3-11 NOISE AND VIBRATION

Summary of Impacts

No noise and vibration impacts have been identified for the No Build or TSM Alternatives.

For the LRT alternatives, it is estimated that residential land uses within 125 feet of the alignment would have the potential for temporary construction noise impacts. Mitigation measures, including limited work to the period 7 am to 6 pm, would help reduce impacts.

For the Full Build LRT alternative, Triple Track configuration, a total of 1,266 residences over the 24 mile length (Segments 1 and 2) would be exposed to noise impacts. Mitigation measures, including soundwalls and sound insulation of some residences, is expected to reduce impacts to below impact thresholds. Potential vibration impacts were identified for 1,575 residences; mitigation measures are expected to reduce impacts to below impact thresholds.

For the Build Alternative to Maintenance Facility, Triple Track configuration, a total of 309 residences over the 9 mile length (Segment 1 only) would be exposed to noise impacts. Mitigation measures, including soundwalls and sound insulation of some residences, is expected to reduce impacts to below impact thresholds. Potential vibration impacts were identified for 575 residences; mitigation measures are expected to reduce impacts to below impact thresholds

For the Full Build LRT alternative, Double Track configuration, a total of 1,202 residences over the 24 mile length (Segments 1 and 2) would be exposed to noise impacts. Mitigation measures, including soundwalls and sound insulation of some residences, is expected to reduce impacts to below impact thresholds. Potential vibration impacts were identified for 1,575 residences; mitigation measures are expected to reduce impacts to below impact thresholds.

For the Build Alternative to Maintenance Facility, Double Track configuration, a total of 309 residences over the 9 mile length (Segment 1 only) would be exposed to noise impacts. Mitigation measures, including soundwalls and sound insulation of some residences, is expected to reduce impacts to below impact thresholds. Potential vibration impacts were identified for 575 residences; mitigation measures are expected to reduce impacts to below impact thresholds.

During Preliminary Engineering, more detailed studies would be conducted to account for the final location of tracks and would include an evaluation of whether existing property walls along some parts of the rail alignment are sufficient to mitigate noise, or whether they would need to be replaced. Final mitigation would be described in the FEIS/FEIR.

3-11.1 Existing Conditions

a. Noise Basics

Noise is typically defined as unwanted or undesirable sound, where sound is characterized by small air pressure fluctuations above and below the atmospheric pressure. The basic parameters of environmental noise that affect human subjective response are (1) intensity or level, (2) frequency content and (3) variation with time. The first parameter is determined by how greatly the sound pressure fluctuates

above and below the atmospheric pressure, and is expressed on a compressed scale in units of decibels. By using this scale, the range of normally encountered sound can be expressed by values between 0 and 120 decibels. On a relative basis, a 3-decibel change in sound level generally represents a barely-noticeable change outside the laboratory, whereas a 10-decibel change in sound level would typically be perceived as a doubling (or halving) in the loudness of a sound.

The frequency content of noise is related to the tone or pitch of the sound, and is expressed based on the rate of the air pressure fluctuation in terms of cycles per second (called Hertz and abbreviated as Hz). The human ear can detect a wide range of frequencies from about 20 Hz to 17,000 Hz. However, because the sensitivity of human hearing varies with frequency, the A-weighting system is commonly used when measuring environmental noise to provide a single number descriptor that correlates with human subjective response. Sound levels measured using this weighting system are called "A-weighted" sound levels, and are expressed in decibel notation as "dBA." The A-weighted sound level is widely accepted by acousticians as a proper unit for describing environmental noise.

Because environmental noise fluctuates from moment to moment, it is common practice to condense all of this information into a single number, called the "equivalent" sound level (Leq). Leq can be thought of as the steady sound level that represents the same sound energy as the varying sound levels over a specified time period (typically 1 hour or 24 hours). Often the Leq values over a 24-hour period are used to calculate cumulative noise exposure in terms of the Day-Night Sound Level (Ldn). Ldn is the A-weighted Leq for a 24-hour period with an added 10-decibel penalty imposed on noise that occurs during the nighttime hours (between 10 P.M. and 7 A.M.). Many surveys have shown that Ldn is well correlated with human annoyance, and therefore this descriptor is widely used for environmental noise impact assessment. **Figure 3-11.1** provides examples of typical noise environments and criteria in terms of Ldn. While the extremes of Ldn are shown to range from 35 dBA in a wilderness environment to 85 dBA in noisy urban environments, Ldn is generally found to range between 55 dBA and 75 dBA in most communities. This range was found to be true for the Phase II corridor, based upon actual noise measurements where Ldns ranged from 55 dBA to 65 dBA. As shown in Figure 3-11.1, this spans the range between an "ideal" residential environment and the threshold for an unacceptable residential environment according to U.S. Federal agency criteria.

b. Existing Noise Conditions

Noise-sensitive land uses along the project corridor and near the proposed maintenance facility were first identified based on preliminary alignment drawings, aerial photographs, and visual surveys. Areas adjacent to the proposed Gold Line Phase II alignment include single-family residences along with some non-residential (commercial) and institutional land uses. Adjacent uses are currently exposed to noise from traffic (I-210 and other local streets), freight trains, and Metrolink commuter trains.

Existing ambient noise levels along the corridor were characterized through direct measurements at 26 sites along the proposed alignment made during the period from October 6 through October 10, 2003. Estimating existing noise exposure is an important step in the noise impact assessment since, as indicated below, the thresholds for noise impact are based on the existing levels of noise exposure. The measurements included both long-term (typically 24-hour) and short-term (1-hour) monitoring of the A-weighted sound level at representative noise-sensitive locations.

All of the measurement sites were located in noise-sensitive areas, and were selected to represent a range of existing noise conditions along the corridor. **Figures 3-11.2 through 3-11.4** show the general location of the 18 long-term monitoring sites along the Gold Line Phase II Extension Project (LT-1 through LT-18)

FIGURE 3-11.1: EXAMPLES OF TYPICAL OUTDOOR NOISE EXPOSURE

CLICK HERE TO VIEW FIGURE 3-11.1

FIGURE 3-11.2: AMBIENT NOISE MONITORING LOCATIONS SEGMENT 1

CLICK HERE TO VIEW FIGURE 3-11.2

FIGURE 3-11.3: AMBIENT NOISE MONITORING LOCATIONS SEGMENT 2A

CLICK HERE TO VIEW FIGURE 3-11.3

FIGURE 3-11.4: AMBIENT NOISE MONITORING LOCATIONS SEGMENT 2B

CLICK HERE TO VIEW FIGURE 3-11.4

TABLE 3-11.1
SUMMARY OF EXISTING AMBIENT NOISE MEASUREMENTS

Site No.	Measurement Location Description	City	Start of Measurement		Meas. Time (hrs)	Noise Exposure (dBA)	
			Date	Time		Ldn	Leq
LT-1	3740 Arbeleda Street	Pasadena	10/6/03	10:00	24	64	--
LT-2	1025 Catalpa Road	Arcadia	10/6/03	10:00	24	65	--
LT-3	107 Santa Ynez Drive	Arcadia	10/6/03	12:00	24	60	--
LT-4	1525 Alamitas Avenue	Monrovia	10/6/03	12:00	24	60	--
LT-5	1480 Three Ranch Road	Duarte	10/6/03	13:00	24	57	--
LT-6	Proposed Maintenance Facility	Irwindale	10/6/03	14:00	24	59	--
LT-7	Azusa Senior Center	Azusa	10/7/03	11:00	24	65	--
LT-8	167 Lowell Avenue	Glendora	10/7/03	11:00	24	55	--
LT-9	Presbyterian Hospital	Glendora	10/7/03	15:00	24	58	--
LT-10	948 Lemon Avenue	Glendora	10/7/03	13:00	24	55	--
LT-11	655 Remuda Drive	Glendora	10/7/03	13:00	24	60	--
LT-12	The Lakes at Raintree Village Apartments	San Dimas	10/7/03	15:00	24	60	--
LT-13	Sunnyside Senior Apartments	San Dimas	10/8/03	12:00	24	65	--
LT-14	1638 1st Street	La Verne	10/8/03	14:00	24	65	--
LT-15	2655 Deodar Road	Pomona	10/8/03	13:00	24	62	--
LT-16	Mountain Village Senior Apartments	Claremont	10/8/03	14:00	24	62	--
LT-17	417 Elder Drive	Claremont	10/9/03	14:00	24	65	--
LT-18	Montclair Park-n-Ride Facility	Upland/Montclair	10/9/03	14:00	24	63	--
ST-1	Latter Day Saints Church	Arcadia	10/9/03	6:16	1	--	73
ST-2	Bonita Park/ Serendipity School	Arcadia	109/03	7:43	1	--	53
ST-3	Aloysia Moore Park	Duarte	10/10/03	7:54	1	--	61
ST-4	St. Augustine Medical Center	Azusa	10/10/03	8:01	1	--	66
ST-5	Calvary Lutheran Church	Glendora	10/9/03	16:43	1	--	51
ST-6	Foothill Christian Preschool	Glendora	10/9/03	15:32	1	--	52
ST-7	Pioneer Park	San Dimas	10/9/03	16:23	1	--	56
ST-8	Keck Graduate Institute	Claremont	10/9/03	15:03	1	--	58

LT – Long-term noise measurement (24 hours) at residential locations, Ldn
ST – Short-term noise measurement (1hour) at institutional locations, Leq

Source: Harris, Miller, Miller & Hanson, 2003

and eight short-term monitoring sites (ST-1 through ST-8). Measurements were conducted within each city along the proposed alignment, except for Montclair. Data for Montclair was derived from nearby measurements in Claremont and Upland. As seen in Figures 3-11.2 through 3-11.4, the measurement sites were spaced approximately 1 mile apart.

At each site, the measurement microphone was positioned to characterize the exposure of the site to the dominant noise sources in the area. For example, microphones were located at the approximate setback lines of the receptors from adjacent roads or rail lines, and were positioned to avoid acoustic shielding by landscaping, fences or other obstructions. The results of the existing ambient noise measurements are summarized below in Table 3-11.1 and the measurement sites are described below. Detailed noise data are included in the Noise and Vibration Technical Report in the Appendices. Site LT-1 was located north of the proposed alignment, at 3740 Arbeleda Street, in Pasadena. The microphone was located in the backyard of the single-family residence. Traffic on I-210 was the dominant source of noise at this site. The measured Ldn at this site was 64 dBA.

Site LT-2 was located south of the proposed alignment, at 1025 Catalpa Road, in Arcadia. The microphone was located in the backyard of the single-family residence. Dominant sources of noise at this site included traffic on I-210 and Colorado Boulevard. The measured Ldn at this site was 65 dBA.

Site LT-3 was located south of the proposed alignment, at 107 Santa Ynez Drive, in Arcadia. The microphone was located in the backyard of the single-family residence. Traffic on I-210, local traffic on Colorado Boulevard, and aircraft activity all contributed to the noise environment at this location. The measured Ldn at this site was 60 dBA.

Site LT-4 was located south of the proposed alignment at 1525 Alamitas Avenue, in Monrovia. The microphone was placed in the backyard of a single-family residence. Traffic on I-210 and other local roads contributed to the noise environment. The measured Ldn at this site was 60 dBA.

Site LT-5 was located north of the proposed alignment at 1480 Three Ranch Road, Duarte. The microphone was located in the backyard of the single-family residence. Noise sources at this site included distant traffic on I-210 and local traffic on Duarte Avenue. The measured Ldn at this site was 57 dBA.

Site LT-6 was located south of the proposed alignment at the Miller Brewing Company Facility, in Irwindale. The microphone was located near the proposed maintenance facility site. Activities at the brewing facility and aircraft contributed to the noise environment. The measured Ldn at this site was 59 dBA.

Site LT-7 was located south of the proposed alignment at the Azusa Senior Center, in Azusa. The microphone was located at the edge of the parking lot, next to the rail corridor. Local traffic, aircraft, and activities at the Senior Center contributed to the noise environment. The measured Ldn at this site was 65 dBA.

Site LT-8 was located south of the proposed alignment at 167 Lowell Avenue, in Glendora. The microphone was located in the backyard of the single-family residence. Aircraft, local activities, and local street traffic contributed to the noise environment. The measured Ldn at this site was 55 dBA.

Site LT-9 was located south of the proposed alignment at the Presbyterian Hospital, in Glendora. The microphone was placed next to the Medical Arts Building. Local traffic, aircraft, and hospital activities contributed to the noise environment at this site. The measured Ldn at this site was 58 dBA.

Site LT-10 was located south of the proposed alignment at 948 Lemon Avenue, in Glendora. The microphone was located in the backyard of a single-family residence. Traffic on local streets and aircraft contributed to the noise environment at this site. The measured Ldn at this site was 55 dBA.

Site LT-11 was located south of the proposed alignment at 655 Remuda Drive, in Glendora. The microphone was located in the yard of the residence. Local traffic, aircraft and distant highway noise contributed to the noise environment at this site. The measured Ldn at this site was 60 dBA.

Site LT-12 was located north of the proposed alignment at the Lakes at Raintree Village Apartments, in San Dimas. The microphone was located next to the parking lot of the apartment complex. Traffic on I-210 and other local traffic contributed to the noise environment. The measured Ldn at this site was 60 dBA.

Site LT-13 was located north of the proposed alignment at the Sunnyside Senior Apartments, in San Dimas. The microphone was located next to the parking lot of the apartment complex. Local traffic and distant highway noise contributed to the noise environment at this location. The measured Ldn at this site was 65 dBA.

Site LT-14 was located north of the proposed alignment at 1638 1st Street, in La Verne. The microphone was located in the yard of a single-family residence. Local traffic and Metrolink trains on the existing alignment were the dominant sources of noise at this location. The measured Ldn at this site was 65 dBA.

Site LT-15 was located south of the proposed alignment at 2655 Deodar Road, in Pomona. The microphone was located in the yard of a single-family residence. Metrolink trains, street traffic and other local noise sources contributed to the noise environment at this location. The measured Ldn at this site was 62 dBA.

Site LT-16 was located north of the proposed alignment at the Mountain Village Senior Apartments, in Claremont. The microphone was located next to the parking lot of the apartment complex. Metrolink trains and grade crossing noise (horns) were the dominant sources of noise at this location. The measured Ldn at this site was 62 dBA.

Site LT-17 was located south of the proposed alignment at 417 Elder Drive, in Claremont. The microphone was located in the yard of a single-family residence. Metrolink trains and grade crossing noise (horns) were the dominant sources of noise at this location. The measured Ldn at this site was 65 dBA.

Site LT-18 was located north of the proposed alignment at the Montclair Park-n-Ride Facility, in Upland/Montclair. The microphone was located to the north of the Park-n-Ride facility near the location of the proposed residential development. Park-n-Ride traffic, local traffic and Metrolink trains were the dominant sources of noise at this location. The measured Ldn at this site was 63 dBA.

Site ST-1 was located north of the proposed alignment at the Latter Day Saints Church, in Arcadia. Traffic on I-210 dominated the noise environment at this site. The measured one-hour Leq at this site was 73 dBA.

Site ST-2 was located south of the proposed alignment at the Bonita Park/Serendipity School, in Arcadia. Local traffic contributed to the noise environment at this site. The one-hour Leq at this site was 53 dBA.

Site ST-3 was located south of the proposed alignment at the Aloysia Moore Park, in Duarte. Traffic on Duarte Avenue dominated the noise environment at this site. The one-hour Leq at this site was 61 dBA.

Site ST-4 was located south of the proposed alignment at the St. Augustine Medical Center, in Azusa. Traffic on Foothill Boulevard and Orange Avenue dominated the noise environment at this site. The one-hour Leq at this site was 66 dBA.

Site ST-5 was located south of the proposed alignment at the Calvary Lutheran Church, in Glendora. Traffic on Foothill Boulevard and other local noise sources contributed to the noise environment at this site. The one-hour Leq at this site was 51 dBA.

Site ST-6 was located south of the proposed alignment at the site of the future Foothill Christian Preschool, in Glendora. Traffic on local roads dominated the noise environment at this site. The one-hour Leq at this site was 52 dBA.

Site ST-7 was located south of the proposed alignment at the Pioneer Park, in San Dimas. Local traffic was the main contribution to the noise environment at this site. The one-hour Leq at this site was 56 dBA.

Site ST-8 was located south of the proposed alignment at the Keck Graduate Institute, in Claremont. Metrolink trains and freight trains were the dominant noise sources at this site. The one-hour Leq at this site was 58 dBA.

3-11.1.2 Vibration

a. Vibration Basics

Ground-borne vibration is the oscillatory motion of the ground about some equilibrium position that can be described in terms of displacement, velocity or acceleration. Because sensitivity to vibration typically corresponds to the amplitude of vibration velocity within the low-frequency range of most concern for environmental vibration (roughly 5-100 Hz), velocity is the preferred measure for evaluating ground-borne vibration from transit projects.

The most common measure used to quantify vibration amplitude is the peak particle velocity (PPV), defined as the maximum instantaneous peak of the vibratory motion. PPV is typically used in monitoring blasting and other types of construction-generated vibration, since it is related to the stresses experienced by building components. Although PPV is appropriate for evaluating building damage, it is less suitable for evaluating human response, which is better related to the average vibration amplitude. Thus, ground-borne vibration from transit trains is usually characterized in terms of the "smoothed" root mean square (rms) vibration velocity level, in decibels (VdB), with a reference quantity of one micro-inch per second. VdB is used in place of dB to avoid confusing vibration decibels with sound decibels.

Figure 3-11.5 illustrates typical ground-borne vibration levels for common sources as well as criteria for human and structural response to ground-borne vibration. As shown, the range of interest is from approximately 50 to 100 VdB, from imperceptible background vibration to the threshold of damage. Although the approximate threshold of human perception to vibration is 65 VdB, annoyance is usually not significant unless the vibration exceeds 70 VdB.

b. Existing Vibration Conditions

The only significant sources of existing ground-borne vibration along the project corridor are the freight trains and Metrolink trains operating along portions of the corridor. In addition to measuring the vibration levels from the existing freight trains, the vibration measurements for this project focused on characterizing the vibration propagation characteristics of the soil at representative locations.

Eight vibration testing sites (V-1 though V-8), at the locations shown in **Figures 3-11.6 through 3-11.8**, were selected to represent a range of soil conditions in areas along the corridor that include a significant number of vibration-sensitive receptors. During the period from October 6 through October 10, 2003, ground-borne vibration propagation tests were conducted at each of these sites by impacting the ground and measuring the input force and corresponding ground vibration response at various distances. The resulting force-response transfer function can be combined with the known input force characteristics of the Pasadena Gold Line LRT vehicle (which were also measured as a part of this project, along the existing Phase I corridor) to predict future vibration levels at locations along the project corridor.

