4.8 Noise and Vibration

4.8.1 Regulatory Framework and Methodology

4.8.1.1 Regulatory Framework

Federal

Federal noise and vibration impact assessment methodology is defined in the FTA (2006) *Transit Noise and Vibration Impact Assessment* guidance manual. The FTA Guidance Manual provides prediction procedures and impact criteria for noise and vibration from transit sources and the criteria apply to transit projects seeking federal funds. The FTA assessment procedures and criteria are well suited to compare noise impacts among different transit modes and project alternatives. Therefore, noise and vibration criteria from the FTA Guidance Manual are applied to the BRT, LRT, TSM, and no-build alternatives for the project.

The FTA Guidance Manual also includes prediction procedures and impact criteria for noise and vibration from construction.

State

The State of California has published the *Guidelines for the Preparation and Content of the Noise Element for the General Plan*. These state guidelines are meant to provide sufficient information concerning community noise environment so that noise may be effectively considered in the land use planning process. In contrast with the FTA criteria and guidelines, the state noise guidelines were not developed to apply specifically to transit projects and are not relevant to a transit noise impact assessment.

The State of California does not have limits or guidelines for vibration from transit systems or vibration during construction. The State of California also does not have limits for construction noise, and instead defers to the limits put forth in local ordinances.

While the State of California does not provide specific limits for noise and vibration from transit projects, it does provide the following checklist to evaluate potential noise and vibration impacts in Appendix G of the State CEQA Guidelines:

a) Would the project result in exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

b) Would the project result in exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels?

c) Would the project result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?

d) For a project located within 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?

e) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?

Questions (a), (c), and (d) in the checklist are evaluated using the standards in the local *L.A. CEQA Thresholds Guide*. Question (b) in the checklist is evaluated using the vibration impact thresholds from the FTA Guidance Manual. Question (e) in the checklist is not relevant to this project.

Local

The City of Los Angeles has prepared the *L.A. CEQA Thresholds Guide*, which specifies noise criteria for railroad and vehicular noise sources. The *L.A. CEQA Thresholds Guide* noise limits are applied to the BRT, LRT, TSM, and no-build alternatives for the project.

The City of San Fernando has adopted a noise control ordinance as part of its municipal code. However, the ordinance exempts trains operated in conformity with and regulated by any federal or state agency. Therefore, the FTA operational noise threshold should be applied for the project to comply with the City of San Fernando noise ordinance.

The City of Los Angeles construction noise regulations are addressed in the City of Los Angeles Municipal Code Chapter IV Section 41.40 and the *L.A. CEQA Thresholds Guide*. The City of Los Angeles Municipal Code prohibits construction work between the hours of 9 p.m. and 7 a.m. in commercial and residential areas. The *L.A. CEQA Thresholds Guide* provides noise limits for construction activities.

The City of San Fernando addresses construction noise in its municipal code in Section 34-31. The City of San Fernando Municipal Code prohibits construction noise between the hours of 6 p.m. and 7 a.m. on weekdays and 6 p.m. and 8 a.m. on Saturdays, or at any time on Sundays or on federal holidays. The code also limits noise sources associated with construction to 70 dB measured at the property line. The project may file an application with the City for a variance from the noise code.

There are no local regulations from the City of Los Angeles or the City of San Fernando that address operational vibration or construction vibration.

4.8.1.2 Methodology

The noise assessment methodology follows the Detailed Noise Assessment guidelines outlined in the FTA Guidance Manual. The basic approach used to identify potential noise impacts is:

1. **Identify sensitive receivers**. Noise-sensitive land uses along the corridor are identified using aerial photography and field visits. Sensitive receivers are grouped into clusters based on their location relative to the proposed track and their land use. The land uses that qualify as noise-sensitive are defined in the FTA Guidance Manual and include spaces where quiet is an important element of their intended uses such as concert halls, residential land uses where people sleep such as houses or hotels, and institutional land uses such as schools or churches.
2. **Determine existing conditions**. Existing noise levels were measured throughout the project corridor. FTA noise impact thresholds are a function of the measured existing noise levels.
3. **Apply prediction models**. The noise prediction models in the FTA Guidance Manual use standard formulas to characterize noise from light-rail vehicles (LRVs) and BRT vehicles. Measurements of noise at existing light rail and bus rapid transit systems are also incorporated into the prediction model.
4. **Evaluate receivers for predicted impact**. The prediction models are used to estimate future noise for each cluster of sensitive receivers. Predictions for each cluster are compared to the applicable FTA impact thresholds and CEQA thresholds to identify potential noise impacts.
5. **Evaluate mitigation options**. Mitigation options are evaluated for all clusters of sensitive receivers where the predicted noise levels exceed the applicable threshold.

The vibration assessment methodology follows the Detailed Vibration Assessment guidelines outlined in the FTA Guidance Manual. The approach for the vibration assessment is similar to the approach for the noise assessment and follows the same basic steps. The primary differences are:

- The propagation of the vibration through the ground must be based on measurements while the propagation of noise through air can be based on standard attenuation formulas.
- Existing vibration is usually not a consideration when assessing vibration impacts because it is relatively rare for people to be exposed to perceptible ground-borne vibration unless they are near a construction site or near roadways with large potholes and heavy vehicles. However, existing vibration is taken into consideration for sensitive receivers located near existing rail operations.
- Outdoor spaces are not considered sensitive to ground-borne vibration. In contrast, outdoor spaces where quiet is important for their intended function are considered noise sensitive.
- Vibration assessment is applicable only for FTA based evaluation of LRT operations. A vibration assessment is not required for evaluation of BRT operations because vibration from buses on a smooth roadway is usually below the threshold of human perception.

Noise and vibration impacts from construction were also assessed using the procedures in the FTA Guidance Manual. Actual construction noise and vibration levels would depend on the means and methods decided upon by the contractor, which are not available at this time. The predicted construction noise and vibration levels are based on hypothetical scenarios developed from similar projects for the purposes of modeling.

