considered more sensitive to vibration that occurs during nighttime hours, when people generally sleep. However, schools and places of work may also be considered sensitive to daytime vibration since it may affect a person's ability to complete work or focus on certain tasks. For this analysis, a significant vibration impact would be considered to occur when construction activities generate vibration levels that are strongly perceptible (i.e., 0.1 PPV in/sec) at nearby residential, school or commercial land uses during daytime or nighttime hours, or when vibration levels exceed the criteria outlined in ConnectMenlo EIR Mitigation Measure NOISE-2a. According to ConnectMenlo EIR Mitigation Measure NOISE-2a, vibration levels must be limited to a PPV of 0.126 in/sec at the nearest workshop, 0.063 in/sec at the nearest office, 0.032 in/sec at the nearest residence during daytime hours, and 0.016 in/sec at the nearest residence during nighttime hours.

The nearest residential land uses would be approximately 150 feet west of the main Project Site, and 25 feet south of the Hamilton Avenue Parcels. The most vibration-intensive equipment proposed for use at the main Project Site would be an impact pile driver. At a distance of 150 feet (the distance to the nearest residential use), pile driving could result in a vibration level of 0.103 PPV in/sec. This level is above the "strongly perceptible" level of 0.1 PPV in/sec (refer to Table 3.7-6 above for the Caltrans Vibration-related annoyance criteria), and exceeds the 0.032 PPV in/sec criteria for residences during daytime hours from ConnectMenlo EIR Mitigation Measure NOISE-2a.

Regarding the Hamilton Avenue Parcels, the most vibration-intensive equipment proposed for use in this area would be an excavator (e.g., a large bulldozer). At a distance of 25 feet (the distance to the nearest residential use), the use of this equipment could result in a vibration level of 0.089 PPV in/sec. This level is also below the "strongly perceptible" level of 0.1 PPV in/sec. However, it exceeds the 0.032 PPV in/sec criteria for residences during daytime hours from ConnectMenlo EIR Mitigation Measure NOISE-2a.

Regarding the Mid-Peninsula High School, located near the southwest corner of the main Project Site, construction activities may occur at very close distances to the school (e.g., grading for the park), but the more vibration intensive work (e.g., involving a pile driver) would occur further away. Project construction that would involve the use of pile drivers would occur approximately 1,200 feet away from the school. The estimated PPV vibration level at this distance is 0.005 in/sec, which is well below the "strongly perceptible" level of 0.1 in/sec, and below the 0.063 in/sec threshold for offices (which is applied to school land uses for this analysis).

Regarding grading activities at the park proposed near Mid-Peninsula High School, the use of an excavator to develop the publicly accessible park would generate similar vibration levels to a small or large bulldozer. At a distance of 10 feet, a small bulldozer can generate a vibration level of 0.012 PPV in/sec and a large bulldozer can generate a vibration level of 0.352 PPV in/sec. Note that activities for the park would only occur at this very close distance to the school for a short period of time, with most construction work occurring much further away. The estimated vibration level for a small bulldozer is below the Caltrans "strongly perceptible" level of 0.1 PPV in/sec and the ConnectMenlo EIR Mitigation Measure NOISE-2a criterion for office uses of 0.063 PPV in/sec. However, the vibration level from a large bulldozer at this distance (0.325 PPV in/sec) exceeds both the Caltrans and Connect Menlo Mitigation Measure NOISE-2a applicable thresholds for annoyance. Therefore, annoyance-related vibration impacts to the Mid-Peninsula High School might be significant.

Regarding the Open Mind School (located near the southeast corner of the main Project Site), Project construction could occur as close as 190 feet from this school. The PPV vibration level from the use of pile drivers on the main Project Site, which is the most vibration-intensive construction equipment proposed for use in this area, would be approximately 0.072 in/sec. This level is below the "strongly perceptible" level of 0.1 PPV in/sec, but exceeds the ConnectMenlo EIR Mitigation Measure NOISE-2a criterion for office uses (applied to schools in this analysis) of 0.063 in/sec. Therefore, annoyance-related vibration impacts to the Open Mind School might be significant.

Although commercial and office uses are not always considered sensitive to vibration, an evaluation of vibration-related annoyance impacts to the nearby UPS customer center was also conducted. This building is located approximately 100 feet from the proposed North Garage. The most vibration-intensive equipment proposed for use in this area is a pile driver. At a distance of 100 feet, a pile driver produces a PPV vibration level of 0.190 in/sec. This level is above the "strongly perceptible" level of 0.1 PPV in/sec and the 0.126 in/sec criterion for a workshop from the ConnectMenlo EIR Mitigation Measure NOISE-2a. Therefore, annoyance-related vibration impacts to the nearby UPS customer center might also be significant.

