

3.9. NOISE

The following summarizes the applicable regulations and the existing setting and provides a detailed impact assessment related to noise and vibration. Refer to the Noise and Vibration Technical Report (Appendix N) for additional details related to applicable regulations and the existing setting.

Sound can be described in terms of its loudness (amplitude) and frequency (pitch). The standard unit of measurement for sound is the decibel (i.e., dB). Because the human ear is not equally sensitive to sound at all frequencies, the A-weighted scale (dBA) is used to reflect the normal hearing sensitivity range. This noise analysis discusses sound levels in terms of equivalent noise level (L_{eq}), day-night average noise level (L_{dn}), and the Community Noise Equivalent Level (CNEL).

Equivalent Noise Level (L_{eq}). L_{eq} represents the average noise level on an energy basis for a specific time period. Average noise level is based on the energy content (acoustic energy) of sound. For example, the L_{eq} for one hour is the energy average noise level during that hour. L_{eq} can be thought of as a continuous noise level of a certain period equivalent in energy content to a fluctuating noise level of that same period. L_{eq} is expressed in units of dBA.

Day-Night Average Noise Level (L_{dn}). L_{dn} is an adjusted noise measurement scale of average sound level during a 24-hour period. Events from 10:00 p.m. to 7:00 a.m. are increased by 10 dB to account for humans' greater sensitivity to noise during this period. L_{dn} is used to assess transit noise for residential uses.

Community Noise Equivalent Level (CNEL). CNEL is an adjusted noise measurement scale of average sound level during a 24-hour period. Due to increased noise sensitivities during evening and night hours, human reaction to sound between 7:00 p.m. and 10:00 p.m. is as if it were actually 5 dBA higher than had it occurred between 7:00 a.m. and 7:00 p.m. From 10:00 p.m. to 7:00 a.m., humans perceive sound as if it were 10 dBA higher. To account for these sensitivities, CNEL figures are obtained by adding an additional 5 dBA to evening noise levels between 7:00 p.m. and 10:00 p.m. and 10 dBA to nighttime noise levels between 10:00 p.m. and 7:00 a.m.

3.9.1 Regulatory Framework

3.9.1.1 Federal Regulations

Federal Transit Administration (FTA). Federal methodologies for assessing noise impacts are defined in the FTA's *Transit Noise and Vibration Impact Assessment Manual* (Assessment Manual). The Assessment Manual provides impact criteria to evaluate transit projects. The criteria include procedures for evaluating transit projects like BRT facilities.

Table 3.9-1 shows guidelines for evaluating the impact of operational noise on sensitive land uses. Historic sites, parks, indoor-only uses, and undeveloped land can be considered noise-sensitive under special circumstances.

Table 3.9-1 – FTA Land Use Categories and Metrics for Transit Noise Impact Criteria

Land Use Category	Land Use Type	Noise Metric, dBA	Description of Land Use Category
1	High Sensitivity	Outdoor L_{eq} (1-hour)*	Land where quiet is an essential element of its intended purpose. Example land uses include preserved land for serenity and quiet, outdoor amphitheaters and concert pavilions, and national historic landmarks with considerable outdoor use. Recording studios and concert halls are also included in this category.
2	Residential	Outdoor L_{dn}	This category is applicable to all residential land uses and buildings where people normally sleep, such as hotels and hospitals.
3	Institutional	Outdoor L_{eq} (1-hour)*	This category is applicable to institutional land uses with primarily daytime and evening use. Example land uses include schools, libraries, theaters, and churches where it is important to avoid interference with such activities as speech, meditation, and concentration on reading material. Places for meditation or study associated with cemeteries, monuments, museums, campgrounds, and recreational facilities are also included in this category.

* L_{eq} (1-hour)* for the loudest hour of project-related activity during hours of noise sensitivity.

SOURCE: FTA, *Transit Noise and Vibration Impact Assessment Manual*, September 2018.

The Assessment Manual provides guidance on how to evaluate the impact of noise levels from transit projects (**Table 3.9-2**). The levels of impact reflect a comparison of future project noise with existing noise and consider land use type. Noise sensitivity is a function of activity and time period of concern. The higher ambient noise levels are, the lower tolerance there is to any increase in noise.

The Assessment Manual also provides guidelines for evaluating the vibration impacts related to the construction and operation of transit projects. This guidance includes criteria for a General Vibration Impact Analysis that focuses on overall operational vibration velocity level. These criteria do not account for existing vibration, as it is rare than roadway traffic generates perceptible groundborne vibration in the absence of irregularities in the road surface. The Assessment Manual also includes impact thresholds to assess the risk of damage from construction activities to off-site structures.

Table 3.9-2– FTA Levels of Impact

Level of Impact	Description
No Impact	Project-generated noise is not likely to cause community annoyance. Noise projections in this range are considered acceptable by FTA and mitigation is not required.
Moderate Impact	Project-generated noise in this range is considered to cause impact at the threshold of measurable annoyance. Moderate impacts serve as an alert to project planners for potential adverse impacts and complaints from the community. Mitigation should be considered at this level of impact based on project specifics and details concerning the affected properties.
Severe Impact	Project-generated noise in this range is likely to cause a high level of community annoyance. The project sponsor should first evaluate alternative locations/alignments to determine whether it is feasible to avoid severe impacts altogether. In densely populated urban areas, evaluation of alternative locations may reveal a trade-off of affected groups, particularly for surface rail alignments. If it is not practical to avoid severe impacts by changing the location of the project, mitigation measures must be considered.

SOURCE: FTA, *Transit Noise and Vibration Impact Assessment Manual*, September 2018.

3.9.1.2 State Regulations

California General Plan Guidelines. The 2017 General Plan Guidelines establish county and city standards for acceptable exterior noise levels based on land use. These standards are incorporated into land use planning processes to prevent or reduce noise and land use incompatibilities.

California Government Code Section 65302. California Government Code Section 65302 requires each county and city to prepare and adopt a comprehensive long-range general plan for its physical development. Section 65302(f) requires a noise element to be included in the general plan. This noise element must identify and appraise noise problems in the community, recognize Office of Noise Control Guidelines, and analyze and quantify current and projected noise levels.

3.9.1.3 Regional Regulations

There are no applicable regional regulations.

3.9.1.4 Local Regulations

City of Los Angeles

General Plan. The City of Los Angeles General Plan includes a Noise Element that includes policies and standards in order to guide the control of noise to protect residents, workers, and visitors. Its primary goal is to regulate long-term noise impacts to preserve acceptable noise environments for all types of land uses. There are also references to programs applicable to construction projects that call for protection of noise sensitive uses and use of best practices to minimize short-term noise impacts. However, the Noise Element contains no quantitative or

other thresholds of significance for evaluating a project's noise or vibration impacts. Instead, it adopts the State's guidance on noise and land use compatibility "to help guide determination of appropriate land use and mitigation measures vis-à-vis existing or anticipated ambient noise levels."

Los Angeles Municipal Code. Los Angeles Municipal Code contains regulations that would regulate temporary construction activities and operational activities. Section 41.40(a) prohibits specific construction activities from occurring between the hours of 9:00 p.m. and 7:00 a.m., Monday through Friday. Subdivision(c) would further prohibit such activities from occurring before 8:00 a.m. or after 6:00 p.m. on any Saturday or national holiday, or at any time on any Sunday. These restrictions serve to limit specific construction activities to Monday through Friday 7:00 a.m. to 9:00 p.m., and 8:00 a.m. to 6:00 p.m. on Saturdays or national holidays. The City can issue a variance from these Municipal Code requirements on a case-by-case basis.

Section 112.05 of the Los Angeles Municipal Code establishes noise limits for powered equipment and hand tools operated in a residential zone or within 500 feet of any residential zone. Of particular importance to construction activities is subdivision (a), which institutes a maximum noise limit of 75 dBA as measured at a distance of 50 feet from the activity for construction vehicles and equipment. However, the Los Angeles Municipal Code notes that these limitations are not necessarily applicable if it can be proven that compliance would be technically infeasible despite the use of noise-reducing means or methods.

Section 111.02 discusses the measurement procedure and criteria regarding the sound level of "offending" noise sources. A noise source causing a 5 dBA increase over the existing average ambient noise levels of an adjacent property is considered to create a noise violation. However, Section 111.02(b) provides a 5 dBA allowance for noise sources lasting more than five but less than 15 minutes in any 1-hour period, and a 10 dBA allowance for noise sources causing noise lasting 5 minutes or less in any 1-hour period. In accordance with these regulations, a noise level increase from certain City-regulated noise sources of 5 dBA over the existing or presumed ambient noise level at an adjacent property is considered a violation.