FIGURE 3-11.5: TYPICAL GROUND-BORNE VIBRATION LEVELS AND CRITERIA

CLICK HERE TO VIEW FIGURE 3-11.5

FIGURE 3-11.6: GROUND-BORNE VIBRATION MEASUREMENT LOCATIONS SEGMENT 1

CLICK HERE TO VIEW FIGURE 3-11.6

FIGURE 3-11.7: GROUND-BORNE VIBRATION MEASUREMENT LOCATIONS SEGMENT 2A

CLICK HERE TO VIEW FIGURE 3-11.7

FIGURE 3-11.8: GROUND-BORNE VIBRATION MEASUREMENT LOCATIONS SEGMENT 2B

CLICK HERE TO VIEW FIGURE 3-11.8

The vibration propagation test sites are described below. Detailed results of the measurements are included in the Noise and Vibration Technical Report.

Site V-1 was located south of the proposed alignment at the Serendipity School, in Arcadia. This site is representative of the vibration-sensitive receptors in the western portion of the proposed alignment from the start of the Phase II project to the proposed Monrovia Station.

Site V-2 was located north of the proposed alignment at the corner of Three Ranch Road and Cinco Robles, in Duarte. This site is representative of vibration-sensitive receptors between the Monrovia Station and the maintenance facility in Irwindale.

Site V-3 was located south of the proposed alignment at the Azusa Senior Center, Azusa. This site is representative of vibration-sensitive receptors from the maintenance facility in Irwindale and North Grand Avenue in Glendora.

Site V-4 was located north of the proposed alignment at the Corner of Lemon Avenue and Minnesota Avenue, in Glendora. This site is representative of vibration-sensitive sites from North Grand Avenue in Glendora to the I-210 in Glendora.

Site V-5 was located south of the proposed alignment at the corner of Lone Vista Avenue and Railway Avenue, in San Dimas. This site is representative of vibration-sensitive sites between the I-210 in Glendora and San Dimas Canyon Road.

Site V-6 was located north of the proposed alignment at the corner of 1st Street and Park Avenue, in La Verne. This site is representative of vibration-sensitive sites between San Dimas Canyon Road and Fulton Road in La Verne.

Site V-7 was located south of the proposed alignment at the Palomares Park, in Pomona. This site is representative of vibration-sensitive sites between Fulton Road and Mountain Avenue in Claremont. In addition, vibration measurements of existing Metrolink trains were also performed at this location.

Site V-8 was located south of the proposed alignment at the corner of East Green Street and Dartmouth Road, in Montclair. This site is representative of vibration-sensitive sites from Mountain Avenue to the eastern end of the alignment. In addition, vibration measurements of existing Metrolink trains were also performed at this location.

3-11.2 Environmental Impacts

3-11.2.1 Evaluation Methodology

a. Noise Impact Assessment Methodology

The Gold Line Phase II Extension Project noise levels were projected based on noise measurements of the Pasadena Gold Line LRT vehicles, the operating plan provided by Manuel Padron & Associates and the prediction model specified in the FTA guidance manual. Significant factors are summarized below:

- Based on the vehicle noise measurements, the predictions assume that a two car 180-foot long vehicle operating at 30 mph on ballast and tie track with continuous welded rail (CWR) generates

a maximum noise level of 76 dBA at a distance of 50 feet from the track centerline. This reference noise level is used in the projections and is adjusted for the actual speed of the train and the distance to the noise-sensitive receptors at all locations. For higher speeds, the noise levels would be higher, and for lower speeds, the noise levels would be lower.

- The operating times of the Gold Line Phase II trains would likely be between 4:30 AM and 2:30 AM.[1] The operating plan for LRT service specifies peak-hour headways of 10 minutes, off-peak base period headways of 20 minutes and early morning/late night headways of 20 minutes. Two-car trains would operate most of the day, with three-car trains in peak periods.
- Peak hour operations would occur between 6:00 AM and 9:00 AM and between 3:00 PM and 6:00 PM. Early morning/late night operations will occur between 4:30 AM and 6:00 AM and 10:00 PM and 12:30 AM, and base service will occur during all other time periods. The average number of cars per train would be three cars during peak hours, two cars during base service, and two cars during evening service.
- Vehicle operating speeds are assumed to be at a maximum of 55 mph.
- The noise projections near grade crossings account for noise from train whistles and crossing bells. The projections are based on noise measurements made on the Pasadena Gold Line Phase I light rail system in 2003. The noise projections assume that the whistles generate a noise level of 76 dBA at 50 feet from the track for a five second period as trains approach each crossing. The bells are estimated to generate a noise level of 67 dBA at 50 feet for 15 seconds prior to each train. In addition, to account for the intrusive character of the whistles and bells, a 5dBA penalty was applied to noise levels from these sources in accordance with FTA procedures. It should be noted that these assumptions, in combination, produce a worst-case scenario for impacts and these reported results are subject to change during Preliminary Engineering. Changes to the analysis could occur as the result of modifications to the LRT operating assumptions or from on on-going discussions with the California Public Utilities Commission about sounds levels required for warning devices, and the circumstances under which warning devices must be sounded.

b. Vibration Impact Assessment Methodology

The potential vibration impact from LRT operation was assessed on an absolute basis using the FTA criteria. The following factors were used in determining potential vibration impacts along the Pasadena Gold Line Phase II Extension Project:

- Vibration source levels were based on measurements made on the Pasadena Gold Line Phase I light rail vehicles operating on the existing light rail system.
- Vibration propagation tests were conducted at eight sites along the corridor near sensitive receptors. These tests measured the response of the ground to an input force. The results of these tests were combined with the vibration source level measurements to provide projections of vibration levels from vehicles operating on the Pasadena Gold Line Phase II Extension Project.
- Vehicle operating speeds are based on speed profiles provided by Parsons Brinckerhoff. The speed limit is 55 mph along the corridor.

[1] The last departures from downtown would typically be at 12:30 a.m.; some trains would be moving up until about 2:30 a.m. to reach the Maintenance and Operating Facility.

3-11.2.2 Impact Criteria

a. NEPA Impact Criteria

Transit Noise Criteria

Noise impact for this project is based on the criteria defined in the U. S. Federal Transit Administration (FTA) guidance manual *Transit Noise and Vibration Impact Assessment* (FTA Report DOT-T-95-16, April 1995). The FTA noise impact criteria are founded on well-documented research on community reaction to noise and are based on change in noise exposure using a sliding scale. Although higher transit noise levels are allowed in neighborhoods with high levels of existing noise, smaller increases in total noise exposure are allowed with increasing levels of existing noise.

The FTA Noise Impact Criteria group noise sensitive land uses into the following three categories:

- Category 1: Buildings or parks where quiet is an essential element of their purpose.
- Category 2: Residences and buildings where people normally sleep. This includes residences, hospitals, and hotels where nighttime sensitivity is assumed to be of utmost importance.
- Category 3: Institutional land uses with primarily daytime and evening use. This category includes schools, libraries, churches and active parks.

Ldn is used to characterize noise exposure for residential areas (Category 2). For other noise sensitive land uses, such as outdoor amphitheaters and school buildings (Categories 1 and 3), the maximum 1-hour Leq during the facility's operating period is used.

There are two levels of impact included in the FTA criteria. The interpretation of these two levels of impact is summarized below:

- Severe: Severe noise impacts are considered "significant" as this term is used in the National Environmental Policy Act (NEPA) and implementing regulations.[2] Noise mitigation would normally be specified for severe impact areas unless there is no practical method of mitigating the noise.
- Impact: In this range of noise impact, sometimes referred to as moderate impact, other project-specific factors must be considered to determine the magnitude of the impact and the need for mitigation. These other factors can include the predicted increase over existing noise levels, the types and number of noise-sensitive land uses affected, existing outdoor-indoor sound insulation, and the cost effectiveness of mitigating noise to more acceptable levels.

The noise impact criteria are summarized in Table 3-11.2. The first column shows the existing noise exposure and the remaining columns show the additional noise exposure from the transit project that would cause either moderate or severe impact. The future noise exposure would be the combination of the existing noise exposure and the additional noise exposure caused by the transit project. Table 3-11.3 expresses the same criteria in terms of the increase in total or cumulative noise that can occur in the

[2] The California Environmental Quality Act (CEQA) does not specify impact criteria for noise. The thresholds determining the significance of impacts under CEQA for this project are based on the FTA criteria. The noise impact criteria of individual cities do not apply.

overall noise environment before impact occurs. If the projected noise levels are less than the allowable increment, no impact would result. As seen in Table 3-11.3, the higher the ambient noise level, the smaller the increment of noise generated by a project can be before an impact or severe impact would occur.

TABLE 3-11.2
FTA NOISE IMPACT CRITERIA

Existing Noise Exposure Leq or Ldn	Project Noise Exposure Impact Thresholds, Ldn or Leq (dBA)			
	Category 1 or 2 Sites		Category 3 Sites	
	Impact	Severe Impact	Impact	Severe Impact
<43	Amb.+10	Amb.+15	Amb.+15	Amb.+20
43	52	58	57	63
44	52	59	57	64
45	52	59	57	64
46	52	59	57	64
47	52	59	57	64
48	53	59	58	64
49	53	59	58	64
50	53	60	58	65
51	54	60	59	65
52	54	60	59	65
53	54	60	59	65
54	55	61	60	66
55	55	61	60	66
56	56	62	61	67
57	56	62	61	67
58	57	62	62	67
59	57	63	62	68
60	58	63	63	68
61	58	64	63	69
62	59	64	64	69
63	60	65	65	70
64	60	66	65	71
65	61	66	66	71
66	61	67	66	72
67	62	67	67	72
68	63	68	68	73
69	64	69	69	74
70	64	69	69	74
71	65	70	70	75
72	65	71	70	76
73	65	72	70	77
74	65	72	70	77
75	65	73	70	78
76	65	74	70	79
77	65	75	70	80
>77	65	75	70	80

TABLE 3-11.2 *continued*
FTA NOISE IMPACT CRITERIA

Existing Noise Exposure Leq or Ldn	Project Noise Exposure Impact Thresholds, Ldn or Leq (dBA)			
	Category 1 or 2 Sites		Category 3 Sites	
	Impact	Severe Impact	Impact	Severe Impact

Notes: Ldn is used for land uses where nighttime sensitivity is a factor;
Maximum 1-hour Leq is used for land use involving only daytime activities.
Category 1: Buildings or parks where quiet is an essential element of their purpose.
Category 2: Residences and buildings where people normally sleep. This includes residences, hospitals, and hotels where nighttime sensitivity is assumed to be of utmost importance.
Category 3: Institutional land uses with primarily daytime and evening use. This category includes schools, libraries, churches and active parks.
Source: Federal Transit Administration, April 1995.

TABLE 3-11.3
CUMULATIVE NOISE LEVEL INCREASE ALLOWED BY FTA CRITERIA

Existing Noise Exposure Leq or Ldn	Impact Threshold for Increase in Cumulative Noise Exposure (dBA)			
	Category 1 or 2 Sites		Category 3 Sites	
	Impact	Severe Impact	Impact	Severe Impact
45	8	14	12	19
46	7	13	12	18
47	7	12	11	17
48	6	12	10	16
49	6	11	10	16
50	5	10	9	15
51	5	10	8	14
52	4	9	8	14
53	4	8	7	13
54	3	8	7	12
55	3	7	6	12
56	3	7	6	11
57	3	6	6	10
58	2	6	5	10
59	2	5	5	9
60	2	5	5	9
61	1.9	5	4	9
62	1.7	4	4	8
63	1.6	4	4	8
64	1.5	4	4	8
65	1.4	4	3	7
66	1.3	4	3	7
67	1.2	3	3	7
68	1.1	3	3	6
69	1.1	3	3	6
70	1.0	3	3	6

TABLE 3-11.3 *continued*
CUMULATIVE NOISE LEVEL INCREASE ALLOWED BY FTA CRITERIA

Existing Noise Exposure Leq or Ldn	Impact Threshold for Increase in Cumulative Noise Exposure (dBA)			
	Category 1 or 2 Sites		Category 3 Sites	
	Impact	Severe Impact	Impact	Severe Impact
71	1.0	3	3	6
72	0.8	3	2	6
73	0.6	2	1.8	5
74	0.5	2	1.5	5
75	0.4	2	1.2	5

Notes: Ldn is used for land uses where nighttime sensitivity is a factor;
Maximum 1-hour Leq is used for land use involving only daytime activities.
Category 1: Buildings or parks where quiet is an essential element of their purpose.
Category 2: Residences and buildings where people normally sleep. This includes residences, hospitals, and hotels where nighttime sensitivity is assumed to be of utmost importance.
Category 3: Institutional land uses with primarily daytime and evening use. This category includes schools, libraries, churches and active parks.
Source: Federal Transit Administration, April 1995.

Ground-Borne Vibration Criteria

The FTA ground-borne vibration impact criteria are based on land use and train frequency, as shown in Table 3-11.4. There are some buildings, such as concert halls, recording studios and theaters, which can be very sensitive to vibration but do not fit into any of the three categories listed in Table 3-11.4. Due to the sensitivity of these buildings, they usually warrant special attention during the environmental assessment of a transit project. Table 3-11.5 shows the criteria for acceptable levels of ground-borne vibration for various types of special buildings.

It should also be noted that Tables 3-11.4 and 3-11.5 include separate FTA criteria for ground-borne noise, the "rumble" that can be radiated from the motion of room surfaces in buildings due to ground-borne vibration. Although expressed in dBA, which emphasizes the more audible middle and high frequencies, the criteria are set significantly lower than for airborne noise to account for the annoying low-frequency character of ground-borne noise. Because airborne noise often masks ground-borne noise for above ground (i.e. at-grade or elevated) rail systems, ground-borne noise criteria are primarily applied to subway operations where airborne noise is not a factor. For the above-grade transit system planned along the Pasadena Gold Line Phase II, ground-borne noise criteria would be applied only to buildings that have sensitive interior spaces that are well insulated from exterior noise.

TABLE 3-11.4
GROUND-BORNE VIBRATION AND NOISE IMPACT CRITERIA

Land Use Category	Ground-Borne Vibration Impact Levels (VdB re 1 micro inch/sec)		Ground-Borne Noise Impact Levels (dB re 20 micro Pascals)	
	Frequent Events[1]	Infrequent Events[2]	Frequent Events[1]	Infrequent Events[2]
Category 1: Buildings where low ambient vibration is essential for interior operations.	65 VdB[3]	65 VdB[3]	(-4)	(-4)
Category 2: Residences and buildings where people normally sleep.	72 VdB	80 VdB	35 dBA	43 dBA
Category 3: Institutional land uses with primarily daytime use.	75 VdB	83 VdB	40 dBA	48 dBA

Notes:
1. "Frequent Events" is defined as more than 70 vibration events per day. Most rapid transit projects fall into this category.
2. "Infrequent Events" is defined as fewer than 70 vibration events per day. This category includes most commuter rail systems.
3. This criterion limit is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. Vibration sensitive manufacturing or research will require detailed evaluation to define the acceptable vibration levels. Ensuring lower vibration levels in a building often requires special design of the HVAC systems and stiffened floors.
4. Vibration-sensitive equipment is not sensitive to ground-borne noise.

Source: Federal Transit Administration, April 1995

TABLE 3-11.5
GROUND-BORNE VIBRATION AND NOISE IMPACT CRITERIA FOR SPECIAL BUILDINGS

Type of Building or Room	Ground-Borne Vibration Impact Levels (VdB re 1 micro-inch/sec)		Ground-Borne Noise Impact Levels (dB re 20 micro Pascals)	
	Frequent Events[1]	Infrequent Events[2]	Frequent Events[1]	Infrequent Events[2]
Concert Halls	65 VdB	65 VdB	25 dBA	25 dBA
TV Studios	65 VdB	65 VdB	25 dBA	25 dBA
Recording Studios	65 VdB	65 VdB	25 dBA	25 dBA
Auditoriums	72 VdB	80 VdB	30 dBA	38 dBA
Theaters	72 VdB	80 VdB	35 dBA	43 dBA

Notes:
1. "Frequent Events" is defined as more than 70 vibration events per day. Most transit projects fall into this category.
2. "Infrequent Events" is defined as fewer than 70 vibration events per day. This category includes most commuter rail systems.
3. If the building will rarely be occupied when the trains are operating, there is no need to consider impact. As an example consider locating a commuter rail line next to a concert hall. If no commuter trains will operate after 7 pm, it should be rare that the trains interfere with the use of the hall.

Source: Federal Transit Administration, April 1995

b. CEQA Impact Criteria

There are no noise and vibration impact criteria specified in CEQA. The Construction Authority has chosen to use the FTA noise and vibration criteria for the Phase II project since this is a federally sponsored environmental analysis.

3-11.2.3 Construction-Period Impacts

a. No Build Alternative

The only project in the No Build Alternative that would be expected to generate construction-period impacts is the planned Eastside Extension. Construction-period noise impacts are addressed in the environmental document for that project. The proposed increase in Gold Line Phase I service does not include any construction elements, and thus would generate no construction-period noise. Increases in bus service included in the No Build Alternative do not include substantial construction and would likely generate only short-term construction noise from possible construction of bus shelters or shelter improvements.

b. Transportation System Management (TSM) Alternative

The bus service improvements included in the TSM Alternative do not include any substantial construction. Construction or improvements to bus shelters that may occur would generate only temporary, short-term construction noise. Temporary, short-term noise impacts of a few days duration would be less than adverse under NEPA and less than significant under CEQA.

c. LRT, Triple Track Configuration

Temporary noise and vibration during construction of an LRT project have the potential of being intrusive to residents near the construction sites. Construction noise varies greatly depending on the construction process, type and condition of equipment used, and layout of the construction site. Many of these factors are traditionally left to the contractor's discretion, which makes it difficult to accurately estimate levels of construction noise. Overall, construction noise levels are governed primarily by the noisiest pieces of equipment. For most construction equipment, the engine, which is usually diesel, is the dominant noise source. This is particularly true of engines without sufficient muffling. For special activities such as impact pile driving and pavement breaking, noise generated by the actual process dominates. Construction activities that could cause intrusive vibration include pile driving, vibratory compaction, jackhammers, and use of tracked vehicles such as bulldozers. Please refer to the Noise and Vibration Technical Report in the Appendices for more detail about construction noise and vibration.

Phase I — The Cities Affected and the Effects

There are no elements of the Triple Track configuration in the cities of Los Angeles, South Pasadena, or west of the Sierra Madre Villa Station in Pasadena, so there would be no construction-period noise. The overall Triple Track configuration includes double tracks in the median of I-210 east of the Sierra Madre Villa Station. Residential land uses within 125 feet have the potential to experience temporary construction noise impacts.