Note that most construction activities would take place further from these off-site uses than these worst-case closest distances. In addition, construction that takes place along the permitter of the site would be short-term compared to the overall construction duration, considering the size of the main Project Site. However, because vibration levels might exceed applicable vibration-related annoyance thresholds at nearby uses, annoyance related vibration impacts would be considered ***significant,*** and mitigation would be required***.***

Implementation of Project Mitigation Measure NOI-2.1 would reduce vibration-related annoyance effects from pile driving to nearby sensitive uses. However, because pile installation can be vibration-intensive, it is not known if at all times and in all locations, vibration levels would be reduced to below the applicable annoyance criteria. In addition, Project Mitigation Measure NOI-2.2 would reduce vibration levels from non-pile driving activity. However, it might not be possible to ensure that vibration levels at all times and in all locations would be reduced to below the applicable annoyance thresholds. Therefore, even with the implementation of Project Mitigation Measures NOI-2.1 and NOI-2.2, daytime annoyance-related vibration impacts would remain significant. Vibration-related annoyance impacts during daytime hours would be ***significant and unavoidable.***

Vibration-Related Annoyance - Nighttime Construction

Regarding annoyance-related vibration impacts during nighttime hours, humans are typically considered more sensitive to vibration that occurs during nighttime hours because this is when people generally sleep. For this analysis, a significant vibration impact would be considered to occur when construction activities generate vibration levels that are strongly perceptible (i.e., 0.1 PPV in/sec) at nearby residential land uses during nighttime hours, or when vibration levels exceed the criteria outlined in ConnectMenlo EIR Mitigation Measure NOISE-2a for residential land uses during nighttime hours. According to ConnectMenlo EIR Mitigation Measure NOISE-2a, vibration levels must be limited to a PPV of 0.016 in/sec at the nearest residence during nighttime hours, which is more stringent than the aforementioned Caltrans criterion, and is the main focus of this analysis.

As discussed in the analysis of nighttime construction noise, certain construction activities on the Project Site would occur during the nighttime hours of 10:00 p.m. to 7:00 a.m. Note that activities would also be proposed for off-site areas during these nighttime hours; noise from these off-site activities is discussed in detail below. Regarding on-site construction during nighttime hours, the primary activity expected to occur would be concrete pours.

The nearest residential land uses would be approximately 150 feet west of the main Project site, west of Willow Road. The only construction activities proposed for nighttime hours on the Project site are potential (and occasional) concrete pours. During nighttime concrete pour activities, equipment would be at least 150 feet (and usually much farther) from the nearest off-site sensitive receptors where people sleep during nighttime hours. Concrete mixers and concrete pumps would generate less vibration than a small bulldozer, which is the piece of equipment in the Federal Transit Administration list of vibration source levels with the lowest level of vibration. A small bulldozer would result in a very low vibration level with a PPV of approximately 0.0002 inch per second at a distance of 150 feet. This level is well below the strongly perceptible threshold (i.e., PPV of 0.1 inch per second) (refer to Table 4.11-5) as well as the 0.016 PPV in/sec limit from ConnectMenlo EIR Mitigation measure Noise-2a at the nearest residence during nighttime hours. When nighttime construction occurs farther north or at greater distances from these homes, nighttime vibration levels would be even lower. Therefore, vibration impacts from Project site nighttime construction related to annoyance and sleep disturbance would be considered ***less than significant***.

ConnectMenlo Mitigation Measure NOISE-2a.[30,31]

To prevent architectural damage citywide as a result of construction-generated vibration:

- Prior to the issuance of a building permit for any development project requiring pile driving or blasting, the project applicant/developer shall prepare a noise and vibration analysis to assess and mitigate potential noise and vibration impacts related to these activities. The maximum levels shall not exceed 0.2 in/sec, which is the level that can cause architectural damage for typical residential construction. If maximum levels would exceed the thresholds, alternative methods, such static rollers, non-explosive blasting, and pile drilling, as opposed to pile driving, shall be used to the extent feasible and practical, subject to review and determination by the Community Development Department.

To prevent vibration-induced annoyance as a result of construction-generated vibration:

- Individual projects that involve vibration-intensive construction activities, such as blasting or the use of pile drivers, jack hammers, or vibratory rollers, within 200 feet of sensitive receptors shall be evaluated for potential vibration impacts. A vibration study shall be conducted for individual projects where vibration-intensive impacts may occur. The study shall be prepared by an acoustical or vibration engineer holding a degree in engineering, physics, or an allied discipline who is able to demonstrate a minimum of 2 years of experience in preparing technical assessments regarding acoustics and/or ground-borne vibration. The study is subject to review and approval of the Community Development Department.

Vibration impacts on nearby receptors shall not exceed the vibration annoyance levels (in inches per second), as follows:

- Workshop = 0.126
- Office = 0.063
- Residence, daytime (7:00 a.m.–10:00 p.m.) = 0.032
- Residence, nighttime (10:00 p.m. to 7:00 a.m.) = 0.016

If construction-related vibration is determined to be perceptible at vibration-sensitive uses, additional requirements, such as less vibration-intensive equipment or construction techniques, shall be implemented during construction (e.g., non-explosive blasting, pile drilling, as opposed to pile driving, preclusion for vibratory roller use, use of small or medium-sized bulldozers) to the extent feasible and practical. Vibration reduction measures shall be incorporated into the site development plan as a component of the Project and applicable building plans, subject to the review and approval of the Community Development Department.

Project Mitigation Measure NOI-2.1: Vibration Control Measures for Annoyance from Daytime Pile Driving Activity.

During daytime hours, pile driving activity shall take place no closer than 335 feet from residential land uses, 210 feet from office or school land uses, and 130 feet from workshops or

[30] This noise and vibration study for the Proposed Project has been prepared in accordance with ConnectMenlo Mitigation Measure NOISE-2a.

[31] ConnectMenlo Mitigation Measure NOISE-2a has been modified to allow for compliance "to the extent feasible and practical," which would be subject to review and determination by the Community Development Department.

retail land uses, to the extent feasible and practical. When pile driving work must take place closer than these distances from the aforementioned land uses, reduction measures shall be incorporated to the extent feasible and practical, such as the use of alternative pile installation methods that do not require impact or vibratory pile driving. Examples of alternative pile installation methods include auger cast pressure grouted displacement (APGD) piles, stone columns, cast-in-drilled-hole (CIDH) piles, or press-in piles. These measures will be subject to review and approval of the Community Development Department.