The Los Angeles Municipal Code also provides regulations regarding vehicle-related noise, including Sections 114.02, 114.03, and 114.06. Section 114.02 prohibits the operation of any motor driven vehicles upon any property within the City in a manner that would cause the noise level on the premises of any occupied residential property to exceed the ambient noise level by more than 5 dBA. Section 114.03 prohibits loading and unloading causing any impulsive sound, raucous or unnecessary noise within 200 feet of any residential building between the hours of 10:00 p.m. and 7:00 a.m. Section 114.06 requires vehicle theft alarm systems to be silenced within five minutes.

City of Burbank

General Plan. The City's 2035 General Plan Noise Element provides a policy framework for the control of noise sources in the City. Its noise standards are codified here and provide guidance on how to site land uses that are compatible with the local noise environment. The General Plan Noise Element also contains the City's land use compatibility guidelines.

Burbank Municipal Code. The City's noise standards are codified in the Burbank Municipal Code Chapter 9-3-208 and Chapter 9-1-1-105.8. These set forth sound measurement criteria, maximum ambient noise levels for different land use zoning classifications, sound emission levels for specific uses, hours of operation for certain uses, standards for determining when noise is deemed to be a disturbance, and legal remedies for violations. The Noise Regulation establishes acceptable ambient sound levels to regulate intrusive noises (e.g., stationary mechanical equipment) within specific land use zones.

Chapter 9-1-1-105.8 of the Burbank Municipal Code prohibits construction activity which would create disturbing, excessive, or offensive noise between 7:00 p.m. and 7:00 a.m. Monday through Friday, between 5:00 p.m. and 8:00 a.m. on Saturdays, and at any time on Sundays or national holidays. The Community Development Director, Planning Board, or City Council may grant exceptions pursuant to land use entitlements or wherever there are practical difficulties involved in carrying out the provisions of the abovementioned chapter or other specific on-site activity that warrants unique consideration.

Section 9-3-208 of the Burbank Municipal Code prohibits any person from operating any machinery, equipment, pump, fan, air conditioning apparatus, or similar mechanical device in such a manner to cause the ambient noise levels to be exceeded by more than 5 dBA.

City of Glendale

General Plan. The City of Glendale's General Plan is a comprehensive, long-range declaration of purposes, policies, and programs. The Noise Element contains goals and policies to minimize noise impacts in the community.

Glendale Municipal Code. The Glendale Municipal Code includes an adopted Noise Ordinance, Chapter 8.36 Noise Control, Articles I and II, which identifies noise standards for amplified noise sources, specific noise restrictions, noise insulation standards, and construction noise limits. Noise limits are regulated through the assessment of the offending noise sources, which influence the existing ambient noise environment. In order to assess potential noise impacts.

Section 8.36.080, Construction on Buildings, prohibits construction activity from occurring during the "prohibited hours" that have been established in the Glendale Municipal Code. "Prohibited hours" refers to any time after the hour of 7:00 p.m. of any day; any time before the hour of 7:00 a.m. of any day; any time on Sunday; and any time on holidays. The City can issue a variance from these Municipal Code requirements on a case-by-case basis.

Section 8.36.210 prohibits operation of any device that creates a vibration which is above the vibration perception threshold of an individual at or beyond the property boundary of the source if on private property or at 150 feet from the source, if on a public space or public right-of-way.

Section 8.36.290 contains a list of activities that are exempted from the provisions of Glendale Municipal Code Chapter 8.36. The ordinance also exempts any activity, operation or noise which cannot feasibly be brought into compliance when it is technically infeasible to do so. The party responsible for the exceedance is also responsible to prove that compliance cannot be achieved despite use of mufflers, shields, sound barriers, and/or any other noise reduction device or techniques during the operation of the offending equipment.

City of Pasadena

General Plan. The City of Pasadena General Plan contains policies and programs to achieve and maintain noise levels compatible with various types of land uses. The Noise Element contains objectives and policies to minimize noise impacts from various noise sources.

Pasadena Municipal Code. The City has jurisdiction over noise regulation, as stated in the City of Pasadena Municipal Code, Title 9, Chapter 36 Noise Restrictions (Noise Ordinance). The Noise Ordinance is intended to enforce the City's policy to prohibit "unnecessary, excessive, and annoying noises from all sources." The Noise Ordinance generally limits the generation of noise that exceeds the actual measured existing ambient noise level by 5 dB(A) at neighboring properties, with adjustments made for steady audible tones, repeated impulsive noise, and noise occurring for limited periods. Section 9.36.060 sets interior noise level standards for multifamily residential development at 60 dB(A) during daytime hours (7:00 a.m. to 10:00 p.m.) and 50 dB(A) during nighttime hours (10:00 p.m. to 7:00 a.m.).

The City's noise ordinance includes provisions regarding construction noise. Section 9.36.070 of the Pasadena Municipal Code prohibits the operation of construction equipment and construction activity except from 7:00 a.m. to 7:00 p.m. Monday through Friday, and from 8:00 a.m. to 5:00 p.m. on Saturday in or within 500 feet of a residential district. Operation of construction equipment is prohibited on Sunday and on defined holidays. Section 9.36.080 of the Municipal Code prohibits the operation of powered construction equipment that generates a noise level of 85 dB(A) when measured at 100 feet. The City can issue a variance from these Municipal Code requirements on a case-by-case basis.

The City of Pasadena also regulates vibration levels that could adversely affect its citizens. Section 17.40.090 of the Pasadena Municipal Code prohibits the use, activity, or process that produces vibrations that causes the discomfort or annoyance to reasonable persons of normal sensitivity, or which endangers the comfort, repose, health, or peace of residents.

3.9.2. Existing Setting

3.9.2.1 Existing Noise Levels

Due to public health restrictions associated with the COVID-19 pandemic, field measurements of ambient noise were not possible in early 2020, primarily due to lower traffic volumes on arterials along the BRT corridor. Instead, the existing noise environment was modeled using the FTA’s Traffic Noise Model (version 3.0) methodologies via the SoundPLAN Essential software package (version 5.0). This approach utilized traffic volumes and other activity data from the transportation analysis to estimate how traffic-based noise propagates over the urban environment.

Ambient noise levels were predicted for sensitive receptor locations throughout the 18-mile corridor. These locations were selected to represent average noise conditions in each jurisdiction representing a range of land uses that address FTA’s three land use categories. **Table 3.9-3** show existing noise levels for Category 1 sensitive receptors. **Table 3.9-4** shows existing noise levels at Category 2 sensitive receptors and **Table 3.9-5** shows existing noise level at Category 3 sensitive receptors.

Table 3.9-3 – Existing Ambient Noise Levels at Category 1: Sensitive Receptors

Location	Jurisdiction	FTA Land Use Category	dBA L _{eq} (1-Hour)
Burbank Studios 3000 W. Alameda Ave.	Burbank	1	71.1
Hollywood Production Center 225 E. Broadway	Glendale	1	71.8
School of Rock 1240 E. Colorado Blvd.	Pasadena	1	72.8

SOURCE: Impact Sciences, *North Hollywood to Pasadena BRT Project Noise and Vibration Technical Report*, 2020.

Table 3.9-4 – Existing Ambient Noise Levels at Category 2: Sensitive Receptors

Location	Jurisdiction	FTA Land Use Category	dBA L _{dn} (24-Hour)
Gallery at NoHo Commons 5416 Fair Ave.	Los Angeles	2	64.1
Multi-Family Residences 112 Buena Vista St.	Burbank	2	70.2
Multi-Family Residences 3205 W. Alameda Ave.	Burbank	2	70.1
Multi-Family Residences 114 Sparks St.	Burbank	2	63.8
Multi-Family Residences 150 San Fernando Blvd.	Burbank	2	66.0
Multi-Family Residences 1112 Alameda Ave.	Burbank	2	67.8

Location	Jurisdiction	FTA Land Use Category	dBA L _{dn} (24-Hour)
Single-Family Residence 1068 Willard Ave.	Glendale	2	62.5
Eleve Lofts and Skydeck Apts 200 E. Broadway	Glendale	2	73.7
Multi-Family Residences 5116 Rockland Ave.	Los Angeles	2	61.3
385 Western Asset Plaza 385 Colorado Blvd.	Pasadena	2	71.8
Hill and Colorado Hotel 1336 E. Colorado Blvd.	Pasadena	2	70.2

SOURCE: Impact Sciences, *North Hollywood to Pasadena BRT Project Noise and Vibration Technical Report*, 2020.