4.8.1.3 Significance Thresholds

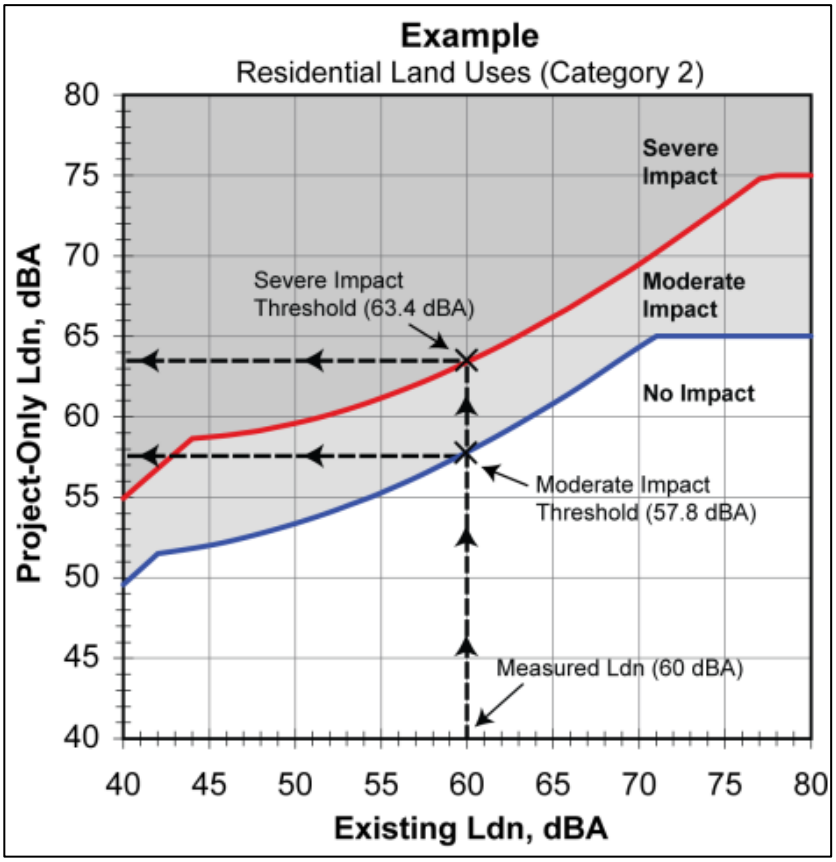
NEPA

Operational Noise

The FTA has established specific operational noise and vibration criteria for transit projects in the FTA Guidance Manual. The FTA Guidance Manual presents both moderate and severe noise impact thresholds. The severe noise impact criteria are used as the NEPA noise significance thresholds for the project; however, noise mitigation is also considered for any locations where moderate noise impact is identified. The FTA noise impact threshold is a sliding scale based on existing noise exposure and land use of sensitive receivers. The basic concept of the FTA impact thresholds is that more project noise is allowed in areas where existing noise exposure is higher. The FTA impact thresholds for residential (Category 2) land uses are presented graphically in Figure 4.8-1. The figure illustrates how to determine the moderate and severe noise impact thresholds for an existing day/night noise level of 60 dBA. The FTA impact thresholds for all uses are presented with more detail in Chapter 2 of the *East San Fernando Valley Transit Corridor Noise and Vibration Impacts Report* (ATS Consulting 2015) (see Appendix M of this EIS/EIR).

The FTA has not established standardized construction noise criteria for transit projects and instead defers to state and local guidelines. Therefore, there are no federal significance thresholds for construction noise that are applicable to the project and the state and local significance thresholds for construction noise will be used to assess potential for impact.

Figure 4.8-1 – FTA Noise Impact Criteria for Residential Land Uses



Source: ATS Consulting, 2012.Construction Noise

Operational Vibration

The FTA vibration impact criteria are based on the maximum indoor vibration level as a light-rail vehicle passes. The detailed vibration impact thresholds from the FTA Guidance Manual are used as the NEPA vibration significance threshold. The detailed vibration impact threshold for residential land uses is 72 VdB in any 1/3 octave band. A 1/3 octave band is a range of frequencies and each 1/3 octave band is referred to by the center frequency of that band. Table 4.8-1 shows the FTA vibration criteria for a detailed assessment. The FTA vibration impact thresholds for all land uses are presented with more detail in Chapter 2 of the *East San Fernando Valley Transit Corridor Noise and Vibration Impacts Report* (see Appendix M of this EIS/EIR).

Construction Vibration

The FTA Guidance Manual does include recommended impact thresholds for construction vibration to reduce the risk of potential damage to structures. The FTA Guidance Manual provides four different thresholds for four different building categories that are used as the federal significance thresholds. Those limits are presented in Table 4.8-2.

Table 4.8-1: FTA Vibration Impact Thresholds

Land Use	Max Lv (VdB)	Description of Use
Workshop	90	Distinctly feelable vibration. Appropriate to workshops and non-sensitive areas.
Office	84	Feelable vibration. Appropriate to offices and non-sensitive areas.
Residential Day	78	Barely fellable vibration. Adequate for computer equipment and low-power optical microscopes (up to 20X).
Residential Night	72	Vibration not feelable, but ground-borne noise may be audible inside quiet rooms. Suitable for medium-power optical microscopes (100X) and other equipment of low sensitivity.

[1] RMS velocity in decibel (VdB) ref 1 micro-inch/second
Source: FTA Guidance Manual, 2006

Table 4.8-2: Construction Vibration Damage Criteria

Building Category	PPV (in/sec)	Approximate Lv (VdB)[1]
I. Reinforced-concrete, steel or timber (no plaster)	0.5	102
II. Engineered concrete and masonry (no plaster)	0.3	98
III. Non-engineered timber and masonry buildings	0.2	94
IV. Buildings extremely susceptible to vibration damage	0.12	90

[1] RMS velocity in decibel (VdB) ref 1 micro-inch/second
Source: FTA Guidance Manual, 2006

CEQA

Operational Noise

The thresholds set forth for noise in the *L.A. CEQA Thresholds Guide* are used as CEQA operational noise significance thresholds for the proposed project. The *L.A. CEQA Thresholds Guide* presents the following impact criteria that are adopted as the CEQA noise significance thresholds:

- If the existing L_{dn} is 67 dBA or greater at residential and institutional land uses and the project will cause noise in L_{dn} at the noise-sensitive receiver to increase by 3 decibels or more.
- The project would cause noise in L_{dn} at any noise-sensitive receiver to increase by 5 decibels or more.

Construction Noise

The construction noise limits from the *L.A. CEQA Thresholds Guide* are used as the significance threshold for construction noise. Based on the guide, there would be a significant impact on noise levels from construction if:

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

Operational and Construction Vibration

There are no state or local operational or construction vibration criteria that are applicable to the project. Therefore, the NEPA significance thresholds defined in the FTA Guidance Manual are also used as the CEQA significance thresholds for the vibration impact assessment.

4.8.2 Affected Environment/Existing Conditions

A noise measurement program was carried out to document the existing noise levels at sensitive receivers throughout the project corridor. The primary noise source throughout the Van Nuys Boulevard portion of the project corridor is motor vehicle traffic. Along the San Fernando Road/Truman Street portion of the corridor, the primary sources of noise include motor vehicle and train traffic, including train horns. The existing noise measurements also capture all other environmental noises, including emergency sirens, airplanes, and pedestrians.

The measurement sites were selected to represent a range of existing noise conditions at representative sensitive receiver locations throughout the project corridor. Short term (1-hour) noise measurements were conducted at 12 locations with primarily daytime use, such as schools and churches. Long-term (24-hour) noise measurements were conducted at nine residential land uses where people sleep and are sensitive to nighttime noise. Long-term and short-term measurement locations are shown in Tables 4.8-3 and 4.8-4 and Figure 4.8-2.

The 1-hour L_{eq} measured at the short-term sites ranged from 62 dBA to 71 dBA. The 24-hour L_{dn} measured at the long-term sites ranged from 54 dBA to 76 dBA. The noisiest measurement sites were near the Metrolink ROW, and the high noise levels are most likely due to horn noise from the freight and Metrolink trains. The lowest noise levels were measured at second-row sites that had an intervening row of buildings between the microphone location and Van Nuys Boulevard. The intervening row of buildings was shielding the traffic noise from Van Nuys Boulevard, which is the dominant noise source throughout most of the project area.

The primary existing vibration source in the project study area along Van Nuys Boulevard is vehicular traffic. Vehicular traffic does not generally cause perceptible vibration, and when it does, the source can usually be traced to bumps in the roadway surface such as potholes or wide expansion joints. Because the existing environmental vibration is often too low to be noticed by humans, the FTA Guidance Manual recommends only a limited survey of existing vibration conditions where there are existing sources of perceptible vibration, such as existing train lines.