Phase II, Segment 1 — The Cities Affected and the Effects

The cities in Segment 1 are Pasadena, Arcadia, Monrovia, Duarte, and Irwindale. Based on the criteria and noise projections presented in the Noise and Vibration Technical Report, and assuming that construction noise is reduced by 6 decibels for each doubling of distance from the center of the site, screening distances for potential construction noise impact can be estimated. These estimates suggest that the potential for construction noise impact will be minimal for commercial and industrial land use, with impact screening distances of 70 feet and 40 feet, respectively. Even for residential land use, the potential for temporary construction noise impact would be limited to locations within about 125 feet of the corridor.

Phase II, Segment 2 — The Cities Affected and the Effects

The cities in Segment 2 are Azusa, Glendora, San Dimas, La Verne, Pomona, Claremont, Montclair, and Upland. Based on the criteria and noise projections presented in the Noise and Vibration Technical Report, and assuming that construction noise is reduced by 6 decibels for each doubling of distance from the center of the site, screening distances for potential construction noise impact can be estimated. These estimates suggest that the potential for construction noise impact will be minimal for commercial and industrial land use, with impact screening distances of 70 feet and 40 feet, respectively. Even for residential land use, the potential for temporary construction noise impact would be limited to locations within about 125 feet of the corridor.

Summary of Triple Track Impacts for Full Build Alternative

For the LRT Triple Track configuration for the Full Build Alternative, residential land uses within 125 feet of the alignment would have the potential for temporary construction noise impacts under the Triple Track Full Build Alternative.

Summary of Triple Track Impacts for Build LRT Alternative to Maintenance Facility

For the LRT Triple Track configuration for the Build Alternative to Maintenance Facility, residential land uses within 125 feet of the alignment would have the potential for temporary construction noise impacts under the Triple Track Build LRT Alternative to Maintenance Facility.

d. LRT, Double Track Configurations

Potential construction-period impacts for the Double Track configuration have the same potential for being intrusive as described for the Triple Track configuration.

Phase I — The Cities Affected and the Effects

There are no elements of the Double Track configurations in the cities of Los Angeles, South Pasadena, or west of the Sierra Madre Villa Station in Pasadena, so there would be no construction-period noise in those areas. For the double tracks in the median of I-210 east of the Sierra Madre Villa Station, residential land uses within 125 feet have the potential to experience temporary construction noise impacts.

Phase II, Segment 1 — The Cities Affected and the Effects

The cities in Phase II, Segment 1 are Pasadena, Arcadia, Monrovia, Duarte, and Irwindale. For Double Track configurations, construction-period impacts would have the same areas (distances) of potential impacts as described for the Triple Track configuration.

Phase II, Segment 2 — The Cities Affected and the Effects

The cities in Phase II, Segment 2 are Azusa, Glendora, San Dimas, La Verne, Pomona, Claremont, Montclair, and Upland. For Double Track configurations, construction-period impacts would have the same areas (distances) of potential impacts as described for the Triple Track configuration.

Summary of Double Track Impacts for Full Build LRT Alternative

For the LRT Double Track configuration for the Full Build Alternative, residential land uses within 125 feet of the alignment would have the potential for temporary construction noise impacts.

Summary of Double Track Impacts for Build LRT Alternative to Maintenance Facility

For the LRT Double Track configurations for the Build Alternative to Maintenance Facility, residential land uses within 125 feet of the alignment would have the potential for temporary construction noise impacts.

3-11.2.4 Long-Term Impacts

a. No Build Alternative

Phase I — The Cities Affected and the Effects

The only elements of the No Build Alternative that would be expected to result in long-term noise or vibration impacts in a Phase I city would be the Eastside Extension. These impacts are addressed in the Draft Supplemental Environmental Impact Statement/Draft Subsequent Environmental Impact Report (FTA and LACMTA 2001).

Phase II, Segment 1 — The Cities Affected and the Effects

The No Build Alternative does not include any elements that result in long-term noise or vibration impacts for Phase II, Segment 1 cities.

Phase II, Segment 2 — The Cities Affected and the Effects

The No Build Alternative does not include any elements that would result in any long-term noise or vibration impacts for Phase II, Segment 2 cities.

b. Transportation System Management (TSM) Alternative

The TSM Alternative does not include any elements that would result in long-term noise or vibration impacts for cities in Phases I and II, Segment 1 or Phase II, Segment 2.

c. LRT, Triple Track Configuration

Noise Analysis

For the LRT Triple Track configuration, detailed comparisons of the existing and future noise levels are presented in Table 3-11.6, Table 3-11.7, Table 3-11.10, and Table 3-11.11. Table 3-11.6 includes results for the Category 2 receptors along the Phase II, Segment 1 portion of the alignment with both daytime and nighttime sensitivity to noise (e.g. residences, hotels and hospitals). Table 3-11.7 is a listing of all Category 3 receptors along the Phase II, Segment 1 portion of the alignment, consisting of institutional sites that are not sensitive to noise at night (e.g. schools, churches, parks and medical offices). Table 3-11.10 includes results for the Category 2 receptors along the Phase II, Segment 2 portion of the alignment with both daytime and nighttime sensitivity to noise (e.g. residences, hotels and hospitals). Table 3-11.11 is a listing of all Category 3 receptors along the Phase II, Segment 2 portion of the alignment, consisting of institutional sites that are not sensitive to noise at night (e.g. schools, churches, parks and medical offices). Written descriptions follow the tables of the locations where noise impacts are predicted.

In addition to the civil station (as shown on maps in Volume 2), distance to the near track and proposed LRT speed, each table includes the existing noise level, the projected noise level from LRT operations and the impact criteria for each receptor or receptor group. Based on a comparison of the predicted project noise level with the impact criteria, the impact category is listed, along with the predicted total noise level and projected noise increase due to the introduction of LRT service. Tables 3-11.6 and 3-11.10 also include an inventory of the number of impacts and severe impacts at each sensitive receptor location.

Vibration Analysis

For the LRT Triple Track configuration, the estimated root mean square (RMS) velocity levels (VdB re 1 micro-in./sec.) for sensitive receptors at representative distances are provided in Table 3-11.8, Table 3-11.9, Table 3-11.12, and Table 3-11.13. These tables summarize the results of the analysis in terms of anticipated exceedances of the FTA criteria for “frequent events” (defined as more than 70 events per day). The criteria are discussed in more detail in Section 3-11.2.2.

Vibration-sensitive locations along the alignment are listed in Table 3-11.8 for Category 2 land use and in Table 3-11.9 for Category 3 land use for Phase II, Segment 1. Vibration-sensitive locations along the alignment are listed in Table 3-11.12 for Category 2 land use and in Table 3-11.13 for Category 3 land use for Phase II, Segment 2. Each table lists the locations, the civil station, the distance to the near track, and the projected LRT speed at each location. In addition, the predicted project vibration level and the impact criterion level are indicated along with the number of impacts projected for each receptor or receptor group. Written descriptions of the locations where vibration impacts are predicted follow the tables.

Phase I — The Cities Affected and the Effects

Noise impacts for Phase I were evaluated using the maximum passby noise levels, or Lmax.[3] Existing service in Phase I uses 2-car train consists. Future service levels when the Eastside LRT Extension project begins operation in 2009 would include 3-car train consists. As a result of this change, Lmax noise levels at the residences closest to the corridor would increase by substantially less than 1 dBA, which is an imperceptible difference. Changes in the frequency of service would not affect Lmax.

Phase II would not induce noise impacts in Phase I cities, since the Operating Plan for Phase II is dictated by the Eastside LRT Extension's Operating Plan, which will precede Phase II.

Phase II, Segment 1 — The Cities Affected and the Effects

Noise

Table 3-11.6 lists the noise impacts for Category 2 land use for Phase II, Segment 1 LRT Triple Track configuration. Written descriptions of the locations where noise impacts are predicted follow the tables.

[3] LACTC, Metro Pasadena Project, "Design & Performance Criteria," 1992.

TABLE 3-11.6
NOISE IMPACTS FOR CATEGORY 2 LAND USE
PHASE II, SEGMENT 1
TRIPLE TRACK CONFIGURATION

Location	City	Civil Stn	Dist to Near Track (ft)	Speed (mph)	Exist. Noise Level[1]	Project Noise Level[1]			Impact Category	Total Noise Level[1,3]	Noise Level Increase[1,3]	# of Res Impacts	
						Pred[2,3]	Impact Criteria					Imp	Sev
							Imp	Sev					
San Luis Rey-1	Arcadia	141	80	55	65	62	60	66	Impact	67.0	1.7	3	0
San Luis Rey-2	Arcadia	146	90	55	65	61	60	66	Impact	66.0	1.4	6	0
San Luis Rey-3	Arcadia	147	50	55	60	65	58	63	Severe	66.0	6.0	0	4
San Luis Rey-4	Arcadia	149	120	55	60	59	58	63	Impact	62.0	2.5	2	0
Cornell-1	Arcadia	151	96	55	60	60	58	63	Impact	63.0	3.2	6	0
Cornell-2	Arcadia	155	90	55	60	61	58	63	Impact	63.0	3.4	8	0
Cornell-3	Arcadia	156	90	55	60	61	58	63	Impact	63.0	3.4	8	0
2nd-2	Arcadia	185	80	55	60	61	58	63	Impact	64.0	3.7	0	0
3rd-1	Arcadia	201	40	55	60	66	57	63	Severe	67.0	7.3	0	12
Contented-1	Monrovia	207	40	55	60	66	57	63	Severe	67.0	7.3	0	2
Contented-3	Monrovia	209	50	55	60	65	57	63	Severe	66.0	6.2	0	4
Contented-4	Monrovia	214	40	55	60	66	57	63	Severe	67.0	7.3	0	6
Montana-1	Monrovia	221	30	55	60	67	57	63	Severe	68.0	8.4	0	8
Anita-1	Monrovia	221	28	55	60	68	57	63	Severe	68.0	8.7	0	4
Montana-3	Monrovia	224	30	55	60	67	57	63	Severe	68.0	8.4	0	2
Anita-3	Monrovia	225	48	55	60	65	57	63	Severe	66.0	6.4	0	5
Montana-5	Monrovia	226	60	55	60	63	57	63	Severe	65.0	5.3	0	48
Alamitas-1	Monrovia	230	40	55	60	66	57	63	Severe	67.0	7.3	0	4
Diamond-1	Monrovia	231	22	55	60	69	57	63	Severe	69.0	9.5	0	5
Diamond-4	Monrovia	236	80	55	60	59	57	63	Impact	62.0	2.7	8	0
Radford-1	Monrovia	236	44	55	60	66	57	63	Severe	67.0	7.2	0	3
Diamond-3	Monrovia	237	40	55	60	68	57	63	Severe	68.0	8.6	0	6
Mayflower-2	Monrovia	238	90	55	60	60	57	63	Impact	63.0	3.2	5	0
Alamitas-2	Monrovia	240	54	55	60	59	57	63	Impact	62.0	2.8	4	0
Mayflower-3	Monrovia	240	120	55	60	58	57	63	Impact	62.0	2.1	4	0
Mayflower-1	Monrovia	240	30	55	60	68	57	63	Severe	69.0	9.3	0	2

TABLE 3-11.6 *continued*
NOISE IMPACTS FOR CATEGORY 2 LAND USE
PHASE II, SEGMENT 1
TRIPLE TRACK CONFIGURATION

Location	City	Civil Stn	Dist to Near Track (ft)	Speed (mph)	Exist. Noise Level[1]	Project Noise Level[1]			Impact Category	Total Noise Level[1,3]	Noise Level Increase[1,3]	# of Res Impacts	
						Pred[2,3]	Impact Criteria					Imp	Sev
							Imp	Sev					
Mayflower-6	Monrovia	241	40	55	60	67	57	63	Severe	68.0	8.2	0	1
Mayflower-4	Monrovia	246	46	55	60	66	57	63	Severe	67.0	7.5	0	40
Genoa-1	Monrovia	250	30	55	60	68	57	63	Severe	68.0	8.7	0	20
Duarte-2	Duarte	315	116	55	57	60	56	62	Impact	62.0	5.3	4	0
Duarte-5	Duarte	318	116	55	57	59	56	62	Impact	61.0	4.2	4	0
Duarte-8	Duarte	322	116	55	57	59	56	62	Impact	61.0	4.2	3	0
Hamilton-1	Duarte	325	134	55	57	59	56	62	Impact	61.0	4.1	7	0
Duarte-11	Duarte	330	116	55	57	59	56	62	Impact	61.0	4.2	3	0
Duarte-14	Duarte	334	116	55	57	59	56	62	Impact	61.0	4.2	3	0
Hamilton-2	Duarte	334	124	55	57	59	56	62	Impact	61.0	4.5	7	0
Hamilton-3	Duarte	339	160	55	57	59	56	62	Impact	61.0	4.5	6	0
Hamilton-4	Duarte	343	160	55	57	57	56	62	Impact	60.0	3.3	6	0
Duarte-17	Duarte	344	126	55	57	58	56	62	Impact	60.0	3.9	5	0
Duarte-18	Duarte	346	146	55	57	57	56	62	Impact	60.0	3.3	10	0
Hamilton-5	Duarte	347	110	55	57	60	56	62	Impact	61.0	4.9	5	0
Hamilton-6	Duarte	351	64	48	57	63	56	62	Severe	64.0	7.4	0	6
Hamilton-8	Duarte	354	80	38	57	60	56	62	Impact	62.0	5.4	5	0
Hamilton-10	Duarte	357	80	30	57	59	56	62	Impact	61.0	4.6	5	0

1. Noise levels are based on Ldn and are measured in dBA. Noise levels are rounded to the nearest decibel except for the increase in noise level, which is given to the nearest one-tenth decibel to provide a better resolution for assessing noise impact.
2. Predicted levels include a 5dBA penalty applied to audible signal noise, where applicable.
3. The reported noise levels represent the highest noise levels for each location.

The following are brief descriptions of each Category 2 land use area where an impact was calculated:

- San Luis Rey: When the alignment turns south of the I-210 median in Arcadia at station number 140+00, 15 single-family homes south of the alignment are forecasted to be subject to noise impacts. Of these 15 homes, four homes are forecasted to have a severe noise impact. The noise impacts would be due to the proximity of these residences to the LRT tracks (50 to 120 feet) and the speed of the LRT vehicles.
- Cornell: North of the rail alignment at station number 151+00 in Arcadia, five multi-family housing buildings with 22 residences would be exposed to noise impact. The noise impacts would be due to the proximity of these residences to the LRT tracks (90 feet) and the speed of the LRT vehicles.
- 2nd Avenue: North of the rail alignment along 2nd Avenue in Arcadia, one hotel (Springhill Suites) would be exposed to noise impact. The impact at this hotel would be due to the proximity to the near track (80 feet) as well as the speed of the LRT vehicles.
- 3rd Avenue: South of the alignment along 3rd Avenue in Arcadia, six multi-family buildings with 12 residences would be exposed to severe noise impact in this area. The severe noise impacts would be due to the proximity of these residences to the tracks (40 feet) and the speed of the LRT vehicles.
- Contented: South of the alignment on Contented Lane and Encino Avenue in Monrovia, 12 single family homes would be exposed to severe noise impact. The severe noise impacts would be due to the proximity of these residences to the tracks (40 to 50 feet) and the speed of the LRT vehicles.
- Montana / Diamond: Both north and south of the rail alignment along Montana Street and Diamond Street in Monrovia, 21 single-family homes would be exposed to noise impact. Thirty-nine additional single-family homes and 48 multi-family residences would be exposed to severe noise impact. The severe noise impacts would be due to the proximity of these residences to the tracks (30 to 60 feet) and the speed of the LRT vehicles. Some residences near Mayflower Avenue would be exposed to audible warning devices (bells and whistles) at the grade crossing. The homes that would not receive exposure to severe noise impact are all second row homes that are slightly further away to the near tracks (50 to 120 feet) and have shielding provided by first row homes.
- Mayflower: North and south of the rail alignment at Mayflower Avenue in Monrovia, one single-family home and 40 multi-family residences would be exposed to severe noise impact. These homes would be exposed to severe noise impact due to their proximity to the near track (40 to 46 feet), their exposure to audible warning devices (bells and whistles) at the grade crossing as well as the speed of LRT vehicles.
- Genoa: South of the rail alignment at Genoa Street in Monrovia, 20 multi-family residences would be exposed to severe noise impact. These homes would be exposed to severe noise impact due to their proximity to the near track (30 feet) and the speed of LRT vehicles.
- Mountain / Buena Vista: Both north and south of the rail alignment between Mountain Avenue and Buena Vista Street in Duarte, 20 single family homes would be exposed to noise impact. The noise impacts would be due to the proximity of these residences to the tracks (116 to 134 feet) and the speed of the LRT vehicles. Single-family homes near Mountain Avenue would also be exposed to audible warning devices (bells and whistles) at the grade crossing.
- Buena Vista / Duncannon: Both north and south of the rail alignment between Buena Vista Street and Duncannon Avenue in Duarte, five single family homes and 10 multi family residences

would be exposed to noise impact. An additional 21 single-family homes would be exposed to severe noise impact. All of these homes would be exposed to noise impact due to the proximity to the near tracks (64 to 146 feet) and the speed of LRT vehicles.

Similar to the Category 2 analysis, an assessment of noise impact for Category 3 receptors was also conducted for Phase II, Segment 1 LRT Triple Track configuration. This assessment was based on a comparison of the existing ambient noise level with the predicted project noise levels in terms of the peak transit hour Leq. Table 3-11.7 lists the noise impacts for institutional receptors. However, the only Category 3 locations with the potential for noise impact are parks used for sports and other active recreation. Because of their land-use, they are not considered noise sensitive. Therefore, there are no Category 3 noise impacts for Phase II, Segment 1.

TABLE 3-11.7
NOISE IMPACTS FOR CATEGORY 3 LAND USE
PHASE II, SEGMENT 1
TRIPLE TRACK CONFIGURATION

Location	City	Civil Stn	Dist to Near Track (ft)	Speed (mph)	Exist. Noise Level[1]	Project Noise Level[1]			Impact Category	Total Noise Level[1]	Noise Level Increase[1]
						Pred[2]	Impact Criteria				
							Imp	Sev			
There are no Category 3 noise impacts for Phase II, Segment 1.											

Vibration

Table 3-11.8 lists the vibration impacts for Category 2 land use for Phase II, Segment 1 LRT Triple Track Configuration.