Table 3.9-5 – Existing Ambient Noise Levels at Category 3: Sensitive Receptors

Location	Jurisdiction	FTA Land Use Category	dBA L _{eq} (1-Hour)
East Valley High School 5525 Vineland Ave.	Los Angeles	3	72.1
Gray Studio 5250 Vineland Ave.	Los Angeles	3	72.0
Saint Finbar School 2120 W. Olive Ave.	Burbank	3	75.3
Burbank Central Library 110 N. Glenoaks Blvd.	Burbank	3	71.2
Thomas Jefferson Elementary 1540 5 th St.	Glendale	3	62.0
John Marshall Elementary 1201 E. Broadway	Glendale	3	72.6
Center for the Arts Eagle Rock 2225 Colorado Blvd.	Los Angeles	3	61.7
Dahlia Heights Elementary School 5063 Floristan Ave.	Los Angeles	3	68.9
Southern California Children's Museum 459 E. Colorado Blvd.	Pasadena	3	72.2
Holliston United Methodist Church 1305 E. Colorado Blvd.	Pasadena	3	71.6

SOURCE: Impact Sciences, *North Hollywood to Pasadena BRT Project Noise and Vibration Technical Report*, 2020.

3.9.2.1 Existing Vibration Levels

Vibration levels in the Project Area are driven largely by vehicular traffic. The Assessment Manual states that it is unusual for vibration from sources such as buses and trucks to be perceptible, even in locations close to major roads. Because ambient vibration levels are often too low to be noticed, FTA recommends a limited survey of conditions where there are sources of perceptible vibration. Site visits indicate that roadway vibration is not typically perceptible outside of the surface street right-of-way.

3.9.3 Significance Thresholds and Methodology

3.9.3.1 Significance Thresholds

In accordance with Appendix G of the State CEQA Guidelines, the Proposed Project would have a significant impact related to noise and vibration if it would:

- a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;
- b) Generation of excessive groundborne vibration or groundborne noise levels; and/or
- c) For a project located within-the vicinity of a private airstrip or-an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, expose people residing or working in the project area to excessive noise levels.

The CEQA Guidelines do not provide a definition for “substantial increase” in noise and they do not provide a threshold of significance for potential noise or vibration impacts. There are no federal significance thresholds for construction noise that are applicable to the Proposed Project. As such, this analysis relies on local thresholds to determine significance. The following thresholds of significance were developed for this noise analysis based upon the General Plan Noise Elements for the Cities of Los Angeles, Burbank, Glendale, and Pasadena discussed above. However, the FTA impact criteria are used to identify potential operational impacts when quantitative local thresholds do not exist.

Noise

City of Los Angeles

Construction Noise Thresholds. Construction noise impacts would be significant if:

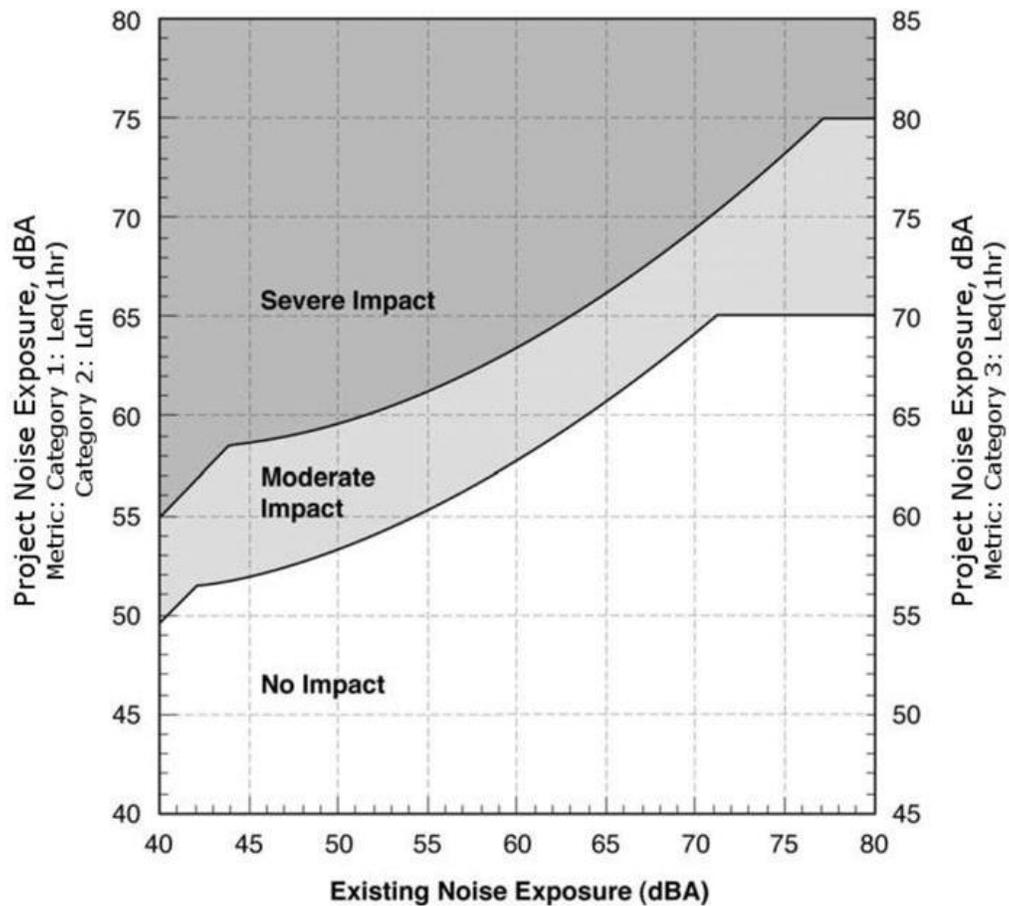
- Construction activities lasting more than one day would exceed existing ambient exterior sound levels by 10 dBA (hourly L_{eq}) or more at a noise-sensitive use;
- Construction activities lasting more than 10 days in a three-month period would exceed existing ambient exterior noise levels by 5 dBA (hourly L_{eq}) or more at a noise-sensitive use; and/or
- Construction activities of any duration would exceed the ambient noise level by 5 dBA (hourly L_{eq}) at a noise-sensitive use between the hours of 9:00 p.m. and 7:00 a.m. Monday through Friday, before 8:00 a.m. or after 6:00 p.m. on Saturday, or at any time on Sunday.

Operational Noise Thresholds. Operational noise impacts would be significant if:

- Project operations would cause ambient noise levels at off-site locations to increase by 3 dBA CNEL or more to or within “normally unacceptable” or “clearly unacceptable” noise/land use compatibility categories, as defined by the State’s 2017 General Plan Guidelines. This threshold would apply at residential uses and schools where the predicted future noise level is at least 70 dBA L_{dn} .
- Project operations would cause any 5 dBA CNEL or greater noise increase.

The FTA Assessment Manual identifies noise significance thresholds which are a function of existing ambient noise levels and the land use category of sensitive receptors. As illustrated in **Figure 3.9-1**, the thresholds at which a moderate or severe impact would occur vary as the existing noise environment changes.

Figure 3.9-1 – FTA Noise Impact Criteria for Transit Projects



SOURCE: FTA, *Transit Noise and Vibration Impact Assessment Manual*, September 2018.

City of Burbank

Construction Noise Threshold. Construction noise impacts would be considered significant if:

- Construction activities lasting more than 10 days in a three-month period would exceed existing ambient exterior noise levels by 5 dBA (hourly L_{eq}) or more at a noise-sensitive use; or
- Construction activities of any duration would exceed the ambient noise level by 5 dBA (hourly L_{eq}) at a noise-sensitive use between the hours of 7:00 p.m. and 7:00 a.m. Monday through Friday, before 8:00 a.m. or after 5:00 p.m. on Saturday, or at any time on Sunday.

Operational Noise Threshold. In addition to applicable City standards and guidelines that would regulate or otherwise moderate operational noise impacts, this analysis uses the following criteria:

- Operations activities would exceed existing ambient exterior noise levels by 5 dBA (hourly L_{eq}) or more at a noise-sensitive use; or
- Operations would exceed noise levels specified in the Assessment Manual (see **Figure 3.9-1**).

City of Glendale

Construction Noise Threshold. Construction noise impacts would be considered significant if:

- Construction activities lasting more than 10 days in a three-month period would exceed existing ambient exterior noise levels by 5 dBA (hourly L_{eq}) or more at a noise-sensitive use; or
- Construction activities would exceed the ambient noise level by 5 dBA (hourly L_{eq}) at a noise-sensitive use between the hours of 7:00 p.m. and 7:00 a.m. Monday through Saturday, or at any time on Sunday.