Table 4.8-3: Summary of Short-Term Noise Measurement Results

Site Label	Measurement Location	Distance to Nearest Major Roadway	Start of Measurement		L_{eq} (1-hr) (dBA)
			Date	Time	
ST-1	San Fernando Middle School 130 N Brand Boulevard	30 ft	3/14/13	11:19	62
ST-2	Pacoima Branch Library 13605 Van Nuys Boulevard	30 ft	1/20/12	14:53	71
ST-3	Mary Immaculate School 10390 Remick Avenue	390 ft	1/20/12	14:46	65
ST-4	Arleta High School 14200 Van Nuys Boulevard	45 ft	1/19/12	15:21	70
ST-5	Imam Bukhari Masjid 8741 Van Nuys Boulevard	45 ft	1/19/12	14:02	69
ST 6	Western Beauty Institute 8612 Van Nuys Boulevard	30 ft	1/25/12	13:57	71
ST 7	Panorama High School 8015 Van Nuys Boulevard	40 ft	1/19/12	12:41	71
ST 8	UEI College 7335 Van Nuys Boulevard	70 ft	1/18/12	13:55	65
ST 9	ICDC College 14434 Sherman Way	150 ft	1/18/12	14:10	62
ST 10	CHAMPS Charter High School 6952 Van Nuys Boulevard	50 ft	1/24/12	11:19	69
ST 11	Preferred College of Nursing 6551 Van Nuys Boulevard	20 ft	1/20/12	12:19	70
ST 12	Los Angeles ORT College 14159 Sylvan Street	195 ft	1/24/12	14:13	62

Source: ATS Consulting, 2013

Table 4.8-4: Summary of Long-Term Noise Measurement Results

Site Label	Measurement Location	Distance[1]	Start of Measurement		L_{dn} (dBA)
			Date	Time	
LT-1	12171 San Fernando Rd	365 ft (this is to NT)[3]	3/05/13	16:00	68
LT-2	101 Park Avenue	145 ft (this is to NT)[3]	3/05/13	16:00	76
LT-3	13642 Pinney Street	255 ft[2]	1/25/12	15:00	62
LT-4	1396 Bartee Street	45 ft	1/19/12	16:00	72
LT-5	9301 Van Nuys Boulevard	50 ft	1/19/12	14:00	69
LT-6	8924 Van Nuys Boulevard	35 ft	3/04/13	13:00	73
LT-7	8801 Tilden Avenue	290 ft[2]	2/28/13	15:00	54
LT-8	7467 Sylmar Avenue	285 ft[2]	1/26/12	16:00	58
LT-9	5322 Circle Drive	175 ft[2]	1/18/12	11:00	62

[1] Distance to closest lane of traffic on Van Nuys Boulevard, Sepulveda Boulevard, or Ventura Boulevard.
[2] The measurement location is a second-row receiver. There is an intervening row of buildings between the measurement location and the project.
[3] Distance to the existing Metrolink/freight tracks. The dominant noise source in this area is horn noise from Metrolink and freight trains.

Source: ATS Consulting, 2013.

Figure 4.8-2: Map of Noise and Vibration Measurement Sites

The primary existing vibration source on the San Fernando Road portion of the corridor is the train traffic on the existing Metrolink tracks. An existing vibration measurement was performed at the San Fernando Middle School Auditorium, which is next to the Metrolink ROW along San Fernando Road. The measurement duration was approximately one hour, during which one Metrolink and one freight train passed by. The measured vibration of the Metrolink train was 61 VdB and the measured vibration of the freight train was 54 VdB at distance of 550 feet from the existing tracks.

4.8.3 Environmental Consequences, Impacts, and Mitigation Measures

This section presents the results of the noise and vibration impact assessment for the six alternatives:

1. No-Build Alternative
2. TSM Alternative
3. Alternative 1: Curb-Running BRT
4. Alternative 2: Median-Running BRT
5. Alternative 3: Low-Floor LRT/Tram
6. Alternative 4: LRT

4.8.3.1 No-Build Alternative

Construction Impacts

Under the No-Build Alternative, no new infrastructure would be built within the study area as part of the project. Therefore, there would be no construction noise or vibration impacts associated with the No-Build Alternative.

Operational Impacts

There is no predicted change in the noise or vibration levels for the No-Build Alternative; therefore, the noise levels for the No-Build Alternative would not exceed the NEPA or CEQA significance thresholds.

Cumulative Impacts

The No-Build Alternative would result in no noise impact and no vibration impacts, so it would not contribute to any cumulative impacts.

Mitigation Measures

No noise or vibration mitigation measures are recommended or required for the No-Build Alternative.

Impacts Remaining After Mitigation

NEPA Finding

No adverse noise or vibration effects would occur.

CEQA Determination

No noise or vibration impacts would occur.

4.8.3.2 TSM Alternative

Construction Impacts

The TSM Alternative would include relatively low-cost transit service improvements such as increased bus frequencies, or very minor improvements to bus stops and the roadway network. Because proposed physical improvements would only require light construction equipment and any construction would be of very short duration, less-than-significant impacts under CEQA and no adverse construction noise or vibration impacts under NEPA are expected to occur under the TSM Alternative.

Operational Impacts

The TSM Alternative would add 20 additional buses to the existing Metro bus lines in the project area. The proposed increase in bus volume would result in a 1.5-decibel increase in bus noise (peak-hour L_{eq}). However, bus noise is only one part of the existing noise environment. A 1.5-decibel increase in bus noise would result in a less than 1-decibel increase in overall noise levels, because the overall noise levels are dominated by the automobile traffic noise. The TSM Alternative may also include minor enhancements to the roadway network; however, those changes would probably have a negligible effect on future operational noise levels.

The changes in noise levels as a result of the TSM Alternative would not exceed the NEPA or CEQA noise significance thresholds at any sensitive receiver clusters.

It is unusual for rubber-tired vehicles such as buses on smooth roadways to cause perceptible vibration. The FTA Guidance Manual advises that no vibration impact is likely and no analysis is needed for rubber-tired vehicles operating on a smooth roadway. Therefore, vibration from additional bus volumes or minor changes to the roadway network that would be part of the TSM Alternative would not exceed the NEPA or CEQA vibration significance thresholds at any sensitive receivers.

Cumulative Impacts

The cumulative impacts assessment for this and the other alternatives uses the planning document Southern California Association of Governments (SCAG) Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) from 2012 and regional traffic projected under that plan, as well the cumulative projects list in Table 2-3 in Chapter 2 to determine if the possible effects of the project are individually limited but cumulatively considerable with respect to noise and vibration.

The study area for the cumulative impacts analysis encompasses the area along the project corridor where project construction or operational noise and vibration could be perceptible at nearby uses. For cumulative construction noise impacts, this area would extend approximately 500 feet from the construction area. For construction vibration impacts, the cumulative impacts study area would extend 50 feet. For operational cumulative noise impacts, this area would extend approximately 175 feet from the roadway and for operational vibration impacts the area would extend 50 feet.

Construction Impacts

Under the TSM Alternative, only very minor construction activities would occur, which would be limited to specific locations (e.g., bus stops) within the roadway right-of-way. Additionally, construction would occur only during daytime hours, and would be short in duration. Therefore, as described above, it's anticipated the TSM Alternative would result in less-than-significant construction noise or vibration impacts under CEQA and non-adverse impacts under NEPA. Given the minimal amount of construction, the TSM Alternative would not contribute to any significant cumulative noise and vibration impacts within the cumulative impacts study area.

Operational Impacts

Roadway noise is the primary source of noise in the corridor, so increases in roadway traffic volumes over time due to cumulative growth and development could also increase ambient noise levels in the area. A possibly significant source of future noise along the San Fernando Road portion of the corridor is the California High-Speed Rail (CAHSR) Project. The SCAG RTP/SCS planning document identifies the CAHSR Project as a project that may be completed and operational before the 2040 Horizon Year.