TABLE 3-11.8
VIBRATION IMPACTS FOR CATEGORY 2 LAND USE
PHASE II, SEGMENT 1
TRIPLE TRACK CONFIGURATION

Location	City	Civil Stn	Dist to Near Track (ft)	Speed (mph)	Project Vibration Level[1,2]	Vibration Impact Criterion[1]	No. of Res. Impacts
Corta Calle-1	Pasadena	34	240	55	72	72	4
Arboleda-1	Pasadena	37	220	55	73	72	6
Arboleda-2	Pasadena	39	200	55	74	72	5
Foothill-2	Arcadia	54	240	55	72	72	4
Catalapa-1	Arcadia	58	220	55	73	72	4
Foothill-3	Arcadia	58	190	55	74	72	4
Catalapa-2	Arcadia	61	220	55	73	72	4
Foothill-5	Arcadia	64	160	55	75	72	3

TABLE 3-11.8 *continued (page 2 of 4)*
VIBRATION IMPACTS FOR CATEGORY 2 LAND USE
PHASE II, SEGMENT 1
TRIPLE TRACK CONFIGURATION

Location	City	Civil Stn	Dist to Near Track (ft)	Speed (mph)	Project Vibration Level[1,2]	Vibration Impact Criterion[1]	No. of Res. Impacts
Catalapa-3	Arcadia	64	220	55	73	72	5
Foothill-6	Arcadia	68	160	55	75	72	3
Catalapa-4	Arcadia	70	250	55	72	72	6
Foothill-7	Arcadia	71	150	55	75	72	4
Catalapa-5	Arcadia	74	250	55	72	72	2
Foothill-8	Arcadia	74	170	55	75	72	3
Catalapa-6	Arcadia	78	250	55	72	72	1
Foothill-9	Arcadia	78	160	55	75	72	4
Foothill-10	Arcadia	85	160	55	75	72	4
Catalapa-8	Arcadia	87	250	55	72	72	2
Katherine-1	Arcadia	91	210	55	73	72	3
English Oaks-2	Arcadia	97	210	55	73	72	6
Oxford-1	Arcadia	107	240	55	72	72	5
Loma Lisa-1	Arcadia	109	180	55	74	72	4
Oxford-2	Arcadia	111	240	55	72	72	5
San Carlos-1	Arcadia	115	130	55	76	72	2
Oxford-3	Arcadia	115	240	55	72	72	4
San Carlos-2	Arcadia	117	210	55	73	72	2
Colorado-1	Arcadia	117	240	55	72	72	3
Asder-1	Arcadia	121	140	55	76	72	3
Brunnel Oaks-1	Arcadia	123	140	55	76	72	1
Brunnel Oaks-2	Arcadia	123	190	55	74	72	2
Chelsea-1	Arcadia	124	144	55	76	72	4
Chelsea-2	Arcadia	126	140	55	76	72	1
Chelsea-3	Arcadia	126	180	55	74	72	1
Leandra/Mary Oaks-1	Arcadia	127	144	55	76	72	5
Renoake-2	Arcadia	129	170	55	75	72	5
Renoake-1	Arcadia	130	120	55	77	72	2
Oakdale-1	Arcadia	131	190	55	74	72	2
Cyrus-1	Arcadia	132	170	55	75	72	4
Oakhurst-1	Arcadia	133	200	55	74	72	2
Rancho-1	Arcadia	137	240	55	72	72	1

TABLE 3-11.8 *continued (page 3 of 4)*
VIBRATION IMPACTS FOR CATEGORY 2 LAND USE
PHASE II, SEGMENT 1
TRIPLE TRACK CONFIGURATION

Location	City	Civil Stn	Dist to Near Track (ft)	Speed (mph)	Project Vibration Level[1,2]	Vibration Impact Criterion[1]	No. of Res. Impacts
Santa Maria-1	Arcadia	139	170	55	75	72	3
Santa Rosa-1	Arcadia	140	180	55	74	72	1
San Luis Rey-1	Arcadia	141	80	55	80	72	3
San Luis Rey-2	Arcadia	146	90	55	79	72	6
San Luis Rey-3	Arcadia	147	50	55	83	72	4
San Luis Rey-4	Arcadia	149	120	55	77	72	2
Cornell-1	Arcadia	151	96	55	79	72	6
Cornell-4	Arcadia	154	140	55	76	72	12
Cornell-2	Arcadia	155	90	55	79	72	8
Santa Ynez-1	Arcadia	156	140	55	76	72	3
Cornell-5	Arcadia	156	170	55	75	72	8
Cornell-3	Arcadia	156	90	55	79	72	8
Windsor-2	Arcadia	159	220	53	73	72	8
3rd-1	Arcadia	201	40	55	84	72	12
3rd-3	Arcadia	203	130	55	76	72	10
3rd-2	Arcadia	205	80	55	80	72	12
Contented-1	Monrovia	207	40	55	84	72	2
Contented-2	Monrovia	208	100	55	78	72	4
Contented-3	Monrovia	209	50	55	83	72	4
Contented-5	Monrovia	214	100	55	78	72	6
Contented-4	Monrovia	214	40	55	84	72	6
Encino-1	Monrovia	215	160	55	75	72	4
Montana-2	Monrovia	219	150	55	75	72	2
Anita-1	Monrovia	221	28	55	87	72	4
Anita-2	Monrovia	221	100	55	78	72	4
Montana-1	Monrovia	221	30	55	86	72	8
Montana-4	Monrovia	222	100	55	78	72	7
Montana-3	Monrovia	224	30	55	86	72	2
Anita-3	Monrovia	225	48	55	83	72	5
Montana-6	Monrovia	226	140	55	76	72	5
Montana-5	Monrovia	226	60	55	82	72	48
Anita-4	Monrovia	227	198	55	74	72	3

TABLE 3-11.8 *continued (page 4 of 4)*
VIBRATION IMPACTS FOR CATEGORY 2 LAND USE
PHASE II, SEGMENT 1
TRIPLE TRACK CONFIGURATION

Location	City	Civil Stn	Dist to Near Track (ft)	Speed (mph)	Project Vibration Level[1,2]	Vibration Impact Criterion[1]	No. of Res. Impacts
Anita-5	Monrovia	229	100	55	78	72	4
Montana-7	Monrovia	229	156	55	75	72	16
Alamitas-1	Monrovia	230	40	55	84	72	4
Diamond-1	Monrovia	231	22	55	88	72	5
Diamond-2	Monrovia	231	140	55	76	72	6
Alamitas-3	Monrovia	234	130	55	76	72	4
Radford-1	Monrovia	236	44	55	84	72	3
Diamond-5	Monrovia	236	110	55	78	72	5
Diamond-4	Monrovia	236	80	55	80	72	8
Radford-2	Monrovia	237	200	55	74	72	3
Diamond-3	Monrovia	237	40	55	84	72	6
Diamond-7	Monrovia	237	180	55	74	72	8
Mayflower-2	Monrovia	238	90	55	79	72	5
Diamond-6	Monrovia	238	120	55	77	72	8
Mayflower-1	Monrovia	240	30	55	86	72	2
Alamitas-2	Monrovia	240	54	55	82	72	4
Mayflower-3	Monrovia	240	120	55	77	72	4
Mayflower-6	Monrovia	241	40	55	84	72	1
Mayflower-5	Monrovia	246	160	55	75	72	16
Mayflower-4	Monrovia	246	46	55	83	72	40
Genoa-2	Monrovia	250	80	55	80	72	4
Genoa-4	Monrovia	250	150	55	75	72	6
Genoa-3	Monrovia	250	120	55	77	72	16
Genoa-1	Monrovia	250	30	55	86	72	20
Magnolia-1	Monrovia	252	240	43	72	72	1
Hamilton-5	Duarte	347	90	55	74	72	5
Hamilton-6	Duarte	351	44	48	84	72	6
Hamilton-8	Duarte	354	60	38	77	72	5
Hamilton-10	Duarte	357	60	30	76	72	5

1. Vibration levels are measured in VdB referenced to 1 µin/sec.
2. The reported vibration level represents the maximum vibration level for each location.

The following are brief descriptions of each Category 2 land use area where an impact is forecasted:

- Arboleda / Corte Calle: Both north and south of the rail alignment between station numbers 34+00 and 41+00 in Pomona, 15 single-family homes would be exposed to vibration impact. These homes are located approximately 200 to 240 feet away from the near track. This vibration impact would be due to the proximity of the homes to the near track, the speed of the LRT vehicles as well as the efficient vibration propagation characteristics of the ground in this area.
- Foothill / Catalapa: Both north and south of the rail alignment between station numbers 52+00 and 161+00 in Arcadia, 152 single-family homes and 40 multi-family residences would be exposed to vibration impact. These homes are located 50 to 250 feet away from the near track. This vibration impact would be due to the proximity of the homes to the near track, the speed of the LRT vehicles as well as the efficient vibration propagation characteristics of the ground in this area.
- 2nd Avenue: North of the rail alignment at station number 185+00, two hotels would be exposed to vibration impact. The Hilton Hotel and the Springhill Suites Hotel are located 210 and 80 feet away from the near track, respectively. These hotels would be exposed to vibration impact due to the proximity to the near track, the speed of the LRT vehicles as well as the efficient vibration propagation characteristics of the ground in this area.
- 3rd Avenue: South of the rail alignment just east of the Rancho High School in Arcadia, 34 multi-family residences would be exposed to vibration impact. This vibration impact would be due to the proximity of the homes to the near track (40 to 130 feet), the speed of the LRT vehicles as well as the efficient vibration propagation characteristics of the ground in this area.
- Contented / Genoa: Both north and south of the rail alignment between 5th Avenue and Genoa Street in Monrovia, 313 residences would be exposed to vibration impact. These include 182 multi-family residences and 131 single-family homes. This vibration impact would be due to the proximity of the homes to the near track (22 to 240 feet), the speed of the LRT vehicles as well as the efficient vibration propagation characteristics of the ground in this area.
- Hamilton: North of the rail alignment east of Buena Vista Street in Duarte, 21 single-family homes would be exposed to noise impact. These homes are all first-row homes located 44 to 90 feet away from the near track. This vibration impact would be due to the proximity of the homes to the near track, the speed of the LRT vehicles as well as the efficient vibration propagation characteristics of the ground in this area.

Similar to the Category 2 analysis, an assessment of vibration impact for Category 3 receptors was also conducted for Phase II, Segment 1 LRT Triple Track configuration. **Table 3-11.9** lists the vibration impacts for Category 3 land use for Phase II, Segment 1 LRT Triple Track configuration.

TABLE 3-11.9
VIBRATION IMPACTS FOR CATEGORY 3 LAND USE
PHASE II, SEGMENT 1
TRIPLE TRACK CONFIGURATION

Location	City	Civil Stn	Dist to Near Track (ft)	Speed (mph)	Project Vibration Level[1,2]	Vibration Impact Criterion[1]	# of Impacts
3rd-Avenue	Arcadia	198	70	55	81	75	1

1. Vibration levels are measured in VdB referenced to 1 µin/sec.
2. The reported vibration level represents the maximum vibration level for each location.

Source: Harris, Miller, Miller & Hanson 2003

The following are brief descriptions of each impacted Category 3 land use area:

- 3rd Avenue: South of the rail alignment at station number 198+00 Rancho High School in Arcadia would be exposed to vibration impact. This vibration impact would be due to the proximity to the near track (70 feet), the speed of the LRT vehicles as well as the efficient vibration propagation characteristics of the ground in this area.

Phase II, Segment 2 — The Cities Affected and the Effects

Noise

Table 3-11.10 lists the noise impacts for Category 2 land use for Phase II, Segment 2 LRT Triple Track configuration. Written descriptions of the locations where impacts are forecasted follow the table.

TABLE 3-11.10
NOISE IMPACTS FOR CATEGORY 2 LAND USE
PHASE II, SEGMENT 2
TRIPLE TRACK CONFIGURATON

Location	City	Civil Stn	Dist to Near Track (ft)	Speed (mph)	Exist. Noise Level[1]	Project Noise Level[1]			Impact Category	Total Noise Level[1,3]	Noise Level Increase[1,3]	# of Res Impacts	
						Pred[2,3]	Impact Criteria					Imp	Sev
							Imp	Sev					
6th-1	Azusa	524	140	55	65	60	60	66	Impact	66	1.4	5	0
6th-3	Azusa	528	90	55	65	61	60	66	Impact	66	1.6	2	0
6th-4	Azusa	533	70	55	65	63	60	66	Impact	67	2.3	4	0
Foothill-1	Azusa	543	80	55	65	62	60	66	Impact	67	1.9	20	0
Foothill-2	Azusa	546	80	55	65	62	60	66	Impact	66	1.9	5	0
Foothill-6	Azusa	550	94	55	65	62	60	66	Impact	67	1.9	4	0
Foothill-8	Azusa	551	124	55	65	60	60	66	Impact	66	1.4	2	0
San Gabriel-1	Azusa	551	20	40	65	67	60	66	Severe	69	4.7	0	1
San Gabriel-6	Azusa	552	70	38	65	63	60	66	Impact	67	2.1	16	0
Soldano-1	Azusa	572	70	45	65	64	60	66	Impact	67	2.8	4	0
Pasadena-1	Azusa	574	60	50	65	71	60	66	Severe	72	7.4	0	18
Pasadena-7	Azusa	578	40	55	65	66	60	66	Severe	68	3.8	0	24
9th-1 (EST FUTURE)	Azusa	580	76	55	65	61	60	66	Impact	66	1.5	15	0
9th-2 (EST FUTURE)	Azusa	583	80	55	65	60	60	66	Impact	66	1.4	15	0
9th-3 (EST FUTURE)	Azusa	586	80	55	65	60	60	66	Impact	66	1.4	15	0
9th-4 (EST FUTURE)	Azusa	590	80	55	65	60	60	66	Impact	66	1.4	15	0
9th-5 (EST FUTURE)	Azusa	593	80	55	65	60	60	66	Impact	66	1.4	15	0
9th-7 (EST FUTURE)	Azusa	599	80	40	65	63	60	66	Impact	67	2.1	12	0
Palm-1	Azusa	602	100	55	65	64	60	66	Impact	67	2.5	12	0
9th-8 (EST FUTURE)	Azusa	603	80	30	65	61	60	66	Impact	66	1.4	12	0
9th-11 (EST FUTURE)	Glendora	614	60	55	55	62	55	61	Severe	63	7.4	0	15
Amber Oaks-1	Glendora	616	64	35	55	64	55	61	Severe	64	8.9	0	16
9th-12 (EST FUTURE)	Glendora	619	60	55	55	63	55	61	Severe	63	8.0	0	15
Meadow Oaks-1	Glendora	620	82	48	55	63	55	61	Severe	63	8.0	0	12
9th-13 (EST FUTURE)	Glendora	623	60	55	55	63	55	61	Severe	64	8.5	0	15
Ranger-1	Glendora	623	70	53	55	64	55	61	Severe	64	8.8	0	3

TABLE 3-11.10 *continued (page 2 of 6)*
NOISE IMPACTS FOR CATEGORY 2 LAND USE
PHASE II, SEGMENT 2
TRIPLE TRACK CONFIGURATON

Location	City	Civil Stn	Dist to Near Track (ft)	Speed (mph)	Exist. Noise Level[1]	Project Noise Level[1]			Impact Category	Total Noise Level[1,3]	Noise Level Increase[1,3]	# of Res Impacts	
						Pred[2,3]	Impact Criteria					Imp	Sev
							Imp	Sev					
Carera-1	Glendora	626	90	55	55	61	55	61	Severe	62	6.9	0	3
9th-14 (EST FUTURE)	Glendora	627	60	55	55	63	55	61	Severe	64	8.5	0	15
Carera-2	Glendora	628	90	55	55	61	55	61	Severe	62	6.9	0	4
9th-15 (EST FUTURE)	Glendora	631	60	55	55	63	55	61	Severe	64	8.5	0	15
Oakbank-1	Glendora	631	76	55	55	63	55	61	Severe	63	8.1	0	2
Ashworth-3	Glendora	633	170	55	55	56	55	61	Impact	59	3.2	8	0
9th-16 (EST FUTURE)	Glendora	634	60	55	55	64	55	61	Severe	65	9.3	0	12
Ashworth-1	Glendora	634	80	55	55	64	55	61	Severe	64	8.9	0	5
Ashworth-2	Glendora	636	130	55	55	58	55	61	Impact	60	4.8	2	0
Barranca-1	Glendora	638	144	55	55	59	55	61	Impact	61	5.3	2	0
Marcile-2	Glendora	640	130	55	55	59	55	61	Impact	61	5.6	5	0
Marcile-1	Glendora	641	80	55	55	73	55	61	Severe	73	17.9	0	4
Lowell-1	Glendora	644	80	55	55	62	55	61	Severe	63	7.6	0	6
Vermont-3	Glendora	688	124	50	58	60	57	62	Impact	62	3.7	4	0
Glendora-1	Glendora	701	110	55	55	60	55	61	Impact	61	5.6	4	0
Lemon-1	Glendora	703	40	55	55	65	55	61	Severe	65	9.8	0	3
Lemon-2	Glendora	706	50	55	55	64	55	61	Severe	64	9.0	0	12
Lemon-4	Glendora	708	130	55	55	56	55	61	Impact	59	3.2	4	0
Pasadena-1	Glendora	710	20	55	55	75	55	61	Severe	75	19.6	0	2
Pasadena-2	Glendora	710	80	55	55	61	55	61	Impact	62	6.4	2	0
Pasadena-4	Glendora	713	20	55	55	69	55	61	Severe	69	14.0	0	4
Pasadena-5	Glendora	713	100	55	55	58	55	61	Impact	60	4.6	7	0
Lemon-5	Glendora	716	40	55	55	65	55	61	Severe	66	10.3	0	8
Alosta-1	Glendora	721	86	55	55	62	55	61	Severe	63	7.3	0	1
Alosta-4	Glendora	725	116	55	55	60	55	61	Impact	61	5.6	0	0
Lemon-8	Glendora	726	44	55	55	65	55	61	Severe	65	9.8	0	7

TABLE 3-11.10 *continued (page 3 of 6)*
NOISE IMPACTS FOR CATEGORY 2 LAND USE
PHASE II, SEGMENT 2
TRIPLE TRACK CONFIGURATON