Operational Noise Threshold. In addition to applicable City standards and guidelines that would regulate or otherwise moderate operational noise impacts, this analysis uses the following criteria:

- Operations activities would exceed existing ambient exterior noise levels by 5 dBA (hourly L_{eq}) or more at a noise-sensitive use; or
- Operations would exceed noise levels specified in FTA's Assessment Manual (see **Figure 3.9-1**).

City of Pasadena

Construction Noise Threshold. Construction noise impacts would be considered significant if:

- Construction equipment would exceed 85 dBA L_{eq} at 100 feet of distance; and/or
- Construction activities of any duration would exceed the ambient noise level by 5 dBA (hourly L_{eq}) at a noise-sensitive use between the hours of 7:00 p.m. and 7:00 a.m. Monday through Friday, before 8:00 a.m. or after 5:00 p.m. on Saturday, or at any time on Sunday.

Operational Noise Threshold. In addition to applicable City standards and guidelines that would regulate or otherwise moderate operational noise impacts, this analysis uses the criteria from the Assessment Manual (see **Figure 3.9-1**).

Vibration

Construction Vibration Threshold. The Cities of Los Angeles, Burbank, Glendale, or Pasadena do not identify numerical thresholds of significance at which a vibration impact is deemed significant. This analysis uses criteria from the Assessment Manual to determine when construction impacts are considered significant. The Assessment Manual includes impact thresholds to assess the risk of damage from construction activities to off-site structures. As shown in **Table 3.9-6**, the guidance includes thresholds for four building categories that are presented in Peak Particle Velocity (PPV). PPV is commonly used to describe and quantify vibration impacts to buildings and other structures. PPV levels represent the maximum instantaneous peak of a vibration signal and are usually measured in inches per second.

Table 3.9-6 – FTA Construction Vibration Damage Criteria

Building Category	Peak Particle Velocity (in/sec)
I. Reinforced concrete, steel or timber (no plaster)	0.5
II. Engineered concrete and masonry (no plaster)	0.3
III. Non-engineered timber and masonry buildings	0.2
IV. Buildings extremely susceptible to vibration damage	0.12

SOURCE: FTA, *Transit Noise and Vibration Impact Assessment Manual*, September 2018.

The FTA Assessment Manual also includes impact thresholds to assess the risk of annoyance to humans. As show in **Table 3.9-7**, this includes thresholds for five types of land uses that are measured in decibel notation (VdB).

Table 3.9-7 – FTA Land Use Disruption Vibration Thresholds

Land Use	Significance Thresholds (VdB)		
	Frequent Events	Occasional Events	Infrequent Events
Buildings where vibration would interfere with interior operations.	65	65	65
Residences and buildings where people normally sleep.	72	75	80
Institutional land uses with primarily daytime use	75	78	83
Concert halls, TV studios, and recording studios	65	65	65
Auditoriums and theaters	72	80	80

SOURCE: FTA, *Transit Noise and Vibration Impact Assessment Manual*, September 2018

Operational Vibration. The Cities of Los Angeles, Burbank, Glendale, or Pasadena do not identify numerical thresholds of significance at which a vibration impact is deemed significant. This analysis uses criteria from the FTA Assessment Manual to determine when operational

impacts are considered significant. This guidance includes criteria for a General Vibration Impact Analysis that focuses on overall vibration velocity level. These criteria do not account for existing vibration, as it is rare that roadway traffic generates perceptible groundborne vibration in the absence of irregularities in the road surface.

3.9.3.2 Methodology

This analysis is consistent with the Detailed Noise Assessment Guidelines outlined in the Assessment Manual and City Guidelines, where applicable.

Construction Noise

To evaluate construction noise, construction equipment was identified for a typical worksite. This includes equipment needed for restriping of lanes on major arterials along the alignment, curb-and-gutter/sidewalk reconstruction, ROW clearing, pavement improvements, station/loading platform construction, landscaping, and lighting and traffic signal modifications. The analysis assumes construction equipment could include, but not be limited to, asphalt milling machines, asphalt pavers, excavators and backhoes, loaders, bulldozers, dump trucks, compactors, rollers, and concrete trucks. Smaller equipment may also include compactors, compact excavators and tractors, and small hydraulic equipment. Reference noise levels were obtained from the Assessment Manual and adjusted by projected equipment usage factor. Logarithmic noise propagation formulae were used to estimate projected noise impacts at nearby receptors. The analysis included construction of improvements around sidewalks associated with curb-running operations and the presence of residential and/or non-residential sensitive receptors within ten feet of a construction site. The analysis does not quantify combined noise levels from multiple station sites because noise generated at two sites would not be audible to a person given the distance between stations. Short-term (1-hour) L_{eq} estimates were made to represent existing noise levels during the day as the basis for analyzing noise impacts for sensitive uses. Construction activities would be limited to the daytime hours of operations as dictated by local noise ordinances.

Construction Vibration

The analysis of vibration impacts during the construction of BRT improvements was performed pursuant to the Assessment Manual. Based on FTA's four-step screening process, a qualitative construction vibration analysis was performed, as prolonged annoyance or damage is not expected. The predicted construction vibration levels are based on hypothetical scenarios and equipment mixes developed from similar projects.

Operational Noise

Operational noise was analyzed pursuant to the Assessment Manual. Sensitive receptors were identified within the four jurisdictions to provide a representative sample of noise levels throughout the BRT corridor. Sensitive receptors were categorized as one of three FTA sensitive Land Use Categories: Category 1 (High Sensitivity), Category 2 (Residential), and Category 3 (Institutional). Refer to **Tables 3.9-3** through **Table 3.9-5** for additional details. Existing and future noise levels were modeled using the TNM version 3.0 methodologies using

the SoundPLAN Essential modeling package (version 5.0). Twenty-four-hour average traffic volumes were extrapolated using peak hour traffic volumes obtained from the transportation analysis. Traffic volumes were input into the SoundPLAN model to predict existing and future noise conditions along the corridor in the Existing conditions, as well as the Project Design year of 2042. Year 2017 was used as the Baseline condition in this analysis to ensure consistency with the regional transportation model. There is a marginal difference (less than 0.1 percent) in regional VMT between 2017 and 2019 and the difference would have no effect to the impact conclusions presented in this analysis. Predictions for each receptor were compared to the applicable FTA noise impact criteria and local jurisdictional thresholds to identify potential noise impacts.

Using the FTA TNM 3.0 model, the operational analysis included the following key assumptions:

- As 24-hour ambient noise measurements were not possible because of unusual conditions from the COVID-19 pandemic, average daily trip volumes were estimated by converting peak AM and PM hourly traffic volumes in 2042. This included an estimate of daytime, evening, and nighttime traffic volumes.
- The posted speed limit on arterials used for BRT service was assumed for the analyses. This ensures that noise levels would reflect faster travel speeds and the elevated noise associated with faster travel on paved roads.
- Noise propagated from all lanes of arterials to reflect the dynamic nature of travel on local arterials as they shift from center- and median-running operations to mixed-flow, side-, and curbside-running operations.
- Vehicle fleet mixed derived from California Air Resources Board (CARB) EMFAC2017 estimates for Los Angeles County.
- Average 30 percent of vehicles on an arterial with traffic light control devices constrained by red lights.

Operational Vibration

Pursuant to the FTA Assessment Manual, BRT projects that rely on rubber-tire vehicles do not require a detailed analysis provided they do not meet the following conditions:

- Roadway irregularity. Expansion joints, speed bumps, or other design features that result in unevenness in the road surface can result in perceptible ground-borne vibration at distances up to 75 feet away.
- Operation close to vibration-sensitive buildings. Buses, trucks, or other heavy vehicles operating close to a vibration-sensitive building (within approximately 100 ft from the property line) may impact vibration-sensitive activities, such as research that uses electron microscopes or manufacturing of computer chips.
- Vehicles operating within buildings. Special considerations are often required for shared use facilities where vehicles operate inside or directly underneath buildings such as bus stations located inside an office building complex.

3.9.4 Impact Analysis

The following section includes the impact analysis, mitigation measures (if necessary), and significance after mitigation measures (if applicable).

Impact 3.9-1) Would the Proposed Project result in generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the Project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

Construction

Less-Than-Significant Impact with Mitigation. Construction activities would require the use of heavy equipment, pneumatic tools, generators, concrete pumps, and similar equipment. **Table 3.9-8** shows the equipment likely to be used during the noisiest periods of construction, the typical noise generated by this equipment, estimated usage factors (percent of time the equipment is operating under full load), and the predicted L_{eq} noise levels.