Noise generated by the TSM Alternative and future increases in roadway traffic are expected to result in a less than 2-decibel increase in community noise levels. This increase is less than cumulatively considerable. Noise contributions from the TSM Alternative would be limited to sensitive receivers along Van Nuys Boulevard and the CAHSR Project would be located in the Metrolink ROW along San Fernando Road. Because the TSM Alternative and CAHSR Project would affect different sensitive receivers, the TSM Alternative would not contribute to a cumulatively considerable impact associated with CAHSR.

The TSM Alternative would result in no adverse vibration impacts; therefore, it would not contribute to any cumulative vibration impacts.

Mitigation Measures

No noise or vibration mitigation measures are required or recommended for the TSM Alternative.

Impacts Remaining After Mitigation

NEPA Finding

Noise effects would not be adverse. No vibration effects would occur.

CEQA Determination

Noise impacts would be less than significant. No vibration impacts would occur.

4.8.3.3 BRT Alternatives (Build Alternatives 1 and 2)

Alternative 1 – Curb-Running BRT

Construction Impacts

The construction of the Curb-Running BRT Alternative would require the use of heavy earthmoving equipment, pneumatic tools, generators, concrete pumps, and similar equipment. Project construction would typically take place between the hours of 7 a.m. and 9 p.m. within the city of Los Angeles, in accordance with the Los Angeles Municipal Code and between 7 a.m. and 6 p.m. within the city of San Fernando, in accordance with the San Fernando City Code. If it is necessary for construction to occur outside of these hours, Metro may seek a variance from Municipal Code requirements.

Actual construction noise levels would depend on means and methods decided upon by the contractor, which are not available at this time. The predicted construction noise levels are based on a hypothetical scenario for the purposes of modeling. The predicted noise level from a typical 8-hour work-shift is 86 dBA (8-hour L_{eq}) at 50 feet, which is about 15 to 20 decibels higher than the ambient noise level. The NEPA and CEQA significance threshold is construction noise levels exceeding existing ambient noise levels by 10 dBA or more at a sensitive land use. Therefore, the Curb-Running BRT Alternative could result in a significant adverse construction noise impact/effect under CEQA and NEPA.

Many construction activities, such as pavement breaking, and the use of tracked vehicles, such as bulldozers, could result in noticeable levels of ground-borne vibration. These activities would be limited in duration and vibration levels are likely to be well below thresholds for minor cosmetic building damage. However, the predicted vibration levels for equipment that produces the highest levels of vibration, such as a vibratory roller, are about equal to the construction vibration NEPA and CEQA significance threshold for non-engineered and timber masonry buildings at a distance of 25 feet. Mitigation measures are proposed for these high-vibration-generating activities if they should occur closer than 25 feet to residences.

Operational Impacts

Changes in noise levels as a result of the Curb-Running BRT Alternative would occur as a result of the increase in bus traffic. The additional bus traffic would operate in the curb-side lane. The predicted noise levels would not exceed the NEPA or CEQA significance thresholds at any sensitive receiver clusters. The predicted increase in future noise levels compared to existing noise levels is less than 2 decibels. However, predicted noise levels would exceed the FTA moderate noise impact threshold at three clusters of receivers for the Curb-Running BRT Alternative (the NEPA significance threshold is the FTA severe noise impact threshold). The moderate impacts were predicted at the residential sensitive receivers located closest to Van Nuys Boulevard between Plummer Street and Tupper Street as a result of introducing additional bus traffic in the curb-running lanes. FTA guidance for moderate impacts is that noise mitigation should be considered and adopted when it is considered reasonable. The FTA Guidance Manual recommends taking into account the number of affected sites, the increase over existing noise levels, and the cost of mitigation among other factors. The increase over existing noise levels as a result of the project is no more than one decibel. Therefore, the moderate noise impacts are not considered an adverse effect and no noise mitigation is required.

It is unusual for rubber-tired vehicles such as buses on smooth roadways to cause perceptible vibration. The FTA Guidance Manual advises that no vibration impact is likely and no analysis is needed for rubber-tired vehicles operating on a smooth roadway. Therefore, vibration from the Curb-Running BRT Alternative would not exceed the NEPA or CEQA significance thresholds at any sensitive receivers.

Cumulative Impacts

The resource study area for the cumulative impacts analysis encompasses the area where increases in project construction or operational noise and vibration would be perceptible. For cumulative construction noise impacts, this area would extend approximately 500 feet from the construction area. For construction vibration impacts, the cumulative impacts study area would extend 50 feet. For operational cumulative noise impacts, this area would extend approximately 175 feet from the proposed LRT tracks or BRT lane and for operational vibration impacts the area would extend approximately 50 feet.

Construction Impacts

Under the Curb-Running BRT Alternative, construction of the proposed project would require heavy equipment and, therefore, could result in significant increases in ambient noise levels. Although recommended construction noise mitigation measures would reduce temporary construction noise impacts due to the proposed project to a less-than significant level, the residual increases in noise levels due to the Curb-Running BRT Alternative, when combined with increased noise generated by other sources or projects in the vicinity of the study area, could result in adverse cumulative noise impacts. The significance of cumulative noise impacts would depend on the locations of other

proposed projects and potential sources of noise and the extent to which they would increase noise levels within the study area during construction of the Curb-Running BRT Alternative. Although it is not possible to predict with certainty which future projects would contribute to cumulative noise levels and quantify the increase in noise levels, nonetheless, because the construction noise levels associated with the Curb-Running BRT Alternative could increase ambient noise levels by as much as 15 to 20 decibels, the project's contribution would be cumulatively considerable over the temporary construction period.

Because vibration impacts are evaluated based on single-event levels, the fact that the cumulative vibration impacts study area is limited to within 50 feet of project construction activities, and because mitigation measures are proposed that would reduce vibration generated by Curb-Running BRT Alternative construction activities to a less-than-significant level, the probability is very low that a BRT construction activity and another single-event activity would occur simultaneously and in very close proximity and would result in a significant cumulative impact. Therefore, during construction, the proposed BRT Alternative and other projects are not expected to result in significant cumulative vibration impacts on sensitive uses within the study area.

Operational Impacts

Because roadway noise is the primary source of noise along the Van Nuys Boulevard portion of the corridor, increases in roadway traffic volumes over time due to cumulative growth and development could also increase ambient noise levels in the area. However, future increases in roadway traffic are expected to result in a less than 1-decibel increase in community noise levels, which is insignificant. Along Van Nuys Boulevard, the estimated long-term cumulative increase in noise levels due to the Curb Running BRT Alternative and future traffic growth would also be minimal (less than 2 decibels); therefore, Alternative 1 is not expected to result in cumulatively considerable or significant cumulative operational noise impacts.

A possibly significant source of future noise along the San Fernando Road portion of the corridor is the CAHSR Project. If the CAHSR Project is constructed in the Metrolink ROW along San Fernando Road, it would likely result in a significant noise impact and require noise mitigation. It's not known whether CAHSR noise impacts could be mitigated to a less-than-significant level. Therefore, although the potential increase in noise levels along San Fernando Road due to the Curb-Running BRT Alternative would be negligible, noise generated by this alternative combined with other future sources of noise along San Fernando Road, such as the CAHSR Project, could potentially result in significant cumulative noise impacts.

The Curb-Running BRT Alternative would result in no vibration impacts, so it would not contribute to any cumulative vibration impacts.