In addition, the construction contractor shall appoint a Project vibration coordinator who will serve as the point of contact for vibration-related complaints during project construction. Contact information for the Project vibration coordinator will be posted at the Project Site and on a publicly available Project website. Should complaints be received, the Project vibration coordinator shall work with the construction team to adjust activities (e.g., drilling instead of driving piles in closer proximity to certain land uses) to the extent feasible and practical to reduce vibration or to reschedule activities for a less sensitive time. The Project vibration coordinator shall notify the Community Development Department of all vibration-related complaints and actions taken to address the complaints.

Project Mitigation Measure NOI-2.2: Vibration Control Measures for Annoyance from Daytime Construction Activities Excluding Pile Driving.

During daytime hours, construction activity involving a vibratory roller shall take place no closer than 90 feet from residential land uses, 60 feet from office or school land uses, and 35 feet from workshops or retail land uses, to the extent feasible and practical, subject to review and approval by the Community Development Department. In addition, equipment that generates vibration levels similar to a large bulldozer shall take place no closer than 50 feet from residential land uses, 35 feet from office or school land uses, and 20 feet from workshops or retail land uses, to the extent feasible and practical, subject to review and approval by the Community Development Department. Maintaining these distances between equipment and the nearest residential, school/office, or workshop land uses would ensure vibration levels would be below 0.032 PPV in/sec at the nearest residences, 0.063 PPV in/sec at the nearest school or office, and 0.126 PPV in/sec at the nearest workshop, per the requirements in ConnectMenlo Mitigation measure NOISE-2a.

When construction would require the use of these equipment types at distances closer than these to nearby sensitive uses, reduction measures shall be incorporated to the extent feasible and practical, such as the use of smaller or less vibration-intensive equipment. For example, the vibration level from a large bulldozer at 10 feet would be approximately 0.352 PPV in/sec, whereas the vibration level from a large bulldozer at the same distance would be approximately 0.012 PPV in/sec. The vibration level from a small bulldozer at 10 feet would be below all daytime vibration thresholds from ConnectMenlo Mitigation Measure Noise-2a. The feasibility of reduction measures shall be subject to review and determination by the Community Development Department. In addition, the construction contractor shall appoint a Project vibration coordinator who will serve as the point of contact for vibration-related complaints during Project construction. Contact information for the Project vibration coordinator will be posted at the Project Site and on a publicly available Project website. Should complaints be received, the Project vibration coordinator shall work with the construction team to adjust activities (e.g., drilling instead of driving piles in closer proximity to certain land uses) to the extent feasible and practical to reduce vibration or to reschedule activities for a less sensitive

time. The Project vibration coordinator shall notify the Community Development Department of all vibration-related complaints and actions taken to address the complaints.

Construction Vibration Impacts from Construction of Off-Site Improvements

Damage to Structures

For the construction activity for the off-site improvements, none of the equipment that would be required would be considered impact equipment other than the Willow Road Tunnel. Impact equipment is equipment that makes forceful contact with the ground, often repeatedly, such as a pile driver. The equipment required for most off-site improvements (other than the Willow Road Tunnel) would thus have a lesser potential to create groundborne vibration and to damage structures, relative to impact equipment. The residential structures in the neighborhoods surrounding the off-site improvements are likely best categorized as either as "new residential structures" or as "older residential structures" under the Caltrans Vibration Guidelines for Potential Damage to Structures (refer to Table 3.7-5, presented previously). It is conservatively assumed that all residential structures near the off-site improvement construction areas are "older residential structures". The damage criterion for structures in this category is a PPV of 0.3 in/sec.

Vibration-generating construction activity for off-site construction improvements besides the Willow Road Tunnel could take place as close as 15 feet from existing structures. As shown in Table 3.7-20 above, the most vibration-intensive equipment proposed for off-site improvements other than the Willow Road Tunnel (i.e., a large bulldozer or loaded truck) could result in vibration levels of 0.164 to 0.191 PPV in/sec at a distance of 15 feet. With respect to the damage threshold for older residential structures, these estimated vibration levels are below the Caltrans maximum allowable PPV vibration level for continuous/frequent intermittent sources of vibration. In addition to residential structures, the off-site improvements would also result in construction activity occurring near other types of structures, such as schools, markets, offices, and churches. These structures are likely most similar to the "modern commercial/industrial" category, and the applicable Caltrans damage criterion for these types of structures is 0.5 PPV in/sec. Because the off-site construction improvement activities would largely occur within roadways, a worst-case distance of 15 feet is also applicable for non-residential structures. Consequently, vibration levels from off-site improvement construction would exceed the applicable damage threshold to adjacent non-residential structures (i.e., commercial or industrial structures) because the damage threshold for these types of buildings is higher (i.e. less conservative) than the damage threshold for residential structures, as evaluated above.

Regarding the Willow Road Tunnel, the most vibration-intensive construction equipment proposed for use is pile drivers. Pile drivers would be used at least 100 feet from the nearest existing structure. At a distance of 100 feet, a pile driver produces a PPV vibration level of 0.190 in/sec, which is below the 0.5 PPV in/sec damage criterion for modern commercial/industrial structures, and the 0.3 and 0.5 PPV in/sec damage criteria for older and new residential structures, respectively. Therefore, construction from the Willow Road Tunnel would not be expected to result in damage at nearby structures.

Based on this assessment, vibration-related damage impacts from off-site improvements to nearby residential, school, and commercial/industrial buildings would be less than significant.