Table 3.9-8 – Construction Noise Levels for Proposed Project

Equipment	Typical Noise Level dBA L_{eq} (1-Hour) at 50 Feet	Usage Factor (% of Time Under Full Load)	Adjusted Noise Level dBA L_{eq} (1-Hour) at 50 Feet
Concrete Saw	76 dBA	30%	72 dBA
Loader/Backhoe	80 dBA	30%	74 dBA
Dozer	85 dBA	30%	80 dBA
Rough Terrain Forklift	80 dBA	20%	72 dBA
Skid Steer Loader	80 dBA	30%	74 dBA
Roller	85 dBA	30%	80 dBA
Paver	85 dBA	30%	80 dBA
Paving Equipment	85 dBA	30%	80 dBA
Combined			87 dBA

Note: This is a worst-case scenario for noise levels at 50 feet, as some local ordinances will require equipment to operate at lower noise levels (e.g., the City of Los Angeles sets 75 dBA limit at 50 feet per Municipal Code section 112.05).

SOURCE: Impact Sciences, *North Hollywood to Pasadena BRT Project Noise and Vibration Technical Report*, 2020; FTA, *Transit Noise and Vibration Impact Assessment Manual*, September 2018.

The predicted noise level from a typical construction project is 87 dBA L_{eq} at 50 feet, though adherence to local ordinance restrictions on powered equipment would likely reduce the cumulative noise level for this mix of equipment. For example, the City of Los Angeles restricts construction equipment to emitting no more than 75 dBA L_{eq} at 50 feet of distance. When added to existing ambient noise levels along the corridor that range from 60.1 to 74.1 dBA L_{eq} , construction activities that generate 65.5 and 79.5 dBA L_{eq} at 50 feet of distance, respectively, could increase ambient noise levels by 5 dBA L_{eq} or more. These increases would exceed local thresholds of significance for all four jurisdictions. Activity at staging areas typically results in

less noise as there is less equipment operations, although there would still be a potential for threshold exceedance.

The actual increases in ambient noise would depend on several factors, including:

- Existing ambient noise levels;
- The scope of construction at a given station location (e.g., full BRT station with shelters and other improvements vs. reduced improvements);
- Location of station improvements. Construction projects that support median or center-running segments would potentially be 40 to 60 feet further from noise-sensitive land uses than projects build on sidewalk ROWs;
- Location of sensitive receptors; and
- Any attenuation from the built environment or other factors between a construction site and nearby receptors.

The Proposed Project relies mostly on existing surface streets, where buses would operate in all lanes of arterials depending on operational circumstances and ROW availability. When local service is based on curb-running, side-running, or mixed-flow service, construction of improvements would be closer to sensitive receptors, potentially resulting in significant short-term impacts. Approximately six stations would be constructed at center-running or median-running segments while the remainder are built on sidewalk ROWs or curb extensions.

In the North Hollywood end of the alignment, service would be a blend of mixed-flow and side-running service on Lankershim and Chandler Boulevards, with curbside stations to support this service. An increase of 15 dBA L_{eq} or more given the proximity of receptors along Chandler Boulevard would exceed the City of Los Angeles significance threshold of 5 dBA (hourly L_{eq}). Service on Vineland Avenue would be center-running, requiring construction of median-based stations at key intersections. Impacts here would be lesser given the approximately 100 feet of distance from the centerline of Vineland Avenue and residences that flank this street.

Within the City of Burbank, stations would be built curbside on sidewalks to accommodate curbside-running operations on Olive Avenue and Glenoaks Boulevard. Construction activities would likely exceed the significance threshold of 5 dBA (hourly L_{eq}). Construction of stations along median-running segments of Glenoaks Boulevard are approximately 45 feet further from sensitive receptors than stations constructed along the curb, given the very wide center medians. Toward the eastern end of Burbank, stations would be built in the median along Glenoaks Boulevard to serve median-running service.

Within the City of Glendale, the Proposed Project would include stations on median islands to accommodate median-running bus lanes along Glenoaks Boulevard, creating substantial distance from receptors along this corridor. Construction activities would likely exceed the significance threshold of 5 dBA (hourly L_{eq}). Along Central Avenue and Broadway, stations would be built on sidewalks to support side-running bus lanes and curbside-running operations.

In the Eagle Rock area, side-running service on Colorado Boulevard would require construction of curbside stations that are closer to existing receptors. An increase of 15 dBA L_{eq} or more given the proximity of receptors along Colorado Boulevard would exceed the City of Los Angeles significance threshold of 5 dBA (hourly L_{eq}).

Within Pasadena, buses would operate exclusively in mixed-flow lanes on Fair Oaks Avenue, Walnut Street, Raymond Avenue, and Colorado Boulevard. As such, the proximity of sensitive receptors built to the sidewalk would increase the potential for noise impacts. For example, the proposed station at Colorado Boulevard and Los Robles Avenue in Pasadena would be built on existing right-of-way in front of housing developments (e.g., 385 Western Asset Plaza). At this and other curbside construction sites, noise could exceed the City's threshold of 85 dBA L_{eq} at 100 feet of distance for construction activities. Construction noise could generate 87 dBA L_{eq} at 50 feet. As noise attenuates approximately 6 dB per doubling of distance for point sources, construction activities could produce noise levels of approximately 81 dBA L_{eq} at a distance of 100 feet and not exceed the threshold of 85 dBA L_{eq} at 100 feet. However, the City also has a 5 dBA incremental threshold (hourly L_{eq}) which would likely be exceeded by an increase of 15 dBA L_{eq} .

Given the ambient noise levels along the corridor, construction activities are likely to generate noise impacts that could increase ambient noise levels by 5 dBA L_{eq} or more. This level of noise increase would likely exceed local significance thresholds within one or more jurisdictions along the BRT alignment. Therefore, without mitigation, the Proposed Project would result in a potentially significant impact related to construction activities. Implementation of Mitigation Measure **NOI-1** would reduce this impact to a less-than-significant level by requiring the construction contractor to prepare and implement a Noise Control Plan, to be approved by Metro, which would require monitoring noise levels and implementation of noise reduction methods to ensure construction noise levels do not exceed the standards established by the four affected jurisdictions.

Nighttime activities are not anticipated to be needed to construct the Proposed Project. However, at this stage of the planning process and without a construction contractor, it cannot be confirmed if nighttime construction would be necessary for specialized construction tasks. Nighttime activities could result in a significant impact should those activities involve heavy equipment or pneumatic tools. Implementation of Mitigation Measure **NOI-1** would reduce this impact to a less-than-significant level by requiring the construction contractor to prepare and implement a Noise Control Plan, to be approved by Metro, which would require monitoring noise levels and implementation of noise reduction methods to ensure construction noise levels do not exceed the standards established by the four affected jurisdictions. In addition, should nighttime construction be necessary, the construction contractor would be required to coordinate with the jurisdictions to obtain necessary permits, such as a variance to the Noise Ordinance in the City of Los Angeles.

Route Options

This analysis evaluates the noise impacts of route options to the Proposed Project. The route options would have noise impacts similar to the Proposed Project, with slight variations due to the number of stations, location of the route segments, and location of the stations. Construction equipment used during construction of the route options would be similar to the Proposed Project. Differences in the route alignments and station locations for the route options are described below.

In North Hollywood, a route option would shift construction activities from Vineland Avenue to Lankershim Boulevard. This would generally increase construction noise exposure, as Lankershim service would be either side-running or curb-running. This would place construction closer to more receptors than the median-based construction that would occur on Vineland Avenue.

Through Glendale, construction noise impacts for any route options would be similar to those for the Proposed Project. For example, a route option through central Glendale that shifts station construction from East Broadway to Colorado Street two blocks to the south would have similar impacts, as both would have side-running service. A route option using Central Avenue, Goode Avenue, and Sanchez Drive would also require construction of curbside stations that support mixed-flow bus service.

Through Eagle Rock, a route option that would include some center-running service at the transition between Ellenwood Drive and El Rio Avenue would not alter the location of stations that service the largely side-running service on Colorado Boulevard.

Within the City of Pasadena, route options proposed on Figueroa Street, Colorado Boulevard, Union Street, and Green Street would not change the nature of construction noise impacts, as all service in the City would operate in mixed-flow lanes that require curbside construction.

This level of noise increase would likely exceed local significance thresholds within one or more jurisdictions along the BRT alignment. Therefore, without mitigation, the similar to the Proposed Project, the route options would result in a potentially significant impact related to construction activities. As with the Proposed Project, implementation of Mitigation Measure NOI-1 would reduce this impact to less than significant.