Mitigation Measures

Construction Mitigation Measures

Construction noise impacts can be reduced with operational methods, scheduling, equipment choice, and acoustical treatments. The following best-practice noise mitigation measures shall be implemented to minimize annoyance from construction noise:

MM-NOI-1a: Specific measures to be employed to mitigate construction noise impacts shall be developed by the contractor and presented in the form of a Noise Control Plan. The Noise Control Plan shall be submitted for review and approval before the beginning of construction noise activities.

MM-NOI-1b: The contractor shall adequately notify the public of construction operations and schedules no less than 72 hours in advance of construction through a construction notice with confirmed details and a look-ahead briefing several weeks in advance.

MM-NOI-1c: If a noise variance from Section 41.40(a) of the Los Angeles Municipal Code is sought for nighttime construction work, a noise limit shall be specified. The contractor shall employ a combination of the noise-reducing approaches listed in MM-NOI-1d to meet the noise limit.

MM-NOI-1d: Where feasible, the contractor shall use the following noise-reducing approaches:

- The contractor shall use specialty equipment with enclosed engines and/or high-performance mufflers.
- The contractor shall locate equipment and staging areas as far from noise-sensitive receivers as possible.
- The contractor shall limit unnecessary idling of equipment.
- The contractor shall install temporary noise barriers to enclose stationary noise sources, such as compressors, generators, laydown and staging areas, and other noisy equipment.
- The contractor shall reroute construction-related truck traffic away from residential buildings to the extent practicable.
- The contractor shall sequence the use of equipment so that simultaneous use of the loudest pieces of equipment is avoided as much as practicable.
- The contractor shall avoid the use of impact equipment and, where practicable, use non-impact equipment. Non-impact equipment could include electric or hydraulic-powered equipment rather than diesel and gasoline-powered equipment where feasible.
- The contractor shall use portable noise control enclosures for welding in the construction staging are.
- The contractor shall use lined or covered storage bins, conveyors, and chutes with noise-deadening material for truck loading and operations.
- When feasible, contractor shall use strobe lights or other OSHA-accepted methods rather than back-up alarms during nighttime construction.

MM-VIB-1: Where equipment, such as a vibratory roller, that produces high levels of vibration is used near buildings, the Construction Vibration Control Plan shall also include mitigation measures to minimize vibration impact 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.
- 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.

Operational Mitigation Measures

No operational noise or vibration mitigation measures are required or recommended for the Curb-Running BRT Alternative.

Impacts Remaining After Mitigation

NEPA Finding

The noise and vibration from construction of the Curb-Running BRT Alternative would be temporary; however, due to the increase in noise levels above ambient levels, the Curb-Running BRT Alternative would result in adverse effects, even after implementation of proposed mitigation measures.

The noise from operation of the Curb-Running BRT Alternative would not result in adverse effects.

Operation of the Curb-Running BRT Alternative would result in no adverse vibration effects.

CEQA Determination

The noise and vibration from the construction of the Curb-Running BRT Alternative would be temporary; however, due to the increase in noise levels above ambient levels, the Curb-Running BRT Alternative would still result in significant and unavoidable impacts, even with mitigation incorporated.

The noise from operation of the Curb-Running BRT Alternative would result in a less-than-significant impact.

Operation of the Curb-Running BRT Alternative would result in no adverse vibration impacts.

Alternative 2 – Median-Running BRT

Construction Impacts

Impacts resulting from the construction of Alternative 2 would be the same as those under Alternative 1 (i.e., the predicted noise levels would exceed the NEPA or CEQA significance thresholds before mitigation).

Operational Impacts

Impacts resulting from the operation of Alternative 2 would be the same as those under Alternative 1; therefore, operation of Alternative 2 would not exceed the NEPA or CEQA significance thresholds at any sensitive receivers.

Cumulative Impacts

Alternative 2's contribution to any cumulative impacts would be the same as those described above for Alternative 1.

Mitigation Measures

Construction Mitigation Measures

Mitigation measures MM-NOI-1a-d and MM-VIB-1 (see discussion above for Alternative 1) are proposed.

Operational Mitigation Measures

No noise or vibration mitigation measures are required or recommended for operation of the BRT Median-Running Alternative.

Impacts Remaining After Mitigation

NEPA Finding

Noise and vibration from construction of the Median-Running BRT Alternative would be temporary; however, due to the increase in noise levels above ambient levels, the Median-Running BRT Alternative would result in an adverse effect, even with implementation of proposed mitigation measures.

The noise from the operation of the Median-Running BRT Alternative would not result in an adverse effect. Operation of the Median-Running BRT Alternative would result in no adverse vibration effects.

CEQA Determination

The noise and vibration from the construction of the Median-Running BRT Alternative would be temporary; however, due to the increase in noise levels above ambient levels, the Median-Running BRT Alternative would still result in a significant and unavoidable impact, even with mitigation incorporated.

The noise from operation of the Median-Running BRT Alternative would result in a less-than-significant impact.

Operation of the Median-Running BRT Alternative would result in no adverse vibration impacts.

4.8.3.4 Rail Alternatives (Build Alternatives 3 and 4)

Alternative 3 – Low-Floor LRT/Tram

Construction Impacts

Construction of the Low-Floor LRT/Tram Alternative would require the use of heavy earth-moving equipment, pneumatic tools, generators, concrete pumps, and similar equipment. Project construction would typically take place between the hours of 7 a.m. and 9 p.m. in the city of Los Angeles in accordance with the Los Angeles Municipal Code and between the hours of 7 a.m. and 6 p.m. in the city of San Fernando in accordance with the San Fernando City Code. If it is necessary for construction to occur outside of these hours, Metro may seek a variance from Municipal Code requirements. Generally, the Low-Floor LRT/Tram Alternative, as well as the LRT Alternative, would result in more extensive construction than the two BRT alternatives.

Actual construction noise levels would depend on means and methods decided upon by the contractor, which are not available at this time. The predicted construction noise levels are based on a hypothetical scenario for the purposes of modeling. The predicted noise level from a typical 8-hour work-shift is 87 dBA (8-hour L_{eq}) at 50 feet, which is about 15 to 20 decibels higher than the ambient noise level. The NEPA and CEQA significance threshold pertains to construction noise levels that exceed existing ambient noise levels by 10 dBA or more at a sensitive land use. Therefore, noise from construction of the Low-Floor LRT/Tram Alternative would result in a significant impact.

Many construction activities, such as pavement breaking and the use of tracked vehicles such as bulldozers could result in noticeable levels of ground-borne vibration. These activities would be limited in duration and vibration levels are likely to be well below thresholds for minor cosmetic

building damage. However, the predicted vibration levels for equipment that produces the highest levels of vibration, such as a vibratory roller, is about equal to the construction vibration NEPA and CEQA significance threshold for non-engineered and timber masonry buildings at a distance of 25 feet. Mitigation measures are recommended for these high-vibration-generating activities if they were to be used within 25 feet of sensitive receivers.