Vibration-Related Annoyance - Daytime Construction

Regarding annoyance-related vibration impacts, and as discussed previously, humans are typically considered more sensitive to vibration that occurs during nighttime hours (when people generally

sleep), but schools and places of work may also be considered sensitive to vibration during the daytime hours since vibration could affect a person's ability to complete work or focus on certain tasks.

A significant vibration impact is considered to occur under this assessment should construction activities generate vibration levels that are strongly perceptible (i.e., 0.1 PPV in/sec in Table 3.7-6) at nearby residential, school or commercial land uses during daytime or nighttime hours, or when vibration levels exceed the criteria outlines in ConnectMenlo EIR Mitigation Measure NOISE-2a. According to ConnectMenlo EIR Mitigation Measure NOISE-2a, vibration levels must be limited to a PPV of 0.126 in/sec at the nearest workshop, 0.063 in/sec at the nearest office, 0.032 in/sec at the nearest residence during daytime hours, and 0.016 in/sec at the nearest residence during nighttime hours.

For the off-site improvements other than the Willow Road Tunnel (for which construction would primarily take place during nighttime hours), the nearest sensitive land uses could be approximately 15 feet from the construction equipment and trucks, as a worst-case scenario. The most vibration-intensive equipment, as noted above, could be a loaded truck or large bulldozer. A distance of 15 feet, this equipment could result in a vibration level of 0.164 to 0.191 PPV in/sec. This range of vibration is above the "strongly perceptible" level of 0.1 PPV in/sec (refer to Table 3.7-6 above for the Caltrans Vibration-related annoyance criteria), and exceeds the 0.032 PPV in/sec criteria for residences during daytime hours from ConnectMenlo EIR Mitigation Measure NOISE-2a. Additionally, some activity would occur during the nighttime hours for work in Caltrans-maintained roadways, and thus the nighttime threshold of 0.016 in/sec would be applicable and exceeded by the nighttime construction work.

It should be noted that most construction activities would take place further from the surrounding land uses than the worst-case distance of 15 feet. However, because vibration levels may exceed applicable vibration-related annoyance thresholds at nearby sensitive uses, annoyance related vibration impacts would be considered ***significant,*** and mitigation would be required***.***

Mitigation Measure NOI-2.2 would apply and would reduce vibration levels from non-pile driving activity through the use of a coordinator who will ensure that vibration-related complaints are properly addressed. Note that the recommended closest distances to sensitive receptors included in this measure may not be achievable for the off-site improvements due to the proximity of intersections and water or feeder line work to nearby sensitive uses. The coordinator described in Mitigation Measure NOI-2.2 would work with the construction team to modify the activities to reduce vibration or reschedule activities for a less sensitive time, to the extent feasible. However, it may not be possible to ensure that vibration levels would be reduced to below the applicable daytime and nighttime annoyance thresholds at all times and in all locations. Therefore, even with the implementation of Mitigation Measure NOI-2.2, daytime and nighttime annoyance-related vibration impacts would remain significant. Vibration-related annoyance impacts for the off-site improvements would be ***significant and unavoidable.***

Vibration-Related Annoyance - Nighttime Construction

As discussed in the assessment of on-site nighttime construction, humans are typically considered more sensitive to vibration that occurs during nighttime hours because this is when people generally sleep. For this analysis, a significant vibration impact would be considered to occur when construction activities generate vibration levels that are strongly perceptible (i.e., 0.1 PPV in/sec) at nearby residential land uses during nighttime hours, or when vibration levels exceed the criteria outlined in ConnectMenlo EIR Mitigation Measure NOISE-2a for residential land uses during nighttime hours. According to ConnectMenlo EIR Mitigation Measure NOISE-2a, vibration levels must be limited to a PPV of 0.016 in/sec at the nearest residence during nighttime hours, which is more stringent than the aforementioned Caltrans criterion, and is the main focus of this analysis.

Construction components that require road closures and are therefore difficult to conduct during daytime hours and generally required to be conducted at night by Caltrans. Therefore, the construction of the Willow Road Tunnel within the SamTrans and Caltrans right of way, northwest of the main Project Site, is expected to primarily be constructed during nighttime hours. It is anticipated that installation/removal of detours would take place over 16 nights, traffic shift activities would take place for 4 nights, tunnel shoring would take up to approximately 45 nights, and the restoration of Willow Road would take 14 nights.

Equipment that might be used during nighttime construction activities include excavators, hoe rams, loaders, grinders, jackhammers, pavers, rollers, light plants, off-haul trucks, utility trucks, highway striping machines, arrow boards, compressors, auger rigs, generators, vibratory impact hammer, impact pile driver, and cement silos. The most vibration-intensive of these activities would be tunnel shoring, which would require the installation of piles. At this time, it is unknown if an impact pile driver, a vibratory pile driver, or alternative installation method (e.g., drilling of piles) would be used. However, this analysis assumes that an impact pile driver may be used to provide a conservative assessment.

The nearest sensitive land use to the proposed nighttime construction area near the SamTrans and Caltrans right of way are the multi-family residences located at 777 Hamilton Avenue. These residences are approximately 480 feet southwest of the proposed nighttime construction areas within the SamTrans and Caltrans right of way. Additionally, there are multi-family residences approximately 550 feet south of this proposed construction area along Willow Road.