Operations

Less-Than-Significant Impact. The Proposed Project would impact the noise environment along the corridor in two key-ways. First, it would increase the number of buses traveling in the study area, with 90,200 annual revenue hours and 1,348,500 annual revenue miles in 2042. However, Metro would reduce service from its Line 501 service, the Metro NoHo to Pasadena Express service that mirrors the BRT alignment while using the SR-134 more often to provide rapid service. This would reduce 52,353 annual revenue hours and 488,565 annual revenue miles, resulting in a net increase of 37,847 annual revenue hours and 859,935 revenue miles. This service would operate during daytime (6:00 a.m. to 6:00 p.m.), evening (6:00 p.m. to 10:00 p.m.) and into nighttime hours (after 10:00 p.m.) seven days a week. This additional bus-

related volume on local arterials would not audibly elevate ambient noise levels, as it takes a doubling of traffic volumes on arterials and/or freeways to increase ambient noise levels by 3 dBA L_{eq} . When buses transition to freeway operations on the SR-134, the impact of adding up to 220 daily trips on a freeway that carries 240,000 average annual daily trips at the Brand Boulevard exits, for example, would be negligible.

Second, the service would shift drivers from personal vehicles to BRT services, reducing 86,659 vehicle miles of travel throughout the region by 2042, of which 13,339 miles would be entirely reduced within the study area and 68,278 miles would be reduced from trips that start or end in the study area. This would reduce ambient noise levels from traffic on local streets. It should be noted that over time, traffic patterns shift with development and transportation infrastructure, changing how traffic is distributed over local roadways. Implementation of BRT service would further reduce traffic volumes on many roadways along the alignment, though some trips could be diverting to parallel roadways based on any reduction in capacity along the BRT alignment.

Table 3.9-9 summarizes the changes in traffic-related noise at Category 1 sensitive receptors along arterial segments. **Table 3.9-10** summarizes the changes in traffic-related noise at Category 2 residential receptors along arterial segments throughout the BRT corridor. These selected segments are consistent with FTA guidance on evaluating operational impacts of bus transit services and represent a cross-section of local jurisdictions, proximity to Category 2 land uses, and service to stations in both the medians and curbs along the alignment. **Table 3.9-11** illustrates changes at Category 3 institutional uses along these same segments.

Ambient noise levels along the surface streets used for BRT service would increase by no more than 2 dBA L_{dn} for Category 2 residences along the alignment. This impact accounts for traffic volumes throughout a 24-hour cycle and the “penalties” associated with noise generated by traffic during evening and night hours. These L_{dn} noise levels also capture the anticipated span of service, which ranges from 21 to 23 hours per day. These increases of no more than 1 dBA are inaudible, as 3 dBA increases are generally recognized as the threshold at which the most sensitive ears can detect changes in the noise environment. These increases are also below the thresholds of significance established by the City of Los Angeles that ranges from a 3 to 5 dBA CNEL increase in ambient noise levels.

The Cities of Burbank, Glendale, and Pasadena do not have applicable quantitative thresholds and the FTA noise impact criteria are used to assess the significance of operational noise impacts. In all cases, the Proposed Project would not result in Moderate or Severe impacts under FTA noise impact criteria.

The Proposed Project would increase noise levels for Category 1 sensitive uses by no more than 1 dBA L_{eq} during the day and three Category 3 institutional uses along the corridor by no more than 2 dBA L_{eq} during the day. As with the 24-hour land uses, these increases would be inaudible and would not exceed any local thresholds of significance for operational noise.

Table 3.9-9 – Predicted Noise Levels for Proposed Project, Category 1 (High Sensitivity) Receivers

Key	Segment	Jurisdiction	Existing Noise Level (dBA L _{eq})	FTA Impact Assessment				Local Jurisdiction Impact Assessment			
				Predicted Project Noise (dBA L _{eq})	FTA Moderate Impact Threshold (dBA L _{eq})	FTA Severe Impact Threshold (dBA L _{eq})	FTA Level Impact Before Mitigation	Predicted Future Noise Level (dBA L _{eq})	Predicted Increase (dBA L _{eq})	Local Jurisdiction Impact Threshold (dBA CNEL)	Local Jurisdiction Impact Before Mitigation
C (Proposed Project)	Olive Ave. from California and Alameda	Burbank	71	62	71	75	--	72	1	N/A	--
E1 (Proposed Project)	Broadway from Brand to Louise	Glendale	72	62	71	76	--	72	0	N/A	--
H1 (Proposed Project)	Colorado Blvd. from Michigan to Chester	Pasadena	73	64	71	76	--	73	1	N/A	--

NOTES: N/A: City does not have its own quantitative threshold.

SOURCE: Impact Sciences, *North Hollywood to Pasadena BRT Project Noise and Vibration Technical Report*, 2020.

Table 3.9-10 – Predicted Noise Levels for Proposed Project, Category 2 (Residential) Receivers

Key	Segment	Jurisdiction	Existing Noise Level (dBA L _{dn})	FTA Impact Assessment				Local Jurisdiction Impact Assessment			
				Predicted Project Noise (dBA L _{dn})	FTA Moderate Impact Threshold (dBA L _{dn})	FTA Severe Impact Threshold (dBA L _{dn})	FTA Level Impact Before Mitigation	Predicted Future Noise Level (dBA L _{dn})	Predicted Increase (dBA L _{dn})	Local Jurisdiction Impact Threshold (dBA CNEL)	Local Jurisdiction Impact Before Mitigation
A1 (Proposed Project)	Chandler Blvd. from Lankershim and Blakeslee	Los Angeles	66	57	62	67	--	66	1	5	--
C (Proposed Project)	Olive Ave. from Myers to Keystone	Burbank	75	66	66	73	--	74	1	N/A	--
	Olive Ave. from California to Alameda Ave.	Burbank	72	64	66	72	--	73	1	N/A	--
	Olive Ave. from Buena Vista to Brighton	Burbank	72	64	66	71	--	73	1	N/A	--
	Olive Ave. from Sparks to Beachwood	Burbank	66	47	62	67	--	66	0	N/A	--
	Olive Ave. from San Fernando to 3 rd	Burbank	68	59	63	68	--	68	1	N/A	--
D (Proposed Project)	Glenoaks Blvd. from Alameda to Spazier	Glendale	70	60	63	68	--	70	1	N/A	--
	Glenoaks Blvd. from Willard to Grandview	Glendale	64	53	61	65	--	65	0	N/A	--
E1 (Proposed Project)	Broadway from Brand to Louise	Glendale	76	66	66	74	--	76	0	N/A	--

Key	Segment	Jurisdiction	Existing Noise Level (dBA L _{dn})	FTA Impact Assessment				Local Jurisdiction Impact Assessment			
				Predicted Project Noise (dBA L _{dn})	FTA Moderate Impact Threshold (dBA L _{dn})	FTA Severe Impact Threshold (dBA L _{dn})	FTA Level Impact Before Mitigation	Predicted Future Noise Level (dBA L _{dn})	Predicted Increase (dBA L _{dn})	Local Jurisdiction Impact Threshold (dBA CNEL)	Local Jurisdiction Impact Before Mitigation
F2 (Proposed Project)	Colorado Blvd. from Rockland to Eagle Rock	Los Angeles	61	60	59	64	--	64	2	5	--
H1 (Proposed Project)	Colorado Blvd. from Euclid to Los Robles	Pasadena	74	66	66	70	--	75	1	N/A	--
	Colorado Blvd. from Holliston to Hill	Pasadena	75	64	65	69	--	65	0	N/A	--

NOTE: There is a marginal difference between L_{dn} and CNEL (CNEL is typically 0.5 dBA higher than L_{dn}) and there would not be a difference in the impact determinations.
N/A: City does not have its own quantitative threshold.

SOURCE: Impact Sciences, *North Hollywood to Pasadena BRT Project Noise and Vibration Technical Report*, 2020

Table 3.9-11 – Predicted Noise Levels for Proposed Project, Category 3 (Institutional) Receivers

Key	Segment	Jurisdiction	Existing Noise Level (dBA L _{eq})	FTA Impact Assessment				Local Jurisdiction Impact Assessment			
				Predicted Project Noise (dBA L _{eq})	FTA Moderate Impact Threshold (dBA L _{eq})	FTA Severe Impact Threshold (dBA L _{eq})	FTA Level Impact Before Mitigation	Predicted Future Noise Level (dBA L _{eq})	Predicted Increase (dBA L _{eq})	Local Jurisdiction Impact Threshold (dBA CNEL)	Local Jurisdiction Impact Before Mitigation
A1 (Proposed Project)	Chandler Blvd. from Blakeslee to Vineland	Los Angeles	70	59	70	74	--	71	0	3 ¹	--
	Vineland Ave. from Weddington to Magnolia	Los Angeles	70	50	71	76	--	70	0	3 ¹	--
D (Proposed Project)	Glenoaks Blvd. from Olive to Angeleno	Glendale	69	59	69	74	--	70	0	N/A	--
	Glenoaks Blvd. from Justin to Ruberta	Glendale	60	48	63	68	--	60	0	N/A	--
E1 (Proposed Project)	Broadway between Chevy Chase and Verdugo	Glendale	71	61	71	75	--	71	0	N/A	--
F2 (Proposed Project)	Colorado Blvd. from Rockland and Eagle Rock	Los Angeles	61	53	63	68	--	61	2	5	--
	Colorado Blvd. from Townsend to Floristan	Los Angeles	67	53	68	72	--	67	0	5	--
H1 (Proposed Project)	Colorado Blvd. from Los Robles to Oakland	Pasadena	70	61	70	74	--	70	1	N/A	--
	Colorado Blvd. from Chester to Holliston	Pasadena	67	56	67	72	--	67	0	N/A	--

N/A: City does not have its own quantitative threshold.