Operational Impacts

Changes in noise levels as a result of the Low-Floor LRT/Tram Alternative would occur as a result of the introduction of Low-Floor LRT/Tram vehicles and removal of all existing buses from Van Nuys Boulevard in the project area. The predicted noise levels would exceed the NEPA and CEQA significance thresholds at three clusters of residences:

- **A cluster of two single-family residences west of El Dorado Avenue on Pinney Street.** Two factors contribute to the high predicted noise levels at these sensitive receivers: (1) they are located near a curve in the Low-Floor LRT/Tram alignment and wheel squeal at curves can increase noise levels by up to 10 decibels; and (2) they are behind existing buildings that would be removed as a part of the project. The removal of the buildings would result in an increase in traffic noise at the sensitive receivers. The existing noise level at these sensitive receivers is 54 dBA L_{dn} and the predicted future noise level with the project is 70 dBA L_{dn}.
- **A cluster of eight single-family residences east of El Dorado Avenue on Pinney Street.** The two factors that contribute to the high predicted noise levels at these sensitive receivers are the same as those for the residences west of El Dorado Avenue: (1) they are located near a curve where wheel squeal may cause noise levels to increase by up to 10 decibels; and (2) they are behind buildings that would be removed as part of the project, which would result in an increase in traffic noise. The existing noise level at these sensitive receivers is 54 dBA L_{dn} and the predicted future noise level with the project is 73 dBA L_{dn}.
- **A cluster of a multi-family residential building and a motel on San Fernando Road north of Hubbard Avenue.** The Low-Floor LRT/Tram would be running on San Fernando Road, about 30 feet from the nearby buildings. Because San Fernando Road is not as wide as Van Nuys Boulevard, the Low-Floor LRT/Tram is closest to sensitive receivers in this area, resulting in higher predicted noise levels. The existing noise level at these sensitive receivers is 68 dBA L_{dn} and the predicted future noise level with the project is 71 dBA L_{dn}.

Moderate noise impacts are predicted at an additional 30 clusters of sensitive receivers, which extend along much of Van Nuys Boulevard. FTA guidance for moderate impacts is that noise mitigation should be considered and adopted when it is considered reasonable. The FTA Guidance Manual recommends taking into account the number of affected sites, the increase over existing noise levels, and the cost of mitigation among other factors. Details, such as the predicted levels and locations of all sensitive receivers, are included in the *Noise and Vibration Impacts Report* (see Appendix M of this EIS/EIR) and should be considered before mitigation measures are finalized.

Traction power substation (TPSS) units are the only ancillary equipment associated with the Low-Floor LRT/Tram Alternative that has the potential to cause noise impacts. There are 12 proposed TPSS sites and the sites are the same for the Low-Floor LRT/Tram Alternative and the LRT Alternative. Noise impact is predicted at five clusters of sensitive receivers, which are all located within 15 feet of a TPSS site. The TPSS sites near the adversely affected receivers are sites: 4A, 6A, 6B, 7A, and 8A. Figures showing the locations of the TPSS sites are included in the *Noise and Vibration Impacts Report* (see Appendix M of this EIS/EIR).

There are three MSF Options associated with the Low-Floor LRT/Tram Alternative. The noise sources associated with MSFs include carwashes, blowdown facilities, repair shops, train movements across track switches, and vehicle traffic into and out of the facility. The predicted noise impacts associated with each MSF Option are:

- **MSF Option A (straddling the Orange Line between Kester Avenue and Vesper Avenue):** Predicted noise levels exceed the NEPA significance threshold at one cluster and exceeds the CEQA significance threshold at two clusters of sensitive receivers.
- **MSF Option B (south of the Metrolink tracks on the west side of Van Nuys Boulevard):** Predicted noise levels do not exceed the NEPA or CEQA significance thresholds at any sensitive receivers.
- **MSF Option C (north of the Metrolink tracks on the west side of Van Nuys Boulevard):** Predicted noise levels exceed the NEPA significance threshold at one cluster of sensitive receivers and exceed the CEQA significance threshold at three clusters of sensitive receivers.

The locations of the clusters where predicted noise levels exceed the NEPA and CEQA significance thresholds are shown in Figure 4.8-3. The predicted noise levels for sensitive receivers near the MSF sites are presented in the *Noise and Vibration Impacts Report* (see Appendix M of this EIS/EIR).

Ground-borne Vibration and Ground-borne Noise Levels

The predicted vibration levels would exceed the NEPA and CEQA significance threshold at 17 clusters of sensitive residential receivers and one institutional land use. There are 634 residential units within the clusters where impacts are predicted to occur. Vibration propagation measurements showed that there is very efficient vibration propagation through the area where vibration impact is predicted. The residential units where vibration impact is predicted are located on Van Nuys Boulevard between Parthenia Street and Woodman Avenue. There is also one additional residential cluster where vibration impact is predicted located on San Fernando Road just north of Hubbard Avenue. Where vibration impact was predicted at residences, the levels exceeded the threshold by about 5 decibels. Five decibels above the limit for residences is equal to the limit for daytime land uses and is a level of vibration that is compatible with schools and offices.

The locations of the clusters where predicted vibration levels exceed the NEPA and CEQA significance thresholds are shown in Figure 4.8-3. Detailed tables, including predicted vibration levels, are presented in the *Noise and Vibration Impacts Report* (see Appendix M of this EIS/EIR).

Typically, impacts from ground-borne noise levels are not assessed for at-grade transit systems because the airborne noise masks the ground-borne noise. There is no tunnel section associated with the Low-Floor LRT/Tram Alternative, so ground-borne noise levels are not assessed.

Cumulative Impacts

The resource study area for the cumulative impacts analysis encompasses the area where project construction or operational noise and vibration would be perceptible. For cumulative construction noise impacts, this area would extend approximately 500 feet from the construction area. For construction vibration impacts, the cumulative impacts study area would extend 50 feet. For operational cumulative noise impacts, this area would extend approximately 175 feet from the proposed LRT tracks and for operational vibration impacts the area would extend approximately 150 feet.

Figure 4.8-3: Map of Predicted Operational Impacts for Low-Floor LRT/Tram Alternative

Metro

Metro

Construction Impacts

Construction of the Low-Floor LRT/Tram Alternative would require heavy equipment and, therefore, could result in significant increases in ambient noise levels. Recommended construction noise mitigation measures (see below) would reduce temporary construction noise levels; however, temporary construction noise impacts would still remain significant and unavoidable.

The residual increases in noise levels due to the Low-Floor LRT/Tram Alternative, when combined with increased noise generated by other sources or projects in the vicinity of the study area, could result in adverse cumulative noise impacts. The significance of cumulative noise impacts would depend on the locations of other proposed projects and potential sources of noise and the extent to which they would increase noise levels within the study area during construction of the Low-Floor LRT/Tram Alternative. Although it's not possible to predict with certainty what future projects would contribute to cumulative noise levels and to quantify the increase in noise levels; nonetheless, because the construction noise levels associated with the Low-Floor LRT/Tram Alternative could increase ambient noise levels by as much as 15 to 20 decibels, the project's contribution would be cumulatively considerable over the temporary construction period.

Because vibration impacts are evaluated based on single-event levels, the fact that the cumulative vibration impacts study area is limited to within 50 feet of project construction activities, and because mitigation measures are proposed (see below) that would reduce vibration generated by the Low-Floor LRT/Tram Alternative construction activities to a less-than-significant level, the probability is very low that a project construction activity and another single-event activity would occur simultaneously and in very close proximity and would result in a significant cumulative impact. Therefore, during construction, the proposed Low-Floor LRT/Tram Alternative and other projects are not expected to result in significant cumulative vibration impacts on sensitive uses within the study area.