Location	City	Civil Stn	Dist to Near Track (ft)	Speed (mph)	Exist. Noise Level[1]	Project Noise Level[1]			Impact Category	Total Noise Level[1,3]	Noise Level Increase[1,3]	# of Res Impacts	
						Pred[2,3]	Impact Criteria					Imp	Sev
							Imp	Sev					
Lemon-10	Glendora	727	164	55	55	56	55	61	Impact	59	3.5	3	0
Lemon-11	Glendora	729	48	55	55	64	55	61	Severe	65	9.4	0	2
Lemon-14	Glendora	732	44	55	55	64	55	61	Severe	65	9.2	0	7
Glenwood-1	Glendora	734	54	55	55	65	55	61	Severe	65	9.7	0	4
Glenwood-3	Glendora	737	74	55	55	64	55	61	Severe	65	9.3	0	4
Elwood-1	Glendora	741	44	55	55	66	55	61	Severe	66	10.6	0	3
Lemon-15	Glendora	746	40	55	55	63	55	61	Severe	63	8.1	0	6
Lemon-16	Glendora	752	30	55	55	73	55	61	Severe	73	17.5	0	6
Lemon-18	Glendora	755	40	55	55	66	55	61	Severe	67	11.1	0	7
Lemon-19	Glendora	757	40	55	55	60	55	61	Impact	61	5.6	7	0
Alosta-8	Glendora	760	180	55	55	56	55	61	Impact	59	3.4	2	0
Lemon-20	Glendora	761	180	55	55	63	55	61	Severe	64	8.1	0	7
Alosta-7	Glendora	762	110	55	55	60	55	61	Impact	61	5.7	2	0
St. Vladimir-1	Glendora	768	40	55	55	66	55	61	Severe	66	10.5	0	6
Alosta-10	Glendora	769	120	55	55	59	55	61	Impact	61	5.2	2	0
Alosta-12	Glendora	770	130	55	55	59	55	61	Impact	60	4.9	0	0
St. Vladimir-2	Glendora	775	76	55	55	61	55	61	Severe	62	7.0	0	6
Compromise Line-1	Glendora	778	20	55	55	68	55	61	Severe	68	12.8	0	4
Compromise Line-3	Glendora	780	20	55	55	67	55	61	Severe	67	11.8	0	4
Compromise Line-5	Glendora	784	50	55	55	64	55	61	Severe	64	8.9	0	5
Alosta-13	Glendora	789	140	55	60	58	57	63	Impact	62	2.1	3	0
Elkhorn-1	Glendora	794	124	55	60	59	57	63	Impact	62	2.5	1	0
Remuda-2	Glendora	796	90	55	60	60	57	63	Impact	63	3.3	2	0
Remuda-3	Glendora	797	40	55	60	65	57	63	Severe	66	6.7	0	7
Remuda-4	Glendora	803	40	55	60	65	57	63	Severe	66	6.7	0	8
Remuda-5	Glendora	807	40	55	60	65	57	63	Severe	66	6.7	0	4

TABLE 3-11.10 *continued (page 4 of 6)*
NOISE IMPACTS FOR CATEGORY 2 LAND USE
PHASE II, SEGMENT 2
TRIPLE TRACK CONFIGURATON

Location	City	Civil Stn	Dist to Near Track (ft)	Speed (mph)	Exist. Noise Level[1]	Project Noise Level[1]			Impact Category	Total Noise Level[1,3]	Noise Level Increase[1,3]	# of Res Impacts	
						Pred[2,3]	Impact Criteria					Imp	Sev
							Imp	Sev					
Canyon Meadows-1	Glendora	810	110	55	60	59	57	63	Impact	62	2.8	2	0
Remuda-10	Glendora	811	44	55	60	66	57	63	Severe	67	7.0	0	3
Remuda-11	Glendora	813	40	55	60	66	57	63	Severe	67	7.1	0	3
Gladstone-1	Glendora	848	84	55	60	63	57	63	Severe	65	5.2	0	1
Gladstone-2	Glendora	848	120	55	60	58	57	63	Impact	62	2.2	1	0
Gladstone-1	San Dimas	850	96	55	60	66	57	63	Severe	67	7.1	0	4
Gladstone-2	San Dimas	851	164	55	60	59	57	63	Impact	62	2.7	4	0
Gladstone-3	San Dimas	852	60	55	60	64	57	63	Severe	65	5.6	0	4
Perlanna-1	San Dimas	863	50	55	60	64	57	63	Severe	66	6.0	0	3
Highland-1	San Dimas	866	50	55	60	64	57	63	Severe	65	5.5	0	2
Village-1	San Dimas	869	140	55	60	58	57	63	Impact	62	2.3	0	0
Oakway-1	San Dimas	872	130	55	60	58	57	63	Impact	62	2.2	32	0
Eucla-2	San Dimas	884	160	55	60	58	57	63	Impact	62	2.1	0	0
Eucla-3	San Dimas	888	100	55	60	63	57	63	Severe	65	5.2	0	0
Walnut-1	San Dimas	922	60	55	65	63	61	66	Impact	67	1.9	32	0
Walnut-3	San Dimas	927	90	55	65	62	61	66	Impact	67	1.7	32	0
1st-1	La Verne	1002	60	55	65	63	61	66	Impact	67	2.0	5	0
1st-3	La Verne	1004	40	55	65	64	61	66	Impact	68	2.5	5	0
1st-5	La Verne	1006	36	55	65	64	61	66	Impact	68	2.7	5	0
1st-6	La Verne	1008	50	55	65	65	61	66	Impact	68	3.0	5	0
1st-9	La Verne	1013	56	55	65	63	61	66	Impact	67	2.2	5	0
1st-10	La Verne	1016	50	55	65	63	61	66	Impact	67	2.1	5	0
ULV-7	La Verne	1034	80	30	65	61	61	66	Impact	66	1.5	24	0
White-1	La Verne	1050	70	55	62	62	59	64	Impact	65	2.9	3	0
Sierra-12	La Verne	1075	140	55	62	60	59	64	Impact	64	2.1	4	0
Bonita-1	Pomona	1145	110	55	62	58	58	64	Impact	64	1.6	24	0

TABLE 3-11.10 *continued (page 5 of 6)*
NOISE IMPACTS FOR CATEGORY 2 LAND USE
PHASE II, SEGMENT 2
TRIPLE TRACK CONFIGURATON

Location	City	Civil Stn	Dist to Near Track (ft)	Speed (mph)	Exist. Noise Level[1]	Project Noise Level[1]			Impact Category	Total Noise Level[1,3]	Noise Level Increase[1,3]	# of Res Impacts	
						Pred[2,3]	Impact Criteria					Imp	Sev
							Imp	Sev					
Bonita-3	Claremont	1150	90	55	62	60	58	64	Impact	64	2.0	16	0
Magnolia-2	Claremont	1155	140	55	62	59	58	64	Impact	64	1.7	16	0
Bonita-5	Claremont	1157	100	55	62	59	58	64	Impact	64	1.8	16	0
Bonita-6	Claremont	1163	40	55	62	68	58	64	Severe	69	7.3	0	8
Bonita-8	Claremont	1165	100	55	62	62	58	64	Impact	65	2.9	20	0
Bonita-11 (EST FUTURE)	Claremont	1169	60	55	62	63	58	64	Impact	66	3.9	16	0
Bonita-14 (EST FUTURE)	Claremont	1173	60	55	62	63	58	64	Impact	66	3.9	16	0
Bonita-15 (EST FUTURE)	Claremont	1177	60	55	62	63	58	64	Impact	66	3.9	32	0
Bonita-16 (EST FUTURE)	Claremont	1179	60	50	62	63	58	64	Impact	66	3.6	24	0
*Claremont-1	Claremont	1228	100	55	63	60	59	64	Impact	65	1.9	3	0
*Claremont-11	Claremont	1231	80	55	63	63	59	64	Impact	66	3.1	2	0
*Claremont-4	Claremont	1231	100	55	63	63	59	64	Impact	66	3.2	4	0
*Claremont-12	Montclair	1235	70	55	63	64	59	64	Impact	66	3.6	4	0
*Claremont-7	Montclair	1235	90	55	63	62	59	64	Impact	65	2.7	5	0
*Claremont-13	Montclair	1238	80	55	63	62	59	64	Impact	65	2.5	2	0
*Claremont-9	Montclair	1239	90	55	63	61	59	64	Impact	65	2.2	5	0
*Monte Vista-2 (EST FUTURE)	Montclair	1259	80	20	63	63	59	64	Impact	66	3.1	5	0
*Monte Vista-3 (EST FUTURE)	Montclair	1263	80	28	63	65	59	64	Severe	67	4.2	0	5
*Monte Vista-4 (EST FUTURE)	Montclair	1265	80	50	63	69	59	64	Severe	70	7.5	0	5
**Claremont-1	Claremont	1230	80	55	65	63	60	66	Impact	67	2.4	8	0
**Claremont-3	Claremont	1232	60	55	65	64	60	66	Impact	67	2.7	2	0

TABLE 3-11.10 *continued (page 6 of 6)*
NOISE IMPACTS FOR CATEGORY 2 LAND USE
PHASE II, SEGMENT 2
TRIPLE TRACK CONFIGURATON

Location	City	Civil Stn	Dist to Near Track (ft)	Speed (mph)	Exist. Noise Level[1]	Project Noise Level[1]			Impact Category	Total Noise Level[1,3]	Noise Level Increase[1,3]	# of Res Impacts	
						Pred[2,3]	Impact Criteria					Imp	Sev
							Imp	Sev					

1. Noise levels are based on Ldn and are measured in dBA. Noise levels are rounded to the nearest decibel except for the increase in noise level, which is given to the nearest one-tenth decibel to provide a better resolution for assessing noise impact.
2. Predicted levels include a 5dBA penalty applied to audible signal noise, where applicable.
3. The reported noise levels represent the highest noise levels for each location.

* These noise-sensitive locations only apply to the Baseline Alternative (north of the Montclair Station Park and Ride).
** These noise-sensitive locations only apply to the Option G Alternative (south of the Montclair Station Park and Ride).

Source: Harris, Miller, Miller & Hanson, 2003.

The following are brief descriptions of each Category 2 land use area where a noise impact was calculated:

- 6th / Lime: On the south side of the rail alignment between Virginia Avenue and Foothill Boulevard in Azusa, 11 single-family homes would be exposed to noise impact. The noise impacts would be due to the proximity of these residences to the tracks (70 to 140 feet) and the speed of the LRT vehicles. Single-family homes near Virginia Avenue would also be exposed to audible warning devices (bells and whistles) at the grade crossing.
- Foothill / San Gabriel: On the south side of the rail alignment between Foothill Boulevard and San Gabriel Avenue in Azusa, 20 multi-family residences and two single family homes would be exposed to noise impact. An additional 9 single-family homes would be exposed to severe noise impact in this area. The noise impacts would be due to the proximity of these residences to the tracks (80 to 124 feet) and the speed of the LRT vehicles. Single-family homes near Gabriel Avenue would also be exposed to audible warning devices (bells and whistles) at the grade crossing.
- San Gabriel: North of the rail alignment just west of San Gabriel Avenue, one single-family home and 16 multi-family residences would be exposed to noise impact. The one single-family home would be exposed to severe noise impact. The noise impacts would be due to the proximity of these residences to the tracks (20 to 70 feet), the speed of the LRT vehicles and exposure to audible warning devices (bells and whistles) at the grade crossing.
- Dalton / Pasadena: South of the rail alignment between Dalton Avenue and Pasadena Avenue in Azusa, four single-family homes would be exposed to noise impact. The noise impacts would be due to the proximity of these residences to the tracks (70 feet), the speed of the LRT vehicles and exposure to audible warning devices (bells and whistles) at Pasadena Avenue grade crossing.
- Pasadena / Palm: North and south of the rail alignment between Pasadena Avenue and Palm Drive in Azusa, 87 future multi-family residences are expected to be exposed to noise impact. These residences are expected to be constructed on the north side of the rail alignment between station numbers 578+00 and 602+00. They are modeled after the existing multi-family residences just to the west of these future homes that have three residences per building and are located 40 feet from the near track. Twenty-four additional multi-family residences located south of the alignment just east of Pasadena Avenue would be exposed severe noise impact. The noise impacts would be due to the proximity of these residences to the tracks (40 to 80 feet), the speed of the LRT vehicles. The residences near Pasadena Avenue and Palm Drive also would be exposed to audible warning devices (bells and whistles) at the grade crossings.
- Palm: North and south of the rail alignment just east of Palm Drive in Azusa, 24 multi-family residences would be exposed to noise impact. Twelve of these residences north of the alignment are expected to be constructed in the future as part of a planned development. Residences just east of these homes where an impact is predicted near Azusa Station are not exposed to noise impact due to decreased train speeds in this area near the station. The noise impacts would be due to the proximity of these residences to the tracks (80 to 100 feet), the speed of the LRT vehicles, and exposure to audible warning devices (bells and whistles) at the grade crossing.
- Barranca: North and south of the rail alignment east of the Azusa Station to Barranca Avenue in Glendora, 115 multi-family residences would be exposed to severe noise impact. Eighty-seven of these residences are located north of the alignment along an expected future housing development. These future residences are modeled after the existing multi-family residences at 575+00 that have three residences per building and are located 40 feet from the near track. Twenty-nine single-family homes would also be exposed to noise impact in this area, 17 of which

would be exposed to severe noise impact. The noise impacts would be due to the proximity of these residences to the tracks (60 to 140 feet), the speed of the LRT vehicles, and exposure to audible warning devices (bells and whistles) at the Barranca Avenue grade crossing.

- Marcile: Just east of Barranca Avenue south of the alignment in Glendora, five single-family homes would be exposed to noise impact and an additional 10 single-family homes would be exposed to severe noise impact. The noise impacts would be due to the proximity of these residences to the tracks (80 to 130 feet) and the speed of the LRT vehicles.
- Vermont: Just west of Vermont Avenue south of the rail alignment in Glendora, four single-family homes would be exposed to noise impact. The noise impacts would be due to the proximity of these residences to the tracks (80 feet), the speed of the LRT vehicles, and exposure to audible warning devices (bells and whistles) at the Vermont Avenue grade crossing.
- Glendora: North of the rail alignment between Glendora Avenue and Pasadena Avenue in Glendora, six single–family homes would be exposed to noise impact and five single-family homes would be exposed to severe noise impact. Four multi-family residences would be exposed to noise impact and 12 multi-family residences would be exposed to severe noise impact. The noise impacts would be due to the proximity of these residences to the tracks (20 to 100 feet), the speed of the LRT vehicles, and exposure to audible warning devices (bells and whistles) at both the Glendora Avenue and Pasadena Avenue grade crossings.
- Lemon: North of the rail alignment between Pasadena Avenue and Glenwood Avenue in Glendora, 10 single-family homes would be exposed to noise impact and 28 homes are exposed to severe noise impact. Impact extends along the entire first-row set of homes in this area. South of the rail alignment at station number 721+00, one single-family home would be exposed to severe noise impact and at 725+00 the Guest Inn Hotel would be exposed to noise impact. The noise impacts would be due to the proximity of these residences to the tracks (20 to 164 feet) and the speed of the LRT vehicles. Homes near Pasadena Avenue and Glenwood Avenue also would be exposed to audible warning devices (bells and whistles) at the grade crossings.
- Glenwood: North of the rail alignment between Glenwood Avenue and Elwood Avenue in Glendora, eight single-family homes would be exposed to severe noise impact. The noise impacts would be due to the proximity of these residences to the tracks (54 to 74 feet), the speed of the LRT vehicles, and exposure to audible warning devices (bells and whistles) at both the grade crossings.
- Elwood: North of the rail alignment between Elwood Avenue and Loraine Avenue in Glendora, 15 single-family homes in the first row would be exposed to severe noise impact. The severe noise impacts would be due to the proximity of these residences to the tracks (30 to 44 feet), the speed of the LRT vehicles, and exposure to audible warning devices (bells and whistles) at both the grade crossings.
- Loraine: North and south of the rail alignment between Lorraine Avenue and the Alosta Avenue overpass in Glendora, 13 single-family homes would be exposed to noise impact and an additional 39 homes would be exposed to severe noise impact. One hotel on the south side of the alignment at station number 770+00 also would be exposed to noise impact. The noise impacts would be due to the proximity of these residences to the tracks (20 to 180 feet) and the speed of the LRT vehicles. Some homes near Loraine Avenue would be exposed to audible warning devices (bells and whistles) at the grade crossing.
- Alosta: South of the rail alignment just east of Alosta Avenue in Glendora, four single-family homes would be exposed to noise impact. The noise impacts would be due to the proximity of these residences to the tracks (124 to 140 feet) and the speed of the LRT vehicles.

- Remuda: North of the rail alignment between station numbers 795+00 and 815+00 in Glendora, two single-family homes would be exposed to noise impact and 25 single-family homes would be exposed to severe noise impact. The noise impacts would be due to the proximity of these residences to the tracks (40 to 90 feet) and the speed of the LRT vehicles.
- Canyon Meadows: South of the rail alignment at station number 810+00 on Canyon Meadows Lane in Glendora, two single-family homes would be exposed to noise impact. The noise impacts would be due to the proximity of these residences to the tracks (110 feet) and the speed of the LRT vehicles.
- Gladstone (west): At station number 848+00 just west of Gladstone Avenue in Glendora, one single-family home would be exposed to noise impact and one single-family home would be exposed to severe noise impact. The noise impacts would be due to the proximity of these residences to the tracks (84 to 120 feet), the speed of the LRT vehicles, and audible warning devices (bells and whistles) at the Gladstone Avenue grade crossing.
- Gladstone (east): Just east of Gladstone Avenue in San Dimas north and south of the rail alignment, four multi-family residences would be exposed to noise impact and eight multi-family housing units would be exposed to severe noise impact. The noise impacts would be due to the proximity of these residences to the tracks (60 to 164 feet), the speed of the LRT vehicles, and audible warning devices (bells and whistles) at the Gladstone Avenue grade crossing.
- Highland: Just east of the Route 57 overpass on the north and south sides of the rail alignment in San Dimas, five single-family homes would be exposed to severe noise impact and 32 multi-family residences in four buildings would be exposed to noise impact. The Red Roof Inn on the south side of the alignment at station number 870+00 would be exposed to noise impact. The noise impacts would be due to the proximity of these residences to the tracks (50 to 140 feet) and the speed of the LRT vehicles.
- Eucla: South of the rail alignment west of Eucla Avenue in San Dimas, the Extended Stay American Hotel would be exposed to noise impact and the Comfort Suites Hotel would be exposed to severe noise impact. The noise impacts would be due to the proximity of these hotels to the tracks (100 to 160 feet) and the speed of the LRT vehicles. The Comfort Suites Hotel would be exposed to audible warning devices (bells and whistles) at the Eucla Avenue grade crossing.
- Walnut: North of the rail alignment between San Dimas Avenue and Walnut Avenue in San Dimas, 64 multi-family residences would be exposed to noise impact. The noise impacts would be due to the proximity of these residences to the tracks (60 to 90 feet) and the speed of the LRT vehicles. The residences near Walnut Avenue also would be exposed to audible warning devices (bells and whistles) at the grade crossing.
- Wheeler: North of the rail alignment between Wheeler Avenue and B Street in La Verne, 30 single-family homes would be exposed to noise impact. The noise impacts would be due to the proximity of these residences to the tracks (36 to 60 feet) and the speed of the LRT vehicles. The residences near Wheeler Avenue, A Street, and B Street also would be exposed to audible warning devices (bells and whistles) at the grade crossings.
- University of La Verne: North of the rail alignment just west of Fairplex Drive in La Verne, 24 dormitories in two buildings would be exposed to noise impact. The noise impacts would be due to the proximity of these dormitories to the tracks (80 feet), the speed of the LRT vehicles, and exposure to audible warning devices (bells and whistles) at the grade crossing.
- White: Just west of White Avenue on the north side of the rail alignment in La Verne, three single-family homes would be exposed to noise impact. Impacts at these homes would be due to

the proximity to the near tracks (70 feet), the speed of the LRT vehicles, and audible warning signals (bells and whistles) at the grade crossing.