¹ This threshold would apply at residential uses and schools where the predicted future noise level is at least 70 dBA L_{dn} in the City of Los Angeles.

SOURCE: Impact Sciences, *North Hollywood to Pasadena BRT Project Noise and Vibration Technical Report*, 2020

It should be noted that when the alignment uses the SR-134 in two locations, bus service would operate on freeway mixed-flow lanes, where noise impacts would be negligible given the volume of traffic on the freeway. In addition, the SR-134 is generally elevated or depressed compared to land uses along this alignment, reducing the potential for line-of-sight propagation of noise impacts at sensitive receptors.

The Proposed Project includes electric charging infrastructure. Charging is a passive use that would not generate audible noise past the property line of the charging location. There would no potential for a noise impact related to charging.

Based on the above detailed analysis, the Proposed Project would result in a less than significant impact related to operational activities.

Route Options

Any route options would shift noise from electric-powered buses to other streets, but like the Proposed Project, would not result in any significant noise impacts. Actual impacts would be a function of the location of stations, proximity of sensitive receptors to the street, and other localized factors.

The North Hollywood route option would use Lankershim Boulevard instead of Vineland Avenue, shifting bus operations to side-running service, as opposed to the center-running segment along Vineland Avenue. This portion of the Lankershim corridor is mostly commercial retail and office uses, but more residential uses are being built that would be considered sensitive receptors.

At the intersection of Lankershim Boulevard and Weddington Avenue, there are sensitive uses that would be impacted by noise from traffic over time. However, as shown in **Table 3.9-12**, noise levels along Lankershim Boulevard near Weddington Avenue would increase by less than 1 dBA L_{eq} at Category 3 receptors near the street.

After traveling on the SR-134 from North Hollywood to the curb-running segment along Olive Avenue in the City of Burbank, a route option would skip a station at the Olive Avenue/Verdugo Avenue intersection and at the Glenoaks Boulevard/Grandview Avenue intersection. Instead, this option would stop at a side-running station at Central Avenue and Lexington Drive in Glendale. Here, this route option would deviate from the Proposed Project by continuing south along Central Avenue, with a station at the intersection of Central Avenue and American Way.

This route option would head east along Colorado Street, making station stops at the Colorado Street/Brand Avenue, Colorado Street/Glendale Avenue, and Colorado Street/Verdugo Road intersections. The route would continue east along Colorado Street in Glendale until the station at the Eagle Rock Plaza, located within the boundaries of the City of Los Angeles.

Table 3.9-12 – Predicted Noise Levels for Route Options

Key	Segment	Jurisdiction	Existing Noise Level (dBA Leq)	Predicted Project Noise (dBA Leq)	FTA Moderate Impact Threshold (dBA Leq)	FTA Severe Impact Threshold (dBA Leq)	FTA Level Impact Before Mitigation	Predicted Future Noise Level (dBA Leq)	Predicted Increase (dBA Leq)	Local Jurisdiction Impact Threshold (dBA Leq)	Local Jurisdiction Impact Before Mitigation
A2 (Route Option)	Lankershim Blvd. from Chandler Ave. to Weddington Ave.	Los Angeles	72	63	71	76	--	72	1	31	--
E2 (Route Option)	Colorado St. from Central Ave. to Brand Blvd.	Glendale	68	61	63	67	--	68	1	N/A	--

¹ This threshold would apply at residential uses and schools where the predicted future noise level is at least 70 dBA Ldn within the City of Los Angeles.

SOURCE: Impact Sciences, *North Hollywood to Pasadena BRT Project Noise and Vibration Technical Report*, 2020

This route option would take Colorado Boulevard through Eagle Rock. This route option would primarily have center-running bus lanes through this segment as opposed to side-running lanes under the Proposed Project. Therefore, the two stations (Colorado Boulevard/Eagle Rock Boulevard and Colorado Boulevard/Townsend Avenue intersections) would be constructed in the median in contrast to stations constructed in the curb under the Proposed Project.

The route would then use SR-134 and the Colorado Boulevard interchange to enter the City of Pasadena. On Colorado Boulevard in Pasadena, this route would have a station at three intersections; Colorado Boulevard/Arroyo Parkway, Colorado Boulevard/Lake Avenue, and Colorado Boulevard/Hill Avenue. With the exception of a different location for the Colorado Boulevard/Arroyo Parkway station, which would be used only for the Colorado Boulevard interchange, the stations for this route option would be the same as under the Proposed Project. Like under the Proposed Project, stations would be along the curb, due to the mixed-flow alignment along Colorado Boulevard.

Another route option would start from North Hollywood and use Lankershim Boulevard instead of Vineland Avenue, as under the Proposed Project. A station would be located at Lankershim Boulevard and Hesby Avenue, which would be side-running along this portion of Lankershim Boulevard.

Like under the Proposed Project, this route option would use SR-134 from North Hollywood to the curb-running segment along Olive Avenue in the City of Burbank. However, along this route option, there would not be a station at the Olive Avenue/Verdugo Avenue intersection. This route option would continue along Glenoaks Boulevard traveling between the City of Burbank and Glendale, which would be curb-running and median-running as under the Proposed Project. However, this would not include the optional station at Glenoaks Boulevard/Grandview Avenue intersection as under the Proposed Project.

This route option would then deviate from the Proposed Project route by locating a station at SR-134 at Brand Boulevard in Glendale. It would take SR-134 through Glendale and Eagle Rock, exiting at Figueroa Street in Eagle Rock to stop at a station located at Colorado Boulevard and Figueroa Street. The route option then east along Colorado Boulevard before reentering SR-134 and taking the Fair Oaks Avenue interchange into the City of Pasadena.

After exiting the Fair Oaks Avenue interchange, this route option would stop at the Raymond Avenue/Holly Street station as under the Proposed Project route. However, this service would head south to Green Street and head east, stopping at station located at the intersections of Green Street/Los Robles Avenue and Green Street/Lake Avenue. It would then turn north on Hill Avenue, making a station stop at Hill Avenue/Colorado Boulevard. Continuing north, this route option would head west at Union Street, stopping at 2 more stations located at the intersections of Union Street/Lake Avenue and Union Street/Los Robles Avenue.

Similar to the Proposed Project, the route options would result in a less than significant impact for operational noise.

Mitigation Measures

NOI-1: Where construction cannot be performed in accordance with the FTA 1-hour L_{eq} construction noise standards, elevates existing ambient noise levels by 5 dBA L_{eq} or more, or exceeds other applicable noise thresholds of significance, The construction contractor shall develop a Noise Control Plan demonstrating how noise criteria would be achieved during construction. The Noise Control Plan shall be designed to follow Metro requirements, include construction noise control measures, measurements of existing noise, a list of the major pieces of construction equipment that would be used, and predictions of the noise levels at the closest noise-sensitive receivers (residences, hotels, schools, churches, temples, and similar facilities). The Noise Control Plan shall be approved by Metro prior to initiating localized construction activities.