Operational Impacts

Because roadway noise is the primary source of existing noise in the corridor, increases in roadway traffic volumes over time due to cumulative growth and development could also increase ambient noise levels in the area. However, future increases in roadway traffic are expected to result in a less than 1-decibel increase in community noise levels. The estimated increase in noise from the Low-Floor LRT/Tram Alternative, however, would be significant. Consequently, the cumulative impacts due to operational noise from Alternative 3 and roadway traffic would be significant. However, the mitigation measures identified below would reduce the operational noise impacts due to Alternative 3 to a less-than-significant level; therefore, the noise impacts of Alternative 3 would not be cumulatively considerable after mitigation.

A possibly significant source of noise along the San Fernando Road portion of the corridor is the CAHSR Project. If the CAHSR Project were constructed in the Metrolink ROW on San Fernando Road, it would likely result in a significant noise impact and require noise mitigation. However, it is not known whether CAHSR noise impacts could be mitigated to a less-than-significant level. Therefore, although the potential increase in noise levels along San Fernando due to the Low-Floor LRT/Tram Alternative would be less than significant after mitigation, remaining noise due to the Low-Floor LRT/Tram Alternative, when combined with other future sources of noise along San Fernando Road, such as the CAHSR Project, would be cumulatively considerable or significant.

Because vibration impact is evaluated based on single-event levels and because it is unlikely that a Low-Floor LRT/Tram vehicle and other potential vibration sources, such as the HSR train cars, would simultaneously pass by a vibration-sensitive use within 150 feet, operation of the Low-Floor LRT/Tram Alternative is not expected to result in significant cumulative vibration impacts.

Mitigation Measures

Construction Mitigation Measures

Mitigation Measures NOI-1a-d and VIB-1 are proposed (see discussion above for Alternative 1).

Operational Mitigation Measures

Predicted noise levels exceed the NEPA and CEQA significance thresholds at three clusters of sensitive receivers. At the two clusters of sensitive receivers located near the intersection of Van Nuys Boulevard and San Fernando Road where a row of buildings would be removed and where there is a curve in the track alignment the following measures will be incorporated:

MM-NOI-2a: A sound wall shall be constructed at the northern edge of the alignment where the Low-Floor LRT/Tram curves to transition between Van Nuys Boulevard and San Fernando Road, in the area bounded by Pinney Street, El Dorado Avenue, Van Nuys Boulevard, and San Fernando Road. The sound wall shall be constructed to mitigate the increase in traffic noise levels that would result from removing the row of buildings in this area. Sound walls should be constructed in such a fashion as to not impair the Train Operator vision triangle –sightlines.

MM-NOI-2b: Friction control shall be incorporated into the design for the curve at Van Nuys Boulevard and San Fernando Road. Friction control may consist of installing lubricators on the rail or using an onboard lubrication system that applies lubrication directly to the wheel.

The recommended measure for the third cluster where predicted noise levels exceed the NEPA and CEQA significance thresholds is to specify and procure low-noise vehicles (see MM-NOI-2c below). Low-noise vehicles would reduce the predicted noise level by 2 to 3 decibels at all receivers. A sound wall would not be a feasible mitigation measure because there is a narrow right-of-way making it difficult to accommodate a sound wall and because a sound wall might create a visual impact.

If specifying a low-noise vehicle is not a feasible mitigation measure, building sound insulation shall be considered as an alternative. Improving building sound insulation increases the outdoor-to-indoor noise reduction and is often the best choice where sound walls are not feasible or reasonable. Specifying a low-noise vehicle is the preferred mitigation measure because it would reduce noise levels in exterior areas of the impacted receivers and it would have the benefit of reducing noise levels at all receivers throughout the project area.

MM-NOI-2c: Metro shall specify and procure low-noise vehicles with a reference sound level of 75 dBA L_{max} at 50 feet and 50 mph for a 2-car train on ballast-and-tie track. Manufacturers could meet this level using a combination of vehicle skirts, a well-designed suspension, and under-car absorption. If specifying a low-noise vehicle is not feasible, Metro shall improve building insulation at the noise-sensitive uses significantly affected by transit vehicle noise. If sound insulation is used, the sound insulation should reduce project noise to below 45 dBA L_{dn} inside the residence.

Noise impacts are also predicted near five of the proposed TPSS sites. The measures that are proposed to mitigate noise from the TPSS units are:

MM-NOI-3a: The following noise limit shall be included in the purchase specifications for the TPSS units: TPSS noise shall not exceed 50 dBA at a distance of 50 feet from any part of a TPSS unit.

MM-NOI-3b: The TPSS units shall be located within the parcel as far from sensitive receivers as feasible. If possible, the cooling fans shall be oriented away from sensitive receivers.

MM-NOI-3c: If necessary, a sound enclosure shall be built around the TPSS unit to further reduce noise levels at sensitive receivers to below the applicable impact threshold.

Noise impacts are predicted at sensitive receivers near MSF Option A and C. Proposed measures to mitigate MSF noise include:

MM-NOI-4a: Low-impact frogs shall be used at crossovers, where feasible. Monoblock, or WBM frog, is a low-impact frog that may be appropriate for the heavy use at a maintenance facility. Where low-impact frogs are not feasible, a noise study shall be completed when the MSF layout is finalized to determine where sound walls are necessary to mitigate noise levels.

MM-NOI-4b: The MSF facility shall be laid out with the noisiest operations located away from sensitive receivers wherever possible. For example, the open façade of the carwash facility shall not directly face sensitive receivers if feasible. When the layout of the MSF facility is finalized, a noise assessment shall be completed to determine if sound walls are necessary to mitigate noise levels.

Predicted vibration levels could be reduced to below the NEPA and CEQA significance thresholds at all sensitive receivers with traditional floating slab track. A floating slab consists of a concrete slab supported by rubber or steel springs. Floating slab is the most expensive vibration mitigation measure; however, it provides the most reduction in vibration levels. Further investigation may show that vibration levels could be reduced to below the applicable thresholds with a less expensive option, such as a continuous mat floating slab.

MM-VIB-2: The contractor shall install a floating-slab track where predicted vibration levels would exceed the NEPA and CEQA significance thresholds. Or alternatively, the contractor may install a less expensive option, such as a continuous mat floating slab or a vibration isolated embedded track system such as QTrack, if further investigation confirms that the alternative method would reduce vibration levels below the applicable thresholds.

Impacts Remaining After Mitigation

NEPA Finding

The noise and vibration from construction of the Low-Floor LRT/Tram Alternative would be temporary; however, due to the increase in noise levels above ambient levels, the Low-Floor LRT/Tram Alternative would result in adverse effects, even with implementation of proposed mitigation measures.

The noise and vibration from operation of the Low-Floor LRT/Tram Alternative would not result in adverse effects with implementation of proposed mitigation measures.

CEQA Determination

The noise and vibration from construction of the Low-Floor LRT/Tram Alternative would be temporary; however, due to the increase in noise levels above ambient levels, the Low-Floor LRT/Tram Alternative would still result in a significant and unavoidable impact, even with implementation of proposed mitigation measures.

The noise and vibration from operation of the Low-Floor LRT/Tram Alternative would result in less-than-significant impacts with implementation of proposed mitigation measures. The predicted noise levels associated with the Low-Floor LRT/Tram Alternative and the reduction that could be achieved with the mitigation is presented in the *East San Fernando Valley Transit Corridor Noise and Vibration Impacts Report* (see Appendix M of this EIS/EIR).

Alternative 4 – LRT

Construction Impacts

Impacts resulting from the construction of Alternative 4 would be the same as those that would occur under Alternative 3, and the proposed mitigation measures for Alternative 3 above would also apply to construction of Alternative 4. One exception is that Alternative 4 includes tunneling, which is not included in Alternative 3. Noise impacts from tunnel boring machines are expected to be less-than-significant, because operations take place under ground.