- Sierra: South of the rail alignment west of Fulton Road in La Verne, four single-family homes would be exposed to noise impact. The noise impacts would be due to the proximity of these residences to the tracks (140 feet), the speed of the LRT vehicles, and exposure to audible warning devices (bells and whistles) at the Fulton Road grade crossing.
- Bonita: North of the rail alignment at station number 1147+00 in Pomona, 24 multi-family residences in three buildings would be exposed to noise impact. The noise impacts would be due to the proximity of these residences to the tracks and the speed of the LRT vehicles.
- Cambridge: North and south of the rail alignment between station number 1149+00 and Cambridge Avenue in Claremont, 48 multi-family residences would be exposed to noise impact and eight multi-family residences would be exposed to severe noise impact. The noise impacts would be due to the proximity of these residences to the tracks (90 to 140 feet) and the speed of the LRT vehicles. The eight multi-family residences with severe noise impact also would be exposed to audible warning devices (bells and whistles) at the Cambridge Avenue grade crossing.
- Cambridge / Bucknell: North of the rail alignment between Cambridge Avenue and Bucknell Avenue in Claremont, 108 multi-family residences would be expected to be exposed to noise impact. Eighty-eight of the 108 multi-family residences would be expected to be constructed in a new housing development in this area. The future residences are modeled similar to the existing multi-family housing that has 20 residences in three buildings. The noise impacts would be due to the proximity of these residences to the tracks (60 to 100 feet) and the speed of the LRT vehicles. The existing residences near Cambridge Avenue also would be exposed to audible warning devices (bells and whistles) at the grade crossing.
- Claremont (west, Baseline): North and south of the rail alignment just west of Claremont Boulevard in Claremont, nine single-family homes would be exposed to noise impact under the Baseline Option of the Triple Track configuration. This option has the LRT rail lines continuing to the north side of the Montclair TransCenter. These nine homes would be exposed to noise impact due to the relocation of the rail lines in this area. These homes also would be exposed to audible warning devices (bells and whistles) at the Claremont Boulevard grade crossing.
- Claremont (east, Baseline): North and south of the rail alignment just east of Claremont Boulevard in Montclair, 16 single-family homes would be exposed to noise impact under the Baseline Option of the Triple Track configuration. This option has the LRT rail lines continuing to the north of the Montclair TransCenter. These nine homes would be exposed to noise impact due to the relocation of the rail lines in this area. Homes near Claremont Boulevard also would be exposed to audible warning devices (bells and whistles) at the grade crossing.
- Monte Vista (Baseline): East of Monte Vista Avenue on the north side of the rail alignment between station numbers 1257+00 and 1268+00 in Montclair, five future single-family homes would be expected to be exposed to noise impact. These homes are planned as a future housing development in the area. The impact of these homes would be due to the location of the near rail lines in this area (80 feet) and the presence of crossovers near the Montclair LRT Station (North). These future single-family homes are modeled after the location of existing single-family homes just east of Claremont Boulevard.
- Claremont (Option H): Just east of Claremont Boulevard on the north and south sides of the rail alignment in Montclair, 10 single-family homes would be exposed to noise impact under Option H of the Triple Track configuration. Option H would extend LRT service along the existing Metrolink line to an LRT station in the south side of the Montclair TransCenter. These 10 homes

would be exposed to noise impact due to the proximity to the tracks (60 to 80 feet), the speeds of the LRT vehicles, and exposure to audible warning devices (bells and whistles) at the Claremont Boulevard grade crossing.

Similar to the Category 2 analysis, an assessment of noise impact for Category 3 receptors was also conducted for Phase II, Segment 2 LRT Triple Track configuration. Although Category 3 includes park lands, since they are all used for sports and other active recreation, they would not be considered as noise-sensitive and are not included in the evaluation. This assessment was based on a comparison of the existing ambient noise level with the predicted project noise levels in terms of the peak transit hour Leq. **Table 3-11.11** lists the noise impacts for institutional receptors.

TABLE 3-11.11
NOISE IMPACTS FOR CATEGORY 3 LAND USE
PHASE II, SEGMENT 2
TRIPLE TRACK CONFIGURATION

Location	City	Civil Stn	Dist to Near Track (ft)	Speed (mph)	Exist. Noise Level[1]	Project Noise Level[1]			Impact Category	Total Noise Level[1]	Noise Level Increase[1]
						Pred[2]	Impact Criteria				
							Imp	Sev			
Alameda-1	Azusa	563	80	23	49	59	58	64	Impact	59	11.0
Pasadena-8 (Baseball)	Azusa	584	102	55	49	61	58	64	Impact	61	12.7
Palm-0	Azusa	599	120	55	51	61	59	65	Impact	61	9.6
Grande-1	Glendora	671	44	55	51	65	58	65	Severe	65	14.6
Foothill-1	Glendora	673	64	55	51	65	58	65	Severe	65	14.4
Foothill-2	Glendora	675	64	55	51	64	58	65	Impact	64	13.7
Foothill-3	Glendora	678	76	55	51	63	58	65	Impact	63	12.1
Pasadena-6 (Future)	Glendora	709	90	55	52	62	59	65	Impact	63	10.4
Pasadena-7 (Future)	Glendora	711	80	55	52	64	59	65	Impact	64	11.5
ULV-2	La Verne	1025	70	53	57	61	61	67	Impact	62	5.4
ULV-4	La Verne	1030	20	40	57	66	61	67	Impact	67	9.7

1. Noise levels are based on Ldn and are measured in dBA. Noise levels are rounded to the nearest decibel except for the increase in noise level, which is given to the nearest one-tenth decibel to provide a better resolution for assessing noise impact.
2. Predicted levels include a 5dBA penalty applied to audible signal noise, where applicable.

Source: Harris, Miller, Miller & Hanson, 2003

The following are brief descriptions of each Category 3 land use area where impact was calculated:

- Alameda: South of the rail alignment between Alameda Avenue and Dalton Avenue in Azusa, the Azusa Historical Museum would be exposed to noise impact. This museum would be subject to impacts due to its proximity to the rail lines (80 feet), the speed of the LRT vehicles, and the exposure to audible warning signals (bells and whistles) at the Dalton Avenue grade crossing.
- Pasadena: South of the rail alignment west of Palm Drive in Azusa, one school building at Azusa Pacific University would be exposed to noise impact. This school would be subject to impact due to its proximity to the rail lines (102 to 120 feet), the speed of the LRT vehicles, and the exposure to audible warning signals (bells and whistles) at the Palm Drive grade crossing.

- Foothill / Vermont: Between Foothill Boulevard and Vermont Avenue on the north and south sides of the rail alignment in Glendora, two medical buildings would be exposed to noise impact, one senior center educational building would be exposed to severe noise impact, and one medical building would be exposed to severe noise impact. These buildings are subject to impact due to their proximity to the rail lines (44 to 76 feet) and the speed of the LRT vehicles. The medical building north Foothill Boulevard also would be exposed to audible warning signals (bells and whistles) at the Foothill Boulevard and Grand Avenue grade crossing.
- Pasadena (future): South of the rail alignment to the west of Pasadena Avenue in Glendora, a future preschool and future medical building would be exposed to noise impact. These buildings would be subject to impact due to their proximity to the rail lines (80 to 90 feet), the speed of the LRT vehicles and their exposure to audible warning signals (bells and whistles) at Pasadena Avenue grade crossing.
- University of La Verne: Between B Street and Fairplex Drive north of the rail alignment at the University of La Verne a school building would be exposed to noise impact. This school building would be subject to impact due to their proximity to the near track (20 and 70 feet), the speed of the LRT vehicles, and audible warning signals (bells and whistles) at D Street.

Vibration

Table 3-11.12 lists the vibration impacts for Category 2 land use for Phase II, Segment 2 LRT Triple Track configuration. Written descriptions of the locations where vibration impacts are forecasted follow the table.

TABLE 3-11.12
VIBRATION IMPACTS FOR CATEGORY 2 LAND USE
PHASE II, SEGMENT 2
TRIPLE TRACK CONFIGURATON

Location	City	Civil Stn	Dist to Near Track (ft)	Speed (mph)	Project Vibration Level[1,2]	Vibration Impact Criterion[1]	# of Res. Impacts
6th-1	Azusa	524	120	55	74	72	5
6th-3	Azusa	528	70	55	79	72	2
6th-4	Azusa	533	50	55	82	72	4
6th-5	Azusa	533	100	55	76	72	4
Lime-1	Azusa	537	90	55	77	72	2
Foothill-4	Azusa	543	140	55	72	72	2
Foothill-3	Azusa	543	90	55	77	72	6
Foothill-1	Azusa	543	60	55	80	72	20
Foothill-2	Azusa	546	60	55	80	72	5
Foothill-7	Azusa	549	140	55	72	72	5
Foothill-6	Azusa	550	70	55	79	72	4
San Gabriel-1	Azusa	551	40	40	81	72	1
San Gabriel-2	Azusa	551	90	40	76	72	1
San Gabriel-3	Azusa	551	130	40	72	72	1
Foothill-8	Azusa	551	100	55	76	72	2
San Gabriel-6	Azusa	552	100	38	75	72	16
Dalton-5	Azusa	567	120	55	74	72	12
Dalton-2	Azusa	568	120	35	73	72	1

TABLE 3-11.12 *continued (page 2 of 4)*
VIBRATION IMPACTS FOR CATEGORY 2 LAND USE
PHASE II, SEGMENT 2
TRIPLE TRACK CONFIGURATON

Location	City	Civil Stn	Dist to Near Track (ft)	Speed (mph)	Project Vibration Level[1,2]	Vibration Impact Criterion[1]	# of Res. Impacts
Soldano-1	Azusa	572	50	45	80	72	4
Soldano-2	Azusa	573	110	48	74	72	3
Pasadena-1	Azusa	574	40	50	83	72	18
Pasadena-2	Azusa	575	110	55	75	72	12
Pasadena-7	Azusa	578	60	55	80	72	24
Pasadena-5	Azusa	579	130	55	73	72	36
9th-1 (EST FUTURE)	Azusa	580	80	55	78	72	15
9th-2 (EST FUTURE)	Azusa	583	80	55	78	72	15
9th-3 (EST FUTURE)	Azusa	586	80	55	78	72	15
9th-4 (EST FUTURE)	Azusa	590	80	55	78	72	15
9th-5 (EST FUTURE)	Azusa	593	80	55	78	72	15
9th-6 (EST FUTURE)	Azusa	596	80	48	76	72	15
9th-7 (EST FUTURE)	Azusa	599	80	40	76	72	12
Palm-1	Azusa	602	100	55	76	72	12
9th-8 (EST FUTURE)	Azusa	603	80	30	75	72	12
9th-10 (EST FUTURE) (NEAR STAT)	Azusa	611	80	35	74	72	15
9th-11 (EST FUTURE)	Glendora	614	80	55	78	72	15
Amber Oaks-1	Glendora	616	70	35	77	72	16
9th-12 (EST FUTURE)	Glendora	619	80	55	78	72	15
Meadow Oaks-1	Glendora	620	90	48	76	72	12
Ranger-1	Glendora	623	60	53	80	72	3
9th-13 (EST FUTURE)	Glendora	623	80	55	78	72	15
Ranger-2	Glendora	625	140	55	72	72	3
Carera-1	Glendora	626	70	55	79	72	3
9th-14 (EST FUTURE)	Glendora	627	80	55	78	72	15
Carera-2	Glendora	628	70	55	79	72	4
Oakbank-1	Glendora	631	60	55	80	72	2
9th-15 (EST FUTURE)	Glendora	631	80	55	78	72	15
Ashworth-1	Glendora	634	60	55	80	72	5
9th-16 (EST FUTURE)	Glendora	634	80	55	78	72	12
Ashworth-2	Glendora	636	110	55	75	72	2
Marcile-2	Glendora	640	110	55	75	72	5
Marcile-1	Glendora	641	60	55	80	72	4
Lowell-1	Glendora	644	60	55	80	72	6
Grande-2	Glendora	677	100	55	75	72	8
Vermont-3	Glendora	688	100	50	74	72	4
Glendora-1	Glendora	701	120	55	73	72	4
Lemon-1	Glendora	703	50	55	84	72	3
Lemon-2	Glendora	706	60	55	82	72	12
Pasadena-1	Glendora	710	60	55	82	72	2
Pasadena-2	Glendora	710	100	55	75	72	2
Pasadena-4	Glendora	713	40	55	87	72	4

TABLE 3-11.12 *continued (page 3 of 4)*
VIBRATION IMPACTS FOR CATEGORY 2 LAND USE
PHASE II, SEGMENT 2
TRIPLE TRACK CONFIGURATON

Location	City	Civil Stn	Dist to Near Track (ft)	Speed (mph)	Project Vibration Level[1,2]	Vibration Impact Criterion[1]	# of Res. Impacts
Pasadena-5	Glendora	713	120	55	73	72	7
Lemon-5	Glendora	716	56	55	83	72	8
Lemon-6	Glendora	716	120	55	73	72	10
Alosta-1	Glendora	721	70	55	80	72	1
Lemon-7	Glendora	721	120	55	73	72	7
Lemon-8	Glendora	726	60	55	82	72	7
Lemon-11	Glendora	729	64	55	81	72	2
Lemon-14	Glendora	732	60	55	82	72	7
Glenwood-1	Glendora	734	70	55	80	72	4
Glenwood-3	Glendora	737	90	55	77	72	4
Elwood-1	Glendora	741	60	55	82	72	3
Alosta-5	Glendora	745	96	55	76	72	3
Lemon-14B	Glendora	746	64	55	81	72	6
Lemon-15	Glendora	746	50	55	84	72	6
Lemon-18	Glendora	755	60	55	82	72	7
Lemon-19	Glendora	757	50	55	84	72	7
Alosta-7	Glendora	762	90	55	77	72	2
St. Vladimir-1	Glendora	768	60	55	82	72	6
Alosta-10	Glendora	769	100	55	75	72	2
St. Vladimir-2	Glendora	775	90	55	77	72	6
Compromise Line-1	Glendora	778	40	55	87	72	4
Compromise Line-3	Glendora	780	30	55	90	72	4
Compromise Line-5	Glendora	784	64	55	81	72	5
Alosta-13	Glendora	789	110	55	74	72	3
Elkhorn-1	Glendora	794	100	55	75	72	1
Remuda-2	Glendora	796	110	55	74	72	2
Remuda-3	Glendora	797	60	55	82	72	7
Remuda-4	Glendora	803	60	55	82	72	8
Remuda-6	Glendora	806	110	55	74	72	3
Remuda-5	Glendora	807	60	55	82	72	4
Remuda-7	Glendora	809	110	55	74	72	4
Canyon Meadows-1	Glendora	810	80	55	78	72	2
Remuda-10	Glendora	811	80	55	78	72	3
Remuda-11	Glendora	813	70	55	80	72	3
Gladstone-1	Glendora	848	64	55	81	72	1
Gladstone-2	Glendora	848	100	55	75	72	1
1st-1	La Verne	1002	60	55	73	72	5
1st-3	La Verne	1004	40	55	80	72	5
1st-5	La Verne	1006	36	55	82	72	5
1st-6	La Verne	1008	50	55	76	72	5
1st-9	La Verne	1013	56	55	74	72	5
1st-10	La Verne	1016	50	55	76	72	5
Garey-1	Pomona	1104	160	55	72	72	54

TABLE 3-11.12 *continued (page 4 of 4)*
VIBRATION IMPACTS FOR CATEGORY 2 LAND USE
PHASE II, SEGMENT 2
TRIPLE TRACK CONFIGURATON

Location	City	Civil Stn	Dist to Near Track (ft)	Speed (mph)	Project Vibration Level[1,2]	Vibration Impact Criterion[1]	# of Res. Impacts
Roderick-2	Pomona	1126	150	55	73	72	6
Bonita-1	Pomona	1145	110	55	76	72	24
Bonita-3	Claremont	1150	90	55	78	72	16
Bonita-4	Claremont	1154	150	55	73	72	4
Magnolia-2	Claremont	1155	140	55	74	72	16
Bonita-5	Claremont	1157	100	55	77	72	16
Bonita-7	Claremont	1162	140	55	74	72	8
Bonita-6	Claremont	1163	40	55	87	72	8
Bonita-11 (EST FUTURE)	Claremont	1169	60	55	76	72	16
Bonita-14 (EST FUTURE)	Claremont	1173	60	55	76	72	16
Bonita-15 (EST FUTURE)	Claremont	1177	60	55	76	72	32
Bonita-16 (EST FUTURE)	Claremont	1179	60	50	75	72	24
**Claremont-1	Claremont	1230	80	55	73	72	8
*Claremont-11	Claremont	1231	80	55	73	72	2
**Claremont-3	Claremont	1232	60	55	76	72	2
Claremont-12	Montclair	1235	70	55	74	72	4
*Claremont-7	Montclair	1235	90	55	72	72	5
*Claremont-8	Montclair	1236	90	55	72	72	5
*Claremont-13	Montclair	1238	80	55	73	72	2
*Claremont-9	Montclair	1239	90	55	72	72	5
*Monte Vista-2 (EST FUTURE)	Montclair	1259	80	20	74	72	5
*Monte Vista-3 (EST FUTURE)	Montclair	1263	80	28	77	72	5
*Monte Vista-4 (EST FUTURE)	Montclair	1265	80	50	82	72	5

1. Vibration levels are measured in VdB referenced to 1 µin/sec.
2. The reported vibration level represents the maximum vibration level for each location.

* These noise-sensitive locations only apply to the Baseline Alternative (north of the Montclair TransCenter).
** These noise-sensitive locations only apply to the Option G Alternative (south of the Montclair TransCenter).

Source: Harris, Miller, Miller & Hanson, 2003.

The following are brief descriptions of each Category 2 land use area where vibration impact was calculated:

- Virginia / San Gabriel: South of the rail alignment between station numbers 523+00 and 553+00 in Azusa, 41 single family homes and 20 multi-family residences would be exposed to vibration impact. North of the rail alignment just west of San Gabriel Avenue in Azusa, three single-family homes and 16 multi-family residences also would be exposed to vibration impact. These homes are located approximately 40 to 140 feet from the near track. The vibration impact would be due to the proximity of the homes to the near track and the speed of the LRT vehicles.