A pile driver, which is the most vibration-intensive equipment that may be used during nighttime hours, can result in a vibration level of 0.018 PPV in/sec at a distance of 480 feet (the distance to the nearest multi-family residences). This vibration level is slightly greater than the maximum allowable vibration level from ConnectMenlo EIR Mitigation Measure NOISE-2a of 0.016 PPV in/sec. At a distance of 550 feet, the distance to the nearest single-family residences, vibration from a pile driver would be approximately 0.15 PPV in/sec. This vibration level is below the maximum allowable nighttime vibration level for residences from ConnectMenlo EIR Mitigation Measure NOISE-2a.

Because nighttime construction in the SamTrans and Caltrans right of way may result in vibration levels in excess of the applicable thresholds from the ConnectMenlo EIR, nighttime annoyance-related vibration impacts to nearby residences from off-site construction would be considered ***significant***, and mitigation would be required.

Project Mitigation Measure NOI-2.3 would ensure that nighttime pile driving would take place at least 540 feet from the nearest residential land uses, as feasible. If pile installation must take place closer than this distance from occupied residences, alternative pile installation methods would be used to reduce vibration levels to below the applicable significance thresholds. However, it may not be possible to ensure that vibration levels at all times and in all locations would be reduced to below the applicable annoyance thresholds if pile driving work must occur closer than 540 feet from residences. Therefore, even with the implementation of Mitigation Measure NOI-2.3, annoyance-related vibration impacts during nighttime hours would remain significant. Vibration-related annoyance impacts during nighttime hours would be ***significant and unavoidable.***

Project Mitigation Measure NOI-2.3: Vibration Control Measures for Annoyance from Nighttime Pile Installation Activity.

> During the nighttime hours of 10:00 p.m. to 7:00 a.m., pile driving activity shall take place no closer than 540 feet from residential land uses to the extent feasible and practical. When pile

installation work must take place closer than this distance to residences, alternative pile installation methods that do not require impact or vibratory pile driving shall be employed to the extent feasible and practical. Examples of alternative pile installation methods include auger cast pressure grouted displacement (APGD) piles, stone columns, cast-in-drilled-hole (CIDH) piles, or press-in piles. The feasibility of these alternative measures shall be subject to review and determination of the Community Development Department.

In addition, the construction contractor shall appoint a Project vibration coordinator who will serve as the point of contact for vibration-related complaints during Project construction. Contact information for the Project vibration coordinator will be posted at the Project Site and on a publicly available Project website. Should complaints be received, the Project vibration coordinator shall work with the construction team to adjust activities (e.g., drilling instead of driving piles in closer proximity to certain land uses) to the extent feasible and practical to reduce vibration or to reschedule activities for a less sensitive time. The Project vibration coordinator shall notify the Community Development Department of all vibration-related complaints and actions taken to address the complaints.

Construction Vibration Impacts to Onsite Land Uses

Damage to Structures

Although not required by CEQA, this section describes vibration effects on the Project's users and residents during Project construction, as onsite residential land uses may be occupied during late-stage Project construction. It is anticipated that residential occupancy may occur as early as the end of August 2025. Later phases of construction that may be ongoing while some onsite buildings are occupied include tenant improvements (of parcels 3, 4, 5, 6, and 7), landscaping (of parcels 2, 3, 4, 5, 6, and 7), core and shell (for parcels 4 and 5), and the final phases of meeting and collaboration space and parks. Potential vibration-related damage impacts from onsite construction while onsite uses are occupied is assessed. During this time with overlapping occupancy and onsite construction, construction activities could occur as close as 20 feet to an existing structure (e.g., the distance between the North Garage and the Meeting and Collaboration Space). For the purposes of this analysis, it is assumed that all on-site structures would fall under the "modern industrial/commercial buildings" or "new residential structures" categories, both of which have a damage criterion of 0.5 PPV in/sec according to the Caltrans vibration guidelines shown in Table 3.7-5. The most vibration-intensive equipment proposed for use during the year 2026 include a small excavator or gradall, which can generate vibration levels similar to a small bulldozer. As shown in Table 3.7-20 above, equipment proposed for use during 2026 could result in vibration levels in the range of 0.004 PPV in/sec (e.g., for a small bulldozer) at the nearest on-site structure (North Garage), located at 20 feet. This vibration level is below the 0.5 PPV in/sec criterion for both "modern industrial/commercial buildings" and "new residential structures." At further distances, vibration levels would be even lower. Therefore, vibration-related damage impacts to onsite uses during late-stage construction (when onsite structures are complete and occupied, but construction is still ongoing) would be considered ***less than significant.***

Vibration-Related Annoyance

In addition to the assessment of vibration impacts to off-site uses, the potential for vibration-related-annoyance impacts to occur to on-site uses is assessed because some structures would be occupied while later stages of Project construction are ongoing. It is expected that construction equipment would be operating at least 25 feet from the nearest on-site occupied structures during this year. Although the South

Garage may be located as close as 20 feet from on-site construction during the second half of 2025 and 2026, this structure would not be occupied with vibration-sensitive uses. Humans are typically considered more sensitive to vibration that occurs during nighttime hours, when people generally sleep. However, places of work and onsite residences may also be considered sensitive to vibration since it may affect a person's ability to complete work or focus on certain tasks. For this analysis, a significant vibration impact would be considered to occur when construction activities generate vibration levels that are strongly perceptible (i.e., PPV of 0.1 inch per second) at on-site residential during daytime or nighttime hours, or when vibration levels exceed the criteria outlined in ConnectMenlo EIR Mitigation Measure NOISE-2a. According to ConnectMenlo EIR Mitigation Measure NOISE-2a, vibration levels must be limited to a PPV of 0.063 in/sec at the nearest office, 0.032 in/sec at the nearest residence during daytime hours, and 0.016 in/sec at the nearest residence during nighttime hours. Nighttime construction would not take place during the later stages of Project development (when on-site uses are occupied) so estimated daytime vibration levels are compared to the applicable office and daytime residential thresholds from ConnectMenlo EIR Mitigation Measure NOISE-2a.