Recently, a tunnel boring machine was used for the Metro Gold Line Eastside Extension. No noise complaints associated with ground-borne noise from the TBM or mine trains used for the Gold Line were received. Ground-borne noise and vibration impacts associated with tunneling are likely to be less than significant because tunneling will only take place within the Van Nuys Boulevard street ROW. However, an assessment of tunneling operations should be including in the Construction Vibration Control Plan required by mitigation measure MM-VIB-1 because ground-borne noise and vibration levels from tunneling are highly dependent on the means and methods selected by the contractor. If the Metro ground-borne noise limits or ground-borne vibration limits are exceeded during tunneling, the contractor will be required to take actions to reduce vibrations to acceptable levels. Such actions could include reducing the muck train speed, additional rail and tie isolation, and more frequent rail and wheel maintenance.

Operational Impacts

Changes in noise levels as a result of the LRT Alternative would occur as a result of the introduction of LRVs and a decrease in the volume of buses. The predicted noise levels would exceed the NEPA and CEQA significance thresholds at two clusters of residences:

- **A cluster of two single-family residences west of El Dorado Avenue on Pinney Street.** Two factors contribute to the high predicted noise levels at these sensitive receivers: (1) they are located near a curve in the LRT alignment and wheel squeal at curves can increase noise levels by up to 10 decibels and (2) they are behind existing buildings that would be removed as a part of the project. The removal of the buildings would result in an increase in traffic noise at the sensitive receivers. The existing noise level at these sensitive receivers is 54 dBA L_{dn} and the predicted future noise level with the project is 70 dBA L_{dn}.
- **A cluster of eight single-family residences east of El Dorado Avenue on Pinney Street**. The two factors that contribute to the high predicted noise levels at these sensitive receivers are the same as those for the residences west of El Dorado Avenue: (1) they are located near a curve where wheel squeal may cause noise levels to increase by up to 10 decibels and (2) they are behind buildings that would be removed as part of the project which would result in an increase in traffic noise. The existing noise level at these sensitive receivers is 54 dBA L_{dn} and the predicted future noise level with the project is 72 dBA L_{dn}.

Moderate noise impacts are predicted at an additional 59 clusters of sensitive receivers, which extend along much of Van Nuys Boulevard. FTA guidance for moderate impacts is that noise mitigation should be considered and adopted when it is considered reasonable. The FTA Guidance Manual recommends taking into account the number of affected sites, the increase over existing noise levels, and the cost of mitigation among other factors. These details are included in the *Noise and Vibration Impacts Report* (see Appendix M in this EIS/EIR) and should be considered before mitigation measures are finalized.

TPSS units are the only ancillary equipment associated with the LRT Alternative that has the potential to cause noise impact. There are 12 proposed TPSS sites and the sites are the same as those proposed for the Low-Floor LRT/Tram Alternative. Noise impact is predicted to occur at five clusters of sensitive receivers, which are all located within 15 feet of a TPSS site. The TPSS sites near the adversely affected receivers are: 4A, 6A, 6B, 7A, and 8A. Figures showing the locations of the TPSS sites are included in the *Noise and Vibration Impacts Report* (see Appendix M of this EIS/EIR).

There are three MSF Options associated with the LRT Alternative. The noise sources associated with MSFs include carwashes, blowdown facilities, repair shops, train movements across track switches, and vehicle traffic into and out of the facility. The predicted noise impacts associated with each MSF Option are:

- **MSF Option A (straddling the Orange Line between Kester Avenue and Vesper Avenue):** Predicted noise levels would exceed the NEPA significance threshold at one cluster and would exceed the CEQA significance threshold at two clusters of sensitive receivers.
- **MSF Option B (south of the Metrolink tracks on the west side of Van Nuys Boulevard):** Predicted noise levels would not exceed the NEPA or CEQA significance thresholds at any sensitive receivers.
- **MSF Option C (north of the Metrolink tracks on the west side of Van Nuys Boulevard):** Predicted noise levels would exceed the NEPA significance threshold at one cluster of sensitive receivers and would exceed the CEQA significance threshold at three clusters of sensitive receivers.

The locations of the clusters where predicted noise levels would exceed the NEPA and CEQA significance thresholds are shown in Figure 4.8-4.

Ground-borne Vibration and Ground-borne Noise Levels

The predicted vibration levels would exceed the NEPA and CEQA significance threshold at 21 clusters of residential receivers and two institutional land uses. There are a total of 630 residential units within the clusters of sensitive receivers where vibration impacts are predicted. Vibration propagation measurements showed that there is very efficient vibration propagation through the area where vibration impact is predicted. The residential units where vibration impact is predicted are located on Van Nuys Boulevard between Parthenia Street and Woodman Avenue. The majority of the vibration impacts predicted for the LRT Alternative were also predicted for the Low-floor LRT/Tram Alternative. Where vibration impact is predicted at residences, the levels exceed the threshold by about 5 decibels. Five decibels above the limit for residences is equal to the limit for daytime land uses, and is a level of vibration that is compatible with schools and offices.

Potential impacts from ground-borne noise were assessed for the clusters of sensitive receivers that are near the tunnel section, because they would not be exposed to airborne noise from the LRVs. Impact from ground-borne noise is predicted at four clusters of residential sensitive receivers and six institutional land uses. Ground-borne noise impact is predicted at the clusters of sensitive receivers closest to the tunnel section. The predicted ground-borne noise levels exceed the significance threshold by 1 to 17 decibels.

For the LRT Alternative, the alignment would vary slightly depending on the location of the MSF. There are three proposed MSF facility locations. For MSF Option B, an additional ground-borne vibration impact is predicted at one residential cluster and additional ground-borne noise impact is predicted at two additional clusters.

The locations of the clusters where predicted vibration levels would exceed the NEPA and CEQA significance thresholds are shown in Figure 4.8-4. Detailed tables including predicted vibration levels are presented in the *Noise and Vibration Impacts Report* (see Appendix M of this EIS/EIR).

Cumulative Impacts

Alternative 4's contribution to any cumulative impacts would be the same as those described above for Alternative 3.

Mitigation Measures

Construction Mitigation Measures

Mitigation Measure NOI-1 and VIB-1 are proposed (see discussion above for Alternative 1). Tunneling impacts would be addressed in the Construction Noise Control Plan (NOI-1) and in the Construction Vibration Control Plan (VIB-1).

Operational Mitigation Measures

Mitigation Measures NOI-2, NOI-3, NOI-4, and VIB-2 (see discussion above for Alternative 3) are proposed. Mitigation Measure VIB-2 shall also be implemented where predicted ground-borne noise levels would exceed the NEPA and CEQA significance thresholds.

Impacts Remaining After Mitigation

NEPA Finding

The noise and vibration from construction of the LRT Alternative would be temporary; however, due to the increase in noise levels above ambient levels, the LRT Alternative would result in adverse effects, even with implementation of proposed mitigation measures.

The noise and vibration from operation of the LRT Alternative would not result in adverse effects with implementation of proposed mitigation measures.

CEQA Determination

The noise and vibration from construction of the LRT Alternative would be temporary; however, due to the increase in noise levels above ambient levels, the LRT Alternative would still result in significant and unavoidable impacts, even with implementation of proposed mitigation measures.

The noise and vibration from operation of the LRT Alternative would result in less-than-significant impacts with implementation of proposed mitigation measures.

Figure 4.8-4: Map of Predicted Operational Impacts for LRT Alternative

Metro

Metro