- Dalton / Azusa Citrus Station: From Dalton Avenue to the Azusa Citrus Station in Azusa, eight single-family homes and 243 multi-family homes would be exposed to vibration impact. One hundred twenty-nine of the multi-family residences are future proposed residences that are expected to be constructed on the north side of the alignment. These homes were modeled similar to the existing multi-family residences just east of Pasadena Avenue on the north side of the alignment. This existing development has three residences per building. The homes in this area are approximately 40 to 130 feet away from the near track. The vibration impact of these homes would be due to the proximity of the homes to the near track and the speed of the LRT vehicles.
- Azusa Citrus Station / Lowell: From the Azusa Citrus Station to Lowell Street in Glendora on both sides of the alignment, 115 multi-family residences and 37 single-family homes would be exposed to vibration impact. These homes are located 60 to 140 feet from the near track. The vibration impact would be due to the proximity of the homes to the near track and the speed of the LRT vehicles.
- Grande: In between Grande Avenue and Vermont Avenue at station number 677+00 on the north side of the alignment and at 688+00 on the south side of the alignment, eight multi-family residences and four single-family homes, respectively, would be exposed to vibration impact. These homes are located 100 feet away from the near track. The vibration impact of these homes would be due to the proximity of the homes to the near track and the speed of the LRT vehicles.
- Glendora / I-210: North and south of the rail alignment between Glendora Avenue and the I-210 off ramp in Glendora, 175 single-family homes, 10 multi-family residences, and two hotels would be exposed to vibration impact. These homes and hotels are located 30 to 120 feet from the near track. The vibration impact would be due to the proximity of the homes to the near track and the speed of the LRT vehicles.
- Gladstone: At station number 848+00 on the south side of the rail alignment in Glendora, two single-family homes would be exposed to vibration impact. These homes are 64 and 100 feet away from the near track. The vibration impact would be due to the proximity of the homes to the near track and the speed of the LRT vehicles.
- Wheeler / B: From Wheeler Street to B Street on the north side of the alignment in La Verne, 30 single-family homes would be exposed to vibration impact. These homes are 36 to 60 feet from the near track. The vibration impact would be due to the proximity of the homes to the near track and the speed of the LRT vehicles.
- Garey: North of the rail alignment at station number 1105+00 in Pomona, 54 multi-family residences in three buildings would be exposed to vibration impact. These residences are located 160 feet from the near track. The vibration impact would be due to the proximity of the homes to the near track and the speed of the LRT vehicles.
- Roderick: South of the rail alignment at station number 1127+00 in Pomona, six single-family homes would be exposed to vibration impact. These residences are located 150 feet from the near track. The vibration impact would be due to the proximity of the homes to the near track and the speed of the LRT vehicles.
- Bonita: North of the rail alignment at station number 1147+00 in Pomona, 24 multi-family residences in three buildings would be exposed to vibration impact. These residences are located 110 feet from the near track. The vibration impact would be due to the proximity of the homes to the near track and the speed of the LRT vehicles.
- Cambridge (west): West of Cambridge Avenue on the north and south sides of the rail alignment in Claremont, 68 multi-family residences would be exposed to vibration impact. These

residences are located 40 to 150 feet from the near track. The vibration impact would be due to the proximity of the homes to the near track and the speed of the LRT vehicles.

- Cambridge (east): East of Cambridge Avenue between station numbers 1168+00 and 1180+00 on the north side of the alignment in Claremont, 88 future multi-family residences would be expected to be exposed to vibration impact. This future housing development is modeled after the existing multi-family housing just east of Cambridge Avenue. The vibration impact would be due to the proximity of the homes to the near track (60 feet) and the speed of the LRT vehicles.
- Claremont (west): Just west of Claremont Boulevard on the south side of the rail alignment in Claremont, two single-family homes would be exposed to vibration impact for the Baseline Option under the Triple Track configuration. These homes are located 80 feet from the near track. The vibration impact would be due to the proximity of the homes to the relocated near track and the speed of the LRT vehicles.
- Claremont (east): East of Claremont Boulevard on both the north and the south side of the rail alignment in Montclair, 21 single-family homes would be exposed to vibration impact for the Baseline Option under the Triple Track configuration. These homes are located 70 to 90 feet from the relocated near tracks. The vibration impact would be due to the proximity of the homes to the relocated near track and the speed of the LRT vehicles.
- Monte Vista (future): North of the rail alignment between station numbers 1257+00 and 1268+00 in Montclair, 15 future single-family residences would be expected to be impacted by vibration in the Baseline Option. These homes are modeled after the existing single-family homes just east of Claremont Boulevard. They are located approximately 80 feet from the near track. The vibration impact would be due to the proximity of the homes to the relocated near track and the speed of the LRT vehicles.
- Claremont (east, Option H): East of Claremont Boulevard on the north and south side of the rail alignment in Montclair, eight multi-family residences and two single-family residences would be exposed to vibration impact. These homes are located 60 to 80 feet from the near track. The vibration impact would be due to the proximity of the homes to the near track and the speed of the LRT vehicles.

Similar to the Category 2 analysis, an assessment of vibration impact for Category 3 receptors was also conducted for Phase II, Segment 2 LRT Triple Track configuration. **Table 3-11.13** lists the vibration impacts for Category 3 land use for Phase II, Segment 2 LRT Triple Track configuration.

TABLE 3-11.13
VIBRATION IMPACTS FOR CATEGORY 3 LAND USE
PHASE II, SEGMENT 2
TRIPLE TRACK CONFIGURATION

Location	City	Civil Stn	Dist to Near Track (ft)	Speed (mph)	Project Vibration Level[1,2]	Vibration Impact Criterion[1]	No. of Impacts
Lime-3	Azusa	539	100	55	76	75	1
Grande-1	Glendora	671	60	55	82	75	1
Foothill-1	Glendora	673	60	55	82	75	1
Foothill-2	Glendora	675	50	55	84	75	1
Foothill-3	Glendora	678	60	55	82	75	1
Pasadena-6 (Future)	Glendora	709	70	55	80	75	1
Pasadena-7 (Future)	Glendora	711	60	55	82	75	1
ULV-4	La Verne	1030	20	40	88	75	1

1. Vibration levels are measured in VdB referenced to 1 µin/sec.
2. The reported vibration level represents the maximum vibration level for each location.

Source: Harris, Miller, Miller & Hanson, 2003.

The following are brief descriptions of each Category 3 land use area where an impact was calculated:

- Lime: South of the rail alignment at station number 538+00 in Azusa, a medical building would be exposed to vibration impact. This building is located 100 feet from the near track. The vibration impact would be due to the proximity of the building to the near track and the speed of the LRT vehicles.
- Grande: East of Grande Avenue from station numbers 670+00 to 679+00, three medical buildings and one school building would be exposed to vibration impact. These buildings are located 50 to 60 feet from the near track. The vibration impacts would be due to the proximity of the buildings to the near track and the speed of the LRT vehicles.
- Pasadena (future): West of Pasadena Avenue on the south side of the alignment in Glendora, a future medical building and a future preschool would be expected to be impacted by vibration. These future buildings are estimated to be 60 to 70 feet from the near track. The vibration impact of these buildings would be due to the proximity of the buildings to the near track and the speed of the LRT vehicles.
- University of La Verne: North of the rail alignment at station number 1080+00, one school building at the University of La Verne would be exposed to vibration impact. This building is located 20 feet from the near track. The vibration impact would be due to the proximity of the building to the near track and the speed of the LRT vehicles.

Summary of Triple Track Impacts for Full Build LRT Alternative

For both Segments 1 and 2, there are 744 residences that are exposed to noise impact and an additional 532 residences that are exposed to severe noise impact. There are a total of 1575 residences that are

exposed to vibration impact. Of this total, 554 residences were located in areas where the vibration measurements indicated efficient propagation conditions resulting in greater than normal number of impacts. For Category 3, there are four schools that are exposed to noise impact and one school that is exposed to severe noise impact. The schools exposed to noise impact include a senior center and a future preschool. There are also three medical buildings and a museum that are exposed to noise impact and one school that is exposed to severe noise impact. There are also vibration impacts for Category 3 land use areas that include four schools and five medical buildings.

Summary of Triple Track Impacts for Build LRT Alternative to Maintenance Facility

For Segment 1 of the Triple Track configuration, there are 127 residences exposed to noise impact and an additional 182 residences that are exposed to severe noise impact. There are a total of 575 homes that are also exposed to vibration impact. Of this total, 554 residences were located in areas where the vibration measurements indicated efficient propagation conditions resulting in greater than normal number of impacts. For Category 3 land use, there is one school that would be exposed to noise impact. This school is also exposed to vibration impact.

d. LRT, Double Track Configurations

Noise Analysis

For the LRT Double Track Configurations, detailed comparisons of the existing and future noise levels are presented in Table 3-11.14, Table 3-11.15, Table 3-11.18, and Table 3-11.19. Table 3-11.14 includes results for the Category 2 receptors along the Phase II, Segment 1 portion of the alignment with both daytime and nighttime sensitivity to noise (e.g. residences, hotels and hospitals). Table 3-11.15 is a listing of all Category 3 receptors along the Phase II, Segment 1 portion of the alignment, consisting of institutional sites that are not sensitive to noise at night (e.g. schools, churches, parks and medical offices). Table 3-11.18 includes results for the Category 2 receptors along the Phase II, Segment 2 portion of the alignment with both daytime and nighttime sensitivity to noise (e.g. residences, hotels and hospitals). Table 3-11.19 is a listing of all Category 3 receptors along the Phase II, Segment 2 portion of the alignment, consisting of institutional sites that are not sensitive to noise at night (e.g. schools, churches, parks and medical offices).

In addition to the civil station (as shown in figures in Volume 2), distance to the near track and proposed LRT speed, each table includes the existing noise level, the projected noise level from LRT operations and the impact criteria for each receptor or receptor group. Based on a comparison of the predicted project noise level with the impact criteria, the impact category is listed, along with the predicted total noise level and projected noise increase due to the introduction of LRT service. Tables 3-11.14 and 3-11.18 also include an inventory of the number of impacts and severe impacts at each sensitive receptor location.

It should be noted that, although the forecasted Double Track noise levels at specific locations are different than for the Triple Track configuration, the number of residences for the Double Track configurations that would be subject to impact or severe impact are the same as reported for the Triple Track configuration.

Vibration Analysis

For the LRT Double Track configurations, the estimated root mean square (RMS) velocity levels (VdB re 1 micro-in./sec.) for sensitive receptors at representative distances are provided in Table 3-11.16, Table 3-11.17, Table 3-11.20, and 3-11.21. These tables summarize the results of the analysis in terms of anticipated exceedances of the FTA criteria for "frequent events" (defined as more than 70 events per day). The criteria are discussed in more detail in Section 3-11.2.2.

Vibration-sensitive locations along the alignment are listed in Table 3-11.16 for Category 2 land use and in Table 3-11.17 for Category 3 land use for Phase II, Segment 1. Vibration-sensitive locations along the alignment are listed in Table 3-11.20 for Category 2 land use and in Table 3-11.21 for Category 3 land use for Phase II, Segment 2. Each table lists the locations, the civil station, the distance to the near track, and the projected LRT speed at each location. In addition, the predicted project vibration level and the impact criterion level are indicated along with the number of impacts projected for each receptor or receptor group.

Phase I — The Cities Affected and the Effects

Noise impacts for Phase I were evaluated using the maximum passby noise levels, or Lmax.[4] Existing service in Phase I uses 2-car train consists. Future service levels when the Eastside LRT Extension project begins operation in 2009 would include 3-car train consists. As a result of this change, Lmax noise levels at the residences closest to the corridor would increase by substantially less than 1 dBA, which is an imperceptible difference. Changes in the frequency of service would not affect Lmax.

Phase II would not induce noise impacts in Phase I cities, since the Operating Plan for Phase II is dictated by the Eastside LRT Extension's Operating Plan, which will precede Phase II.

Phase II, Segment 1 — The Cities Affected and the Effects

Noise

Table 3-11.14 lists the noise impacts for Category 2 land use for Phase II, Segment 1 LRT Double Track configurations. The locations of these impacts are the same as previously described for the Triple Track configurations following **Table 3-11.10**.

[4] LACTC, Metro Pasadena Project, "Design & Performance Criteria," 1992.

TABLE 3-11.14
NOISE IMPACTS FOR CATEGORY 2 LAND USE
PHASE II, SEGMENT 1
DOUBLE TRACK CONFIGURATIONS

Location	City	Civil Stn	Dist to Near Track (ft)	Speed (mph)	Exist. Noise Level[1]	Project Noise Level[1]			Impact Category	Total Noise Level[1,3]	Noise Level Increase[1,3]	# of Res Impacts	
						Pred[2,3]	Impact Criteria					Imp	Sev
							Imp	Sev					
San Luis Rey-1	Arcadia	141	80	55	65	62	60	66	Impact	67	1.7	3	0
San Luis Rey-2	Arcadia	146	90	55	65	61	60	66	Impact	66	1.4	6	0
San Luis Rey-3	Arcadia	147	50	55	60	65	58	63	Severe	66	6.0	0	4
San Luis Rey-4	Arcadia	149	120	55	60	59	58	63	Impact	62	2.5	2	0
Cornell-1	Arcadia	151	96	55	60	60	58	63	Impact	63	3.2	6	0
Cornell-2	Arcadia	155	90	55	60	61	58	63	Impact	63	3.4	8	0
Cornell-3	Arcadia	156	90	55	60	61	58	63	Impact	63	3.4	8	0
2nd-2	Arcadia	185	80	55	60	61	58	63	Impact	64	3.7	0	0
3rd-1	Arcadia	201	40	55	60	66	57	63	Severe	67	7.3	0	12
Contented-1	Monrovia	207	40	55	60	66	57	63	Severe	67	7.3	0	2
Contented-3	Monrovia	209	50	55	60	65	57	63	Severe	66	6.2	0	4
Contented-4	Monrovia	214	40	55	60	66	57	63	Severe	67	7.3	0	6
Montana-1	Monrovia	221	30	55	60	67	57	63	Severe	68	8.4	0	8
Anita-1	Monrovia	221	28	55	60	68	57	63	Severe	68	8.7	0	4
Montana-3	Monrovia	224	30	55	60	67	57	63	Severe	68	8.4	0	2
Anita-3	Monrovia	225	48	55	60	65	57	63	Severe	66	6.4	0	5
Montana-5	Monrovia	226	60	55	60	63	57	63	Severe	65	5.3	0	48
Alamitas-1	Monrovia	230	40	55	60	66	57	63	Severe	67	7.3	0	4
Diamond-1	Monrovia	231	22	55	60	69	57	63	Severe	69	9.5	0	5
Diamond-4	Monrovia	236	80	55	60	59	57	63	Impact	62	2.7	8	0
Radford-1	Monrovia	236	44	55	60	66	57	63	Severe	67	7.2	0	3
Diamond-3	Monrovia	237	40	55	60	68	57	63	Severe	68	8.6	0	6
Mayflower-2	Monrovia	238	90	55	60	60	57	63	Impact	63	3.2	5	0
Alamitas-2	Monrovia	240	54	55	60	59	57	63	Impact	62	2.8	4	0
Mayflower-3	Monrovia	240	120	55	60	58	57	63	Impact	62	2.1	4	0
Mayflower-1	Monrovia	240	30	55	60	68	57	63	Severe	69	9.3	0	2

TABLE 3-11.14 *continued*
NOISE IMPACTS FOR CATEGORY 2 LAND USE
PHASE II, SEGMENT 1
DOUBLE TRACK CONFIGURATIONS

Location	City	Civil Stn	Dist to Near Track (ft)	Speed (mph)	Exist. Noise Level[1]	Project Noise Level[1]			Impact Category	Total Noise Level[1,3]	Noise Level Increase[1,3]	# of Res Impacts	
						Pred[2,3]	Impact Criteria					Imp	Sev
							Imp	Sev					
Mayflower-6	Monrovia	241	40	55	60	67	57	63	Severe	68	8.2	0	1
Mayflower-4	Monrovia	246	46	55	60	66	57	63	Severe	67	7.5	0	40
Genoa-1	Monrovia	250	30	55	60	68	57	63	Severe	68	8.7	0	20
Duarte-2	Duarte	315	130	55	57	60	56	62	Impact	62	5.2	4	0
Duarte-5	Duarte	318	130	55	57	58	56	62	Impact	60	4.0	4	0
Duarte-8	Duarte	322	130	55	57	58	56	62	Impact	60	4.0	3	0
Hamilton-1	Duarte	325	120	55	57	59	56	62	Impact	61	4.3	7	0
Duarte-11	Duarte	330	130	55	57	58	56	62	Impact	60	4.0	3	0
Duarte-14	Duarte	334	130	55	57	58	56	62	Impact	60	4.0	3	0
Hamilton-2	Duarte	334	110	55	57	59	56	62	Impact	61	4.7	7	0
Hamilton-3	Duarte	339	140	55	57	59	56	62	Impact	61	4.8	6	0
Hamilton-4	Duarte	343	140	55	57	58	56	62	Impact	60	3.7	6	0
Duarte-17	Duarte	344	140	55	57	58	56	62	Impact	60	3.7	5	0
Duarte-18	Duarte	346	160	55	57	57	56	62	Impact	60	3.2	10	0
Hamilton-5	Duarte	347	90	55	57	61	56	62	Impact	62	5.7	5	0
Hamilton-6	Duarte	351	44	48	57	65	56	62	Severe	65	8.9	0	6
Hamilton-8	Duarte	354	60	38	57	62	56	62	Severe	63	6.5	0	5
Hamilton-10	Duarte	357	60	30	57	61	56	62	Impact	62	5.5	5	0

1. Noise levels are based on Ldn and are measured in dBA. Noise levels are rounded to the nearest decibel except for the increase in noise level, which is given to the nearest one-tenth decibel to provide a better resolution for assessing noise impact.
2. Predicted levels include a 5dBA penalty applied to audible signal noise, where applicable.
3. The reported noise levels represent the highest noise levels for each location.

Source: Harris, Miller, Miller & Hanson, 2003

TABLE 3-11.15
NOISE IMPACTS FOR CATEGORY 3 LAND USE
PHASE II, SEGMENT 1
DOUBLE TRACK CONFIGURATION

Location	City	Civil Stn	Dist to Near Track (ft)	Speed (mph)	Exist. Noise Level[1]	Project Noise Level[1]			Impact Category	Total Noise Level[1]	Noise Level Increase[1]
						Pred[2]	Impact Criteria				
							Imp	Sev			
There are no Category 3 noise impacts for Phase II, Segment 1.											

Vibration

Table 3-11.16 lists the vibration impacts for Category 2 land use for Phase II, Segment 1 LRT Double Track configurations. The locations of the forecasted vibration impacts would be the same as previously described for the Triple Track configurations following Table 3-11.8.