Construction during year 2026 would include tenant improvements, landscaping, core and shell, and the final phases for meeting, collaboration, and park. Activities, including landscaping, could occur within 25 feet on onsite buildings. At this distance, the PPV vibration level from proposed equipment (e.g., equipment similar to a small bulldozer) could be up to 0.003 PPV in/sec. Therefore, vibration from on-site construction would not exceed the 0.1 PPV in/sec "strongly perceptible" criterion, the 0.063 PPV in/sec office criterion from the ConnectMenlo EIR, or the 0.032 in/sec daytime residential criterion from the ConnectMenlo EIR. Therefore, vibration-related annoyance vibration impacts to onsite uses during late-stage construction would be considered ***less than significant.***

Impact NOI-3: 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 2 miles of a public airport or public use airport, would the project expose of people residing or working in the project area to excessive noise levels (No Impact)

The three closest airports in relation to the Project Site include Moffett Federal Airfield, San Carlos Airport, and Palo Alto Airport. Moffett Federal Airfield is approximately 6 miles southeast of the Project Site, and the San Carlos is approximately 5.5 miles west of the Project Site. The Palo Alto Airport, located approximately 1.8 miles to the southeast, is the closest airport to the Project Site. According to the noise contours presented in the Comprehensive Land Use Plan for the Palo Alto Airport[32], there is approximately 2,000 feet between the Project Site and the 55 dBA CNEL noise contour line of the Palo Alto Airport. Therefore, the Project is located well outside of the 55 dBA CNEL Noise Contour for this airport, and even farther from the noise contours of the other aforementioned airports. According to Table 4-1 of the Comprehensive Land Use Plan for the Palo Alto Airport, all land use categories (including residential land uses) are considered compatible with noise levels below 55 CNEL. Therefore, the proposed Project would not expose people working or residing in the Project to excessive noise levels from either a public or public use airport or private airstrip. There would be ***no impact*** related to excessive aircraft noise levels.

[32] Santa Clara County, *Comprehensive Land Use Plan for the Palo Alto Airport*, November 2020. Available: https://stgenpln.blob.core.windows.net/document/ALUC_PAO_CLUP.pdf. Accessed March 23, 2022.

Cumulative Impacts

Impact C-NOI-1: Cumulative Noise Impacts. The Proposed Project would be a cumulatively considerable contributor to a significant cumulative impact on noise. (SU)

The geographic context used for the cumulative assessment of noise and vibration impacts typically encompasses cumulative projects within 1,000 feet of the project site, but the cumulative context for this analysis is the entire City. The cumulative noise analysis included in the ConnectMenlo EIR correctly stated that, noise levels decrease relatively rapidly with distance, and vibration impacts decrease even more rapidly, resulting in cumulative noise or vibration impacts across city boundaries to occur infrequently. Therefore, the cumulative context for noise and vibration impacts is essentially the same as discussed in the ConnectMenlo EIR. The closely related past, present, and probable future projects considered in this Draft EIR are listed in Tables 3.0-1 (Menlo Park) and 3.0-2 (East Palo Alto) and depicted in Figure 3.0-1. The cumulative impacts analysis contained in the ConnectMenlo EIR is incorporated into this Draft EIR. The cumulative land use assumptions reflect development projects that are under construction, approved, or pending in Menlo Park and East Palo Alto. More information on the approach to the Cumulative Impacts analysis is provided in Chapter 3, Environmental Impact Analysis, of this EIR.

Summary of Analysis in the ConnectMenlo EIR

The ConnectMenlo EIR analyzed the potential for cumulative noise and vibration impacts that could result from ConnectMenlo implementation in combination with other past, present, and probable future projects (pages 4.10-38 to 4.10-39). The geographic context used for the cumulative assessment of noise and vibration impacts was the City and adjacent areas. The ConnectMenlo cumulative analysis states that the direct project analyses components encompass and address cumulative noise impacts from the growth within Menlo Park and pursuant to ConnectMenlo because ambient noise level metrics which form the basis of the noise analysis necessarily incorporate noise from all other nearby perceptible sources and traffic-related noise levels are based upon both existing and projected future traffic volumes that incorporate cumulative regional effects and trends. In summary, the ConnectMenlo analysis of noise and vibration impacts was intrinsically a cumulative assessment. The ConnectMenlo EIR determined that, even with implementation of applicable regulations, the ConnectMenlo project, in combination with past, present, and reasonably foreseeable projects elsewhere in the City, would result in a significant cumulative impact with respect to noise and vibration. However, according to the ConnectMenlo EIR, implementation of ConnectMenlo Mitigation Measures Noise 1-a through Noise-1c, Noise 2-a, Noise 2-b and Noise-4 would reduce impacts to less-than-significant levels. Therefore, cumulative noise impacts under ConnectMenlo were determined to be ***less than significant with mitigation***.