The Noise Control Plan shall require weekly noise monitoring at land used adjacent to construction activities. Noise reducing measures shall be required should the following performance standards be exceeded within the following jurisdictions:

- City of Los Angeles: Construction noise levels that exceed the existing ambient exterior noise level at a noise sensitive use by 10 dBA L_{eq} within one hour for construction lasting more than one day, 5 dBA L_{eq} for construction lasting more than 10 days in a three-month period, and any exceedance of 5 dBA during the hours of 9:00 p.m. to 7:00 a.m. Monday through Friday and between 6:00 p.m. to 8:00 a.m. on Saturday or any time Sunday.
- City of Burbank: Construction noise levels that exceed the existing ambient exterior noise level between 7:00 a.m. and 7:00 p.m. at a noise sensitive use by 5 dBA L_{eq} for construction lasting more than 10 days in a three-month period. Construction noise levels of any duration that exceed existing ambient exterior noise levels by 5 dBA L_{eq} at a noise sensitive use between the hours of 7:00 p.m. and 7:00 a.m. Monday through Friday, before 8:00 a.m. or after 5:00 p.m. on Saturday, or at any time on Sunday.
- City of Glendale: Construction noise levels that exceed the existing ambient exterior noise level between 7:00 a.m. and 7:00 p.m. at a noise sensitive use by 5 dBA L_{eq} for construction lasting more than 10 days in a three-month period. Construction noise levels of any duration that exceed existing ambient exterior noise levels by 5 dBA L_{eq} at a noise sensitive use between 7:00 p.m. and 7:00 a.m. Monday through Saturday or at any time on Sunday.
- City of Pasadena: Construction noise levels that exceed 85 dBA L_{eq} at 100 feet of distance or any duration of noise levels that exceeds existing ambient exterior noise levels by 5 dBA L_{eq} at a noise sensitive use between 7:00 p.m. and 7:00 a.m. Monday through Friday, before 8:00 a.m. or after 5:00 p.m. on Saturday, or at any time on Sunday.

Noise-reducing methods that may be implemented include:

- Where construction occurs near noise sensitive land uses, specialty equipment with enclosed engines, acoustically attenuating shields, and/or high-performance mufflers shall be used.
- Limit unnecessary idling of equipment.
- Install temporary noise barriers or noise-control curtains, where feasible and desirable.
- Reroute construction-related truck traffic away from local residential streets and/or sensitive receivers.
- Use electric instead of diesel-powered equipment and hydraulic instead of pneumatic tools where feasible.

Significance of Impacts after Mitigation

Mitigation Measure **NOI-1** includes noise monitoring and performance standards that ensure construction noise levels would not exceed the significance thresholds and would not elevate ambient noise levels above standards. If monitoring indicates an exceedance, noise levels would be mandated to be reduced through a variety of control measures. Therefore, with mitigation, the Proposed Project would result in a less-than-significant impact related to construction activities.

Impact 3.9-2) Would the Proposed Project result in generation of excessive groundborne vibration or groundborne noise levels?

The following impact conclusions are valid for the Proposed Project and all route variations, treatments, and configurations that are on surface streets. There would no potential for a vibration impact on SR-134 segments, which includes B, E3, G1, and the portions of F1, F2, and F3 on the SR-134 in the City of Los Angeles.

Construction

Less-Than-Significant Impact with Mitigation. Construction activities would require the use of heavy equipment, pneumatic tools, generators, concrete pumps, and similar equipment. Activity at staging areas typically results in less vibration as there is less equipment operations, although there would still be a potential for vibration. As shown in **Table 3.9-13**, most equipment operating near buildings and structures would not exceed the FTA's recommended limit of 0.2 in/sec PPV for any non-engineered timber and masonry buildings within 25 feet of construction activity. In addition, buildings are commonly more sturdy engineered structures and less sensitive to vibration than non-engineered timber and masonry buildings. Regardless, the use of vibratory rollers or more impactful equipment could exceed this limit based on the specific equipment and the proximity and condition of nearby structures. Therefore, without mitigation, the Proposed Project would result in a potentially significant impact related to construction activities.

Table 3.9-13 – Construction Vibration Impacts

Equipment	PPV at 25 feet (in/sec)	VdB at 25 feet
Vibratory Roller	0.21	94
Large Bulldozer	0.09	87
Loaded Trucks	0.08	86
Jackhammer	0.04	79
Small Bulldozer	0.003	58

SOURCE: FTA, *Transit Noise and Vibration Impact Assessment Manual*, 2018.

Implementation of Mitigation Measure **NOI-2** would reduce this impact to less than significant by requiring a Construction Vibration Plan that ensures the contractor minimizes the use for tracked vehicles, avoids vibratory compaction within 25 feet of buildings, and ensures that construction vibration levels near sensitive receivers during activities that generate high vibration levels do not exceed the 0.2 PPV inches per second vibration damage risk threshold.

Construction activities could also disrupt land uses near the proposed station construction sites. While proposed construction equipment is anticipated to generate little ground vibration (e.g., light trucks, hydraulic loaders, air compressors), actual vibration levels would depend on the means and methods decided upon by the contractor, which are not available at this time. Many stations would involve construction in the median of streets, where any sources of vibration would be set back substantially from residences and other sensitive receptors. In case where construction sites are located on curbs near adjacent residences, however, vibration from bulldozers and similar equipment could annoy those in institutional uses (e.g., schools, churches) during the day, and residents at any time during the day or evening. As illustrated in **Table 3.9-13**, equipment such as large bulldozers could generate 87 VdB of vibration at 25 feet, which would exceed the 75 VdB significance threshold for occasional events impacting residences and the 78 VdB threshold for institutional daytime land uses. While vibration impacts would generally be occasional or infrequent, construction activities could exceed the FTA’s land use disruption thresholds. Implementation of Mitigation Measure **NOI-3** would reduce this impact to less than significant by requiring a Construction Vibration Plan that ensures the contractor minimizes the use for tracked vehicles, avoids vibratory compaction within 25 feet of buildings, and ensures that construction vibration levels near sensitive receivers during activities that generate high vibration levels do not exceed the 75 VdB vibration annoyance threshold.

Operations

Less-Than-Significant Impact. The Proposed Project would use rubber-tired buses to provide transportation options on local arterials and freeways. The FTA Transit Noise and Vibration Impact Assessment Manual states that projects that rely on rubber-tire vehicles do not require a detailed analysis if they meet certain conditions regarding roadway irregularity, operations close to vibration sensitive buildings, and vehicles operating within buildings. The Proposed Project and route options do not include substantial infrastructure irregularities like expansion joints, speed bumps, or other design features that create unevenness in the road surface. Electric

charging infrastructure would not generate perceptible vibration. As all the FTA conditions would be met, the Proposed Project does not require a detailed operational vibration analysis as impacts would be unlikely. The absence of internal combustion engines on the electric-powered coaches would further reduce any vibration from idling or moving buses. Therefore, the Proposed Project would result in a less-than-significant impact related to operational activities.

Mitigation Measures

NOI-2: Where equipment such as a vibratory roller, that produces high levels of vibration is used within 25 feet of buildings or typical equipment such as large bulldozer is used within 15 feet of buildings, the 0.2 PPV inches per second vibration damage risk threshold would be exceeded. The Construction Vibration Control Plan shall include mitigation measures to minimize vibration impacts during construction. Recommended construction vibration mitigation measures shall, at a minimum, include:

- The contractor shall minimize the use of tracked vehicles.
- The contractor shall avoid vibratory compaction within 25 feet of buildings.
- The contractor shall monitor vibration levels near sensitive receivers during activities that generate high vibration levels to ensure thresholds are not exceeded.

NOI-3: Where equipment such as a vibratory roller that produces high levels of vibration is used within 105 feet of residences or institutional daytime land uses or equipment such as large bulldozers are used within 65 feet of such uses, the 75 VdB vibration threshold for human annoyance could be exceeded at residences of the 75 VdB threshold at institutional uses. The Construction Vibration Control Plan shall include mitigation measures to minimize vibration impacts during construction. Recommended construction vibration mitigation measures that shall be considered and implemented where feasible include:

- The contractor shall minimize the use of tracked vehicles and vibratory equipment.
- The contractor shall avoid vibratory compaction.
- The contractor shall monitor vibration levels near sensitive receivers during activities that generate high vibration levels to ensure thresholds are not exceeded.

Significance of Impacts after Mitigation

Mitigation Measure **NOI-2** would reduce potential groundborne vibration impacts by requiring a quantitative performance standard and control measures to ensure buildings and structures are not damaged during the construction of the Proposed Project. Further, Mitigation Measure **NOI-3** would reduce potential groundborne vibration impacts by requiring best practices to minimize disruption of persons living, working, or staying nearby during the construction of the Proposed Project. If monitoring indicates an exceedance, vibration levels would be mandated to be

reduced through a variety of control measures. Therefore, with mitigation, the Proposed Project would result in a less-than-significant impact related to construction activities.

Impact 3.9-3) 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 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?

Construction and Operations

No Impact. The Proposed Project would operate no closer than approximately 1.9 miles south of the nearest runway associated with the Hollywood Burbank Airport. The Project would be located outside of the Airport Influence Area and Runway Protection Zone of the Hollywood Burbank Airport. The Proposed Project would not expose people residing or working in the Project Area to excessive noise levels (i.e., 65 dBA CNEL noise levels). Therefore, the Proposed Project would not result in a significant impact related to construction and operational activities.

Mitigation Measures

No mitigation measures are required.

Significance of Impacts after Mitigation

Less than significant.