Cumulative Impacts with the Proposed Project

As noted in Chapter 3, *Environmental Impact Analysis*, of this EIR, in addition to the buildout projections considered in the ConnectMenlo EIR, the cumulative scenario for this EIR also includes the additional unrestricted units at the 123 Independence Drive project and East Palo Alto projects. The 123 Independence Drive project and East Palo Alto projects, as well as other projects in the area, would be required to comply with existing local noise criteria outlined in the City Municipal Code; however, some projects nonetheless could exceed allowable noise limits, especially if construction would occur outside of the regular daytime hours for construction in the city, or depending on the specific operational sources of noise included in a project. Because of this, and because the ConnectMenlo EIR determined the cumulative noise impacts would be significant, these additional projects would not alter the cumulative

impact determination for noise and vibration stated in the ConnectMenlo EIR. To ensure a comprehensive assessment of cumulative noise and vibration impacts associated with the Project, cumulative impacts for specific noise and vibration subtopics are discussed in more detail below.

Construction Noise

Regarding construction noise, the Proposed Project land uses would not result in a substantial change in the ConnectMenlo project; however, new or different noise impacts are identified for the Proposed Project (as compared to the ConnectMenlo project) as a result of certain Project-specific features. For example, the ConnectMenlo EIR included ConnectMenlo Mitigation Measure NOISE-1c, which restricts construction to the standard daytime hours of 8:00 a.m. to 6:00 p.m. weekdays. Due to requirements related to the Project construction schedule and as a result of work being required within the Caltrans and SamTrans rights of way (only allowed at nighttime), these Proposed Project construction would not be limited to these hours. Therefore, new impacts for construction noise outside of these daytime weekday hours are identified, and new Project-specific mitigation is proposed. Because of the stringent thresholds that govern during these non-daytime hours for construction, and because Project construction may result in a 10-dB or greater increase in noise at nearby sensitive uses during daytime hours, the Project would result in a new significant and unavoidable noise impact for construction than included in the ConnectMenlo EIR. However, note that construction noise is a localized impact that reduces as distance from the noise source increases. In addition, intervening features (e.g., buildings) between construction areas and nearby noise-sensitive land uses result in additional noise attenuation by providing barriers that break the line of sight between noise-generating equipment and sensitive receptors. These barriers can block sound wave propagation and somewhat reduce noise at a given receiver. Therefore, for Project construction noise to combine with noise from other nearby construction projects to expose individual receptors to greater noise levels, the projects would need to be located in close proximity to one another.

Because there might be future or approved projects located in close proximity to the Project Site such that could undergo construction at the same time, cumulative construction noise impacts would be ***significant***. Although mitigation is applied to the Proposed Project to reduce construction noise impacts (see ConnectMenlo Mitigation Measure Noise-1c, and Project Mitigation Measures NOI-1.1 and NOI-1.2), including implementation of best practices and construction of temporary construction noise barriers, construction noise impacts for the Proposed Project were determined to be significant and unavoidable. Therefore, consistent with the conclusion in the ConnectMenlo EIR, the Proposed Project in combination with other past, present, and reasonably foreseeable future projects would result in a ***significant cumulative impact*** with respect to construction noise. Unlike the conclusion from the ConnectMenlo EIR pertaining to cumulative construction noise impacts, however, the Proposed Project's contribution to the cumulative impact would be cumulatively considerable and cumulative noise impacts would be ***significant and unavoidable with mitigation.***

Operational Traffic Noise

To determine potential cumulative noise impacts in the area as a result of the Proposed Project, vehicular traffic volumes from the baseline (no Project) scenario are compared to the cumulative (with-Project) scenario. For vehicular traffic noise impacts in areas where the baseline and resulting noise levels (under cumulative conditions) do not exceed the "normally acceptable" land use compatibility standard, an increase of more than 5 dB is considered a significant cumulative traffic noise increase. In areas where the existing or resulting noise levels (under cumulative conditions) do exceed the "normally acceptable" level, based on the land use compatibility chart, a 3 dB or larger increase from existing to cumulative plus-Project conditions is considered a significant cumulative traffic noise increase. Estimates of traffic

volumes for baseline (no-Project) and cumulative plus-Project conditions were based on the ratio analysis methodology described previously. For example, a doubling of traffic (e.g., from 100 to 200 vehicles on a given segment) would result in a 3 dB change in the noise level.

Table 3.7-21 shows the ratio analysis results for roadway segments that would experience at least an approximate doubling of traffic volumes from baseline to cumulative plus-Project conditions. Cumulative increases from baseline to cumulative plus-Project conditions would be between 101 and 1,883 percent for the segments included below in Table 3.7-21, resulting in a traffic noise increase from baseline to cumulative plus-Project conditions of between 3 and 12.9 dB. Therefore, because an increase of more than 3 dB would occur along some roadway segments from baseline to cumulative plus project conditions, cumulative traffic noise impacts would be considered significant.

Although traffic from cumulative development with the Project could increase noise by up to approximately 13 dB, much of that would come from the other development; the Project itself would contribute only a portion of this total dB change. The Project contribution to all of the aforementioned increases can be determined by conducting a ratio analysis of cumulative no-Project and cumulative plus-Project conditions. As shown in Table 3.7-21, the largest Project-related traffic increase from cumulative no-Project to cumulative plus-Project conditions (i.e., the Project contribution to a cumulative impact) would be 88 percent, which would correlate to an increase in noise of approximately 2.8 dB (noting that a change in noise of 3 dB is considered to be "barely perceptible"). Most evaluated segments would have much smaller project-related traffic increases, with many segments experiencing a less than 1 dB increase in noise from project-added traffic. Because Project-related increases in the cumulative condition would be less than 3 dB (and sometimes much less than 3 dB) for all analyzed segments, and although significant cumulative traffic noise impacts were identified, the Project contribution to significant cumulative traffic noise impacts would ***less than cumulatively considerable*** on all roadway segments.

Mechanical Equipment Noise

Although complete details about heating and cooling equipment for the Proposed Project and nearby development projects are not known at this time, because multiple projects may be located close to one another, it is possible that noise from heating and cooling for the Project could combine with heating and cooling noise from nearby projects to cause a cumulative noise impact at nearby noise- sensitive land uses. This cumulative impact is considered potentially significant. Therefore, consistent with the conclusion in the ConnectMenlo EIR, the Proposed Project in combination with other past, present, and reasonably foreseeable future projects would result in a ***significant*** cumulative impact with respect to operational equipment noise. With implementation of Project Mitigation Measure NOI-1.3: Mechanical Equipment Noise Reduction Plan, Project-related impacts would be reduced to less-than-significant levels; similar mitigation would be required for other projects in the project vicinity in order to ensure equipment noise complies with the applicable local noise standards. As a result, the contribution of the Proposed Project to the significant cumulative operational equipment noise impact would be ***less than cumulatively considerable with mitigation.***

Emergency Generator Noise

Emergency generators included in the development of future buildings under the cumulative conditions would result in the generation of audible noise during testing. However, note that emergency generators are tested intermittently, and noise from generators is exempted during actual emergencies. In addition, although specific details regarding the emergency generators proposed for nearby future projects are not known at this time, it is very unlikely that the testing of an emergency generator for the Proposed Project

would occur concurrently with the testing of a generator at a nearby project. Even if testing were to occur simultaneously, which is unlikely, it is not likely that the generators would be close enough to one another for the noise to combine at a given individual receptor. Therefore, cumulative noise impacts related to emergency generator testing would be ***less than significant***.

Vibration Damage and Annoyance

Vibration impacts are based on instantaneous PPV levels. Because PPV is a measure of the peak instantaneous vibration level rather than an average, other sources of vibration that may operate simultaneously (e.g. for other project sites, or even on the same project site) would not be expected to combine to raise the overall peak vibration level experienced at a nearby sensitive use. Worst-case ground-borne vibration levels are generally determined by whichever equipment generates the highest vibration level at the affected location, so vibration would be dominated by the closest and most vibration-intensive equipment being used at a given time.

In general, vibration from multiple construction sites, even if they are close to one another, would not combine to raise the maximum PPV level at sensitive uses near the Project Site. For this reason, the cumulative impact of construction vibration from multiple construction projects near one another (or even adjacent to one another) would generally not combine to increase PPV vibration levels. Cumulative vibration impacts would be ***less than significant.***

Table 3.7-21. Traffic Volume Increases Associated with Project Trips

Roadway Segment	Average Daily Traffic Volumes			Traffic Increase (%) from Baseline to Cumulative plus Project	Cumulative Noise Increase (Baseline vs. Cumulative plus Project)	Percentage Traffic Increase from Cumulative to Cumulative plus Project	Noise Increase (dB) from Project Contribution (Cumulative vs. Cumulative plus Project)
	Baseline (2019) ADT	Cumulative (no Project) ADT	Cumulative Plus Project ADT				
Constitution Drive West of Chrysler Drive	4,417	5,577	5,701	1833%	12.9	2%	0.1
Purdue Avenue East of University Avenue	4,271	8,303	9,099	337%	6.4	10%	0.4
O'Brien Drive East of Adams Drive	4,174	8,362	15,759	302%	6.0	88%	2.8
O'Brien Drive West of University Avenue	3,954	8,534	15,567	300%	6.0	82%	2.6
Ivy Drive West of Willow Road	1,915	6,602	6,602	245%	5.4	0%	0.0
O'Brien Drive West of Adams Drive	5,856	9,727	17,178	216%	5.0	77%	2.5
Saratoga Avenue North of Newbridge Street	495	1,538	1,538	211%	4.9	0%	0.0
Constitution Drive East of Chrysler Drive	3,995	8,829	8,957	210%	4.9	1%	0.1
Kavanaugh Drive East of O'Brien Drive	2,872	5,369	7,444	209%	4.9	39%	1.4
Adams Court West of Adams Drive	1,711	4,373	4,373	156%	4.1	0%	0.0
O'Brien Drive North of Kavanaugh Drive	6,116	9,987	13,993	146%	3.9	40%	1.5
Bay Road East of University Avenue	14,802	25,046	25,046	141%	3.8	0%	0.0

Roadway Segment	Average Daily Traffic Volumes			Traffic Increase (%) from Baseline to Cumulative plus Project	Cumulative Noise Increase (Baseline vs. Cumulative plus Project)	Percentage Traffic Increase from Cumulative to Cumulative plus Project	Noise Increase (dB) from Project Contribution (Cumulative vs. Cumulative plus Project)
	Baseline (2019) ADT	Cumulative (no Project) ADT	Cumulative Plus Project ADT				
Bell Street West of University Avenue	3,696	6,919	7,224	141%	3.8	4%	0.2
Bay Road West of Marsh Road	2,860	4,403	4,561	128%	3.6	4%	0.2
Euclid Avenue North of East Bayshore Road	4,302	7,023	7,218	118%	3.4	3%	0.1
O'Brien Drive East of Willow Road	8,026	14,290	14,290	105%	3.1	0%	0.0
Haven Avenue West of Marsh Road	11,673	20,403	21,044	104%	3.1	3%	0.1
Adams Drive South of Adams Court	2,636	5,300	5,300	101%	3.0	0%	0.0

Source: Hexagon Transportation Consultants —refer to Appendix 3.7.
Note: **Bolded** text indicates data mentioned in report.