TABLE 3-11.16
VIBRATION IMPACTS FOR CATEGORY 2 LAND USE
PHASE II, SEGMENT 1
DOUBLE TRACK CONFIGURATIONS

Location	City	Civil Stn	Dist to Near Track (ft)	Speed (mph)	Project Vibration Level[1,2]	Vibration Impact Criterion[1]	No. of Res. Impacts
Corta Calle-1	Pasadena	34	240	55	72	72	4
Arboleda-1	Pasadena	37	220	55	73	72	6
Arboleda-2	Pasadena	39	200	55	74	72	5
Foothill-2	Arcadia	54	240	55	72	72	4
Catalapa-1	Arcadia	58	220	55	73	72	4
Foothill-3	Arcadia	58	190	55	74	72	4
Catalapa-2	Arcadia	61	220	55	73	72	4
Foothill-5	Arcadia	64	160	55	75	72	3
Catalapa-3	Arcadia	64	220	55	73	72	5
Foothill-6	Arcadia	68	160	55	75	72	3
Catalapa-4	Arcadia	70	250	55	72	72	6
Foothill-7	Arcadia	71	150	55	75	72	4
Catalapa-5	Arcadia	74	250	55	72	72	2
Foothill-8	Arcadia	74	170	55	75	72	3
Catalapa-6	Arcadia	78	250	55	72	72	1
Foothill-9	Arcadia	78	160	55	75	72	4
Foothill-10	Arcadia	85	160	55	75	72	4
Catalapa-8	Arcadia	87	250	55	72	72	2
Katherine-1	Arcadia	91	210	55	73	72	3
English Oaks-2	Arcadia	97	210	55	73	72	6
Oxford-1	Arcadia	107	240	55	72	72	5

TABLE 3-11.16 *continued (page 2 of 3)*
VIBRATION IMPACTS FOR CATEGORY 2 LAND USE
PHASE II, SEGMENT 1
DOUBLE TRACK CONFIGURATIONS

Location	City	Civil Stn	Dist to Near Track (ft)	Speed (mph)	Project Vibration Level[1,2]	Vibration Impact Criterion[1]	No. of Res. Impacts
Loma Lisa-1	Arcadia	109	180	55	74	72	4
Oxford-2	Arcadia	111	240	55	72	72	5
San Carlos-1	Arcadia	115	130	55	76	72	2
Oxford-3	Arcadia	115	240	55	72	72	4
San Carlos-2	Arcadia	117	210	55	73	72	2
Colorado-1	Arcadia	117	240	55	72	72	3
Asder-1	Arcadia	121	140	55	76	72	3
Brunnel Oaks-1	Arcadia	123	140	55	76	72	1
Brunnel Oaks-2	Arcadia	123	190	55	74	72	2
Chelsea-1	Arcadia	124	144	55	76	72	4
Chelsea-2	Arcadia	126	140	55	76	72	1
Chelsea-3	Arcadia	126	180	55	74	72	1
Leandra/Mary Oaks-1	Arcadia	127	144	55	76	72	5
Renoake-2	Arcadia	129	170	55	75	72	5
Renoake-1	Arcadia	130	120	55	77	72	2
Oakdale-1	Arcadia	131	190	55	74	72	2
Cyrus-1	Arcadia	132	170	55	75	72	4
Oakhurst-1	Arcadia	133	200	55	74	72	2
Rancho-1	Arcadia	137	240	55	72	72	1
Santa Maria-1	Arcadia	139	170	55	75	72	3
Santa Rosa-1	Arcadia	140	180	55	74	72	1
San Luis Rey-1	Arcadia	141	80	55	80	72	3
San Luis Rey-2	Arcadia	146	90	55	79	72	6
San Luis Rey-3	Arcadia	147	50	55	83	72	4
San Luis Rey-4	Arcadia	149	120	55	77	72	2
Cornell-1	Arcadia	151	96	55	79	72	6
Cornell-4	Arcadia	154	140	55	76	72	12
Cornell-2	Arcadia	155	90	55	79	72	8
Santa Ynez-1	Arcadia	156	140	55	76	72	3
Cornell-5	Arcadia	156	170	55	75	72	8
Cornell-3	Arcadia	156	90	55	79	72	8
Windsor-2	Arcadia	159	220	53	73	72	8
3rd-1	Arcadia	201	40	55	84	72	12
3rd-3	Arcadia	203	130	55	76	72	10
3rd-2	Arcadia	205	80	55	80	72	12
Contented-1	Monrovia	207	40	55	84	72	2
Contented-2	Monrovia	208	100	55	78	72	4
Contented-3	Monrovia	209	50	55	83	72	4
Contented-5	Monrovia	214	100	55	78	72	6
Contented-4	Monrovia	214	40	55	84	72	6
Encino-1	Monrovia	215	160	55	75	72	4
Montana-2	Monrovia	219	150	55	75	72	2
Anita-1	Monrovia	221	28	55	87	72	4

TABLE 3-11.16 *continued (page 3 of 3)*
VIBRATION IMPACTS FOR CATEGORY 2 LAND USE
PHASE II, SEGMENT 1
DOUBLE TRACK CONFIGURATIONS

Location	City	Civil Stn	Dist to Near Track (ft)	Speed (mph)	Project Vibration Level[1,2]	Vibration Impact Criterion[1]	No. of Res. Impacts
Anita-2	Monrovia	221	100	55	78	72	4
Montana-1	Monrovia	221	30	55	86	72	8
Montana-4	Monrovia	222	100	55	78	72	7
Montana-3	Monrovia	224	30	55	86	72	2
Anita-3	Monrovia	225	48	55	83	72	5
Montana-6	Monrovia	226	140	55	76	72	5
Montana-5	Monrovia	226	60	55	82	72	48
Anita-4	Monrovia	227	198	55	74	72	3
Anita-5	Monrovia	229	100	55	78	72	4
Montana-7	Monrovia	229	156	55	75	72	16
Alamitas-1	Monrovia	230	40	55	84	72	4
Diamond-1	Monrovia	231	22	55	88	72	5
Diamond-2	Monrovia	231	140	55	76	72	6
Alamitas-3	Monrovia	234	130	55	76	72	4
Radford-1	Monrovia	236	44	55	84	72	3
Diamond-5	Monrovia	236	110	55	78	72	5
Diamond-4	Monrovia	236	80	55	80	72	8
Radford-2	Monrovia	237	200	55	74	72	3
Diamond-3	Monrovia	237	40	55	84	72	6
Diamond-7	Monrovia	237	180	55	74	72	8
Mayflower-2	Monrovia	238	90	55	79	72	5
Diamond-6	Monrovia	238	120	55	77	72	8
Mayflower-1	Monrovia	240	30	55	86	72	2
Alamitas-2	Monrovia	240	54	55	82	72	4
Mayflower-3	Monrovia	240	120	55	77	72	4
Mayflower-6	Monrovia	241	40	55	84	72	1
Mayflower-5	Monrovia	246	160	55	75	72	16
Mayflower-4	Monrovia	246	46	55	83	72	40
Genoa-2	Monrovia	250	80	55	80	72	4
Genoa-4	Monrovia	250	150	55	75	72	6
Genoa-3	Monrovia	250	120	55	77	72	16
Genoa-1	Monrovia	250	30	55	86	72	20
Magnolia-1	Monrovia	252	240	43	72	72	1
Hamilton-5	Duarte	347	90	55	74	72	5
Hamilton-6	Duarte	351	44	48	84	72	6
Hamilton-8	Duarte	354	60	38	77	72	5
Hamilton-10	Duarte	357	60	30	76	72	5

1. Vibration levels are measured in VdB referenced to 1 µin/sec.
2. The reported vibration level represents the maximum vibration level for each location.

Source: Harris, Miller, Miller & Hanson, 2003.

Similar to the Category 2 analysis, an assessment of vibration impact for Category 3 receptors was also conducted for Phase II, Segment 1 LRT Double Track configurations. Table 3-11.17 lists the vibration impacts for Category 3 land use for Phase II, Segment 1 LRT Double Track configurations.

TABLE 3-11.17
VIBRATION IMPACTS FOR CATEGORY 3 LAND USE
PHASE II, SEGMENT 1
DOUBLE TRACK CONFIGURATIONS

Location	City	Civil Stn	Dist to Near Track (ft)	Speed (mph)	Project Vibration Level[1,2]	Vibration Impact Criterion[1]	# of Impacts
3rd Avenue	Arcadia	198	70	55	81	75	1

1. Vibration levels are measured in VdB referenced to 1 µin/sec.
2. The reported vibration level represents the maximum vibration level for each location.

Source: Harris, Miller, Miller & Hanson, 2003.

The following is a brief description of the Category 3 land use area where a vibration impact is predicted.

- 3rd Avenue: South of the rail alignment at station number 198+00 Rancho High School in Arcadia is exposed to vibration impact. This vibration impact is due to the proximity to the near track (70 feet), the speed of the LRT vehicles as well as the efficient vibration propagation characteristics of the ground in this area.

Phase II, Segment 2 — The Cities Affected and the Effects

Noise

Table 3-11.18 lists the noise impacts for Category 2 land use for Phase II, Segment 2 LRT Double Track configurations. Although the forecasted noise levels at specific locations are different than for the Double Track configurations, the number of properties affected is the same as reported for the Triple Track configurations. The locations of the impacts are the same as previously described following Table 3-11.10.

TABLE 3-11.18
NOISE IMPACTS FOR CATEGORY 2 LAND USE
PHASE II, SEGMENT 2
DOUBLE TRACK CONFIGURATIONS

Location	City	Civil Stn	Dist to Near Track (ft)	Speed (mph)	Exist. Noise Level[1]	Project Noise Level[1]			Impact Category	Total Noise Level[1,3]	Noise Level Increase[1,3]	# of Res Impacts	
						Pred[2,3]	Impact Criteria					Imp	Sev
							Imp	Sev					
6th-1	Azusa	524	120	55	65	61	60	66	Impact	66	1.5	5	0
6th-3	Azusa	528	70	55	65	62	60	66	Impact	67	2.1	2	0
6th-4	Azusa	533	50	55	65	65	60	66	Impact	68	3.1	4	0
Lime-1	Azusa	537	90	55	65	61	60	66	Impact	66	1.5	2	0
Foothill-1	Azusa	543	60	55	65	63	60	66	Impact	67	2.5	20	0
Foothill-2	Azusa	546	60	55	65	63	60	66	Impact	67	2.4	5	0
Foothill-6	Azusa	550	70	55	65	63	60	66	Impact	67	2.3	4	0
Foothill-8	Azusa	551	100	55	65	61	60	66	Impact	66	1.6	2	0
San Gabriel-1	Azusa	551	40	40	65	66	60	66	Severe	68	3.6	0	1
San Gabriel-6	Azusa	552	100	38	65	62	60	66	Impact	66	1.9	16	0
Soldano-1	Azusa	572	50	45	65	65	60	66	Impact	68	3.2	4	0
Pasadena-1	Azusa	574	40	50	65	71	60	66	Severe	72	7.3	0	18
Pasadena-7	Azusa	578	60	55	65	64	60	66	Impact	68	2.9	24	0
9th-1 (EST FUTURE)	Azusa	580	80	55	65	62	60	66	Impact	66	1.8	15	0
9th-2 (EST FUTURE)	Azusa	583	80	55	65	62	60	66	Impact	66	1.8	15	0
9th-3 (EST FUTURE)	Azusa	586	80	55	65	62	60	66	Impact	66	1.8	15	0
9th-4 (EST FUTURE)	Azusa	590	80	55	65	62	60	66	Impact	66	1.8	15	0
9th-5 (EST FUTURE)	Azusa	593	80	55	65	62	60	66	Impact	66	1.8	15	0
9th-6 (EST FUTURE)	Azusa	596	80	48	65	61	60	66	Impact	66	1.5	15	0
9th-7 (EST FUTURE)	Azusa	599	80	40	65	64	60	66	Impact	67	2.6	12	0
Palm-1	Azusa	602	100	55	65	62	60	66	Impact	67	2.0	12	0
9th-8 (EST FUTURE)	Azusa	603	80	30	65	62	60	66	Impact	66	1.9	12	0
9th-11 (EST FUTURE)	Glendora	614	80	55	55	60	55	61	Impact	61	6.1	15	0
Amber Oaks-1	Glendora	616	70	35	55	61	55	61	Impact	62	6.5	16	0
9th-12 (EST FUTURE)	Glendora	619	80	55	55	61	55	61	Impact	62	6.7	15	0
Meadow Oaks-1	Glendora	620	90	48	55	60	55	61	Impact	61	6.0	12	0

TABLE 3-11.18 *continued (page 2 of 6)*
NOISE IMPACTS FOR CATEGORY 2 LAND USE
PHASE II, SEGMENT 2
DOUBLE TRACK CONFIGURATIONS

Location	City	Civil Stn	Dist to Near Track (ft)	Speed (mph)	Exist. Noise Level[1]	Project Noise Level[1]			Impact Category	Total Noise Level[1,3]	Noise Level Increase[1,3]	# of Res Impacts	
						Pred[2,3]	Impact Criteria					Imp	Sev
							Imp	Sev					
9th-13 (EST FUTURE)	Glendora	623	80	55	55	62	55	61	Severe	62	7.2	0	15
Ranger-1	Glendora	623	60	53	55	63	55	61	Severe	64	8.6	0	3
Carera-1	Glendora	626	70	55	55	62	55	61	Severe	63	7.9	0	3
9th-14 (EST FUTURE)	Glendora	627	80	55	55	62	55	61	Severe	62	7.2	0	15
Carera-2	Glendora	628	70	55	55	62	55	61	Severe	63	7.9	0	4
9th-15 (EST FUTURE)	Glendora	631	80	55	55	62	55	61	Severe	62	7.2	0	15
Oakbank-1	Glendora	631	60	55	55	63	55	61	Severe	64	8.8	0	2
Ashworth-3	Glendora	633	150	55	55	56	55	61	Impact	59	3.3	8	0
9th-16 (EST FUTURE)	Glendora	634	80	55	55	63	55	61	Severe	64	8.2	0	12
Ashworth-1	Glendora	634	60	55	55	65	55	61	Severe	65	9.7	0	5
Ashworth-2	Glendora	636	110	55	55	58	55	61	Impact	60	4.9	2	0
Barranca-1	Glendora	638	160	55	55	59	55	61	Impact	61	5.2	2	0
Marcile-2	Glendora	640	110	55	55	60	55	61	Impact	61	5.6	5	0
Marcile-1	Glendora	641	60	55	55	73	55	61	Severe	73	17.6	0	4
Lowell-1	Glendora	644	60	55	55	63	55	61	Severe	64	8.8	0	6
Vermont-3	Glendora	688	100	50	58	60	57	62	Impact	62	4.1	4	0
Glendora-1	Glendora	701	120	55	55	60	55	61	Impact	61	5.8	4	0
Lemon-1	Glendora	703	50	55	55	65	55	61	Severe	65	9.9	0	3
Lemon-2	Glendora	706	60	55	55	63	55	61	Severe	64	8.6	0	12
Lemon-4	Glendora	708	140	55	55	56	55	61	Impact	59	3.3	4	0
Pasadena-1	Glendora	710	60	55	55	73	55	61	Severe	73	17.6	0	2
Pasadena-2	Glendora	710	100	55	55	60	55	61	Impact	62	6.2	2	0
Pasadena-4	Glendora	713	40	55	55	67	55	61	Severe	67	11.9	0	4
Pasadena-5	Glendora	713	120	55	55	58	55	61	Impact	60	4.3	7	0
Lemon-5	Glendora	716	56	55	55	64	55	61	Severe	65	9.1	0	8
Alosta-1	Glendora	721	70	55	55	62	55	61	Severe	63	7.8	0	1

TABLE 3-11.18 *continued (page 3 of 6)*
NOISE IMPACTS FOR CATEGORY 2 LAND USE
PHASE II, SEGMENT 2
DOUBLE TRACK CONFIGURATIONS

Location	City	Civil Stn	Dist to Near Track (ft)	Speed (mph)	Exist. Noise Level[1]	Project Noise Level[1]			Impact Category	Total Noise Level[1,3]	Noise Level Increase[1,3]	# of Res Impacts	
						Pred[2,3]	Impact Criteria					Imp	Sev
							Imp	Sev					
Alosta-4	Glendora	725	100	55	55	60	55	61	Impact	61	5.9	0	0
Lemon-8	Glendora	726	60	55	55	63	55	61	Severe	64	8.7	0	7
Lemon-10	Glendora	727	180	55	55	56	55	61	Impact	59	3.3	3	0
Lemon-11	Glendora	729	64	55	55	63	55	61	Severe	64	8.4	0	2
Lemon-14	Glendora	732	60	55	55	64	55	61	Severe	65	9.3	0	7
Glenwood-1	Glendora	734	70	55	55	64	55	61	Severe	65	9.1	0	4
Glenwood-3	Glendora	737	90	55	55	64	55	61	Severe	65	9.2	0	4
Elwood-1	Glendora	741	60	55	55	65	55	61	Severe	65	9.8	0	3
Alosta-5	Glendora	745	96	55	55	55	55	61	Impact	58	3.0	3	0
Lemon-15	Glendora	746	50	55	55	64	55	61	Severe	64	8.8	0	6
Lemon-18	Glendora	755	60	55	55	65	55	61	Severe	65	9.7	0	7
Lemon-19	Glendora	757	50	55	55	60	55	61	Impact	61	5.7	7	0
Alosta-8	Glendora	760	160	55	55	57	55	61	Impact	59	3.8	2	0
Lemon-20	Glendora	761	200	55	55	57	55	61	Impact	60	4.1	7	0
Alosta-7	Glendora	762	90	55	55	61	55	61	Impact	62	6.5	2	0
St. Vladimir-1	Glendora	768	60	55	55	63	55	61	Severe	64	8.7	0	6
Alosta-10	Glendora	769	100	55	55	60	55	61	Impact	61	5.9	2	0
Alosta-12	Glendora	770	110	55	55	59	55	61	Impact	61	5.5	0	0
St. Vladimir-2	Glendora	775	90	55	55	61	55	61	Impact	62	6.5	6	0
Compromise Line-1	Glendora	778	40	55	55	66	55	61	Severe	66	11.0	0	4
Compromise Line-3	Glendora	780	30	55	55	67	55	61	Severe	68	12.3	0	4
Compromise Line-5	Glendora	784	64	55	55	63	55	61	Severe	64	8.4	0	5
Alosta-13	Glendora	789	110	55	60	59	57	63	Impact	63	2.9	3	0
Elkhorn-1	Glendora	794	100	55	60	60	57	63	Impact	63	3.2	1	0
Remuda-2	Glendora	796	110	55	60	59	57	63	Impact	63	2.9	2	0
Remuda-3	Glendora	797	60	55	60	63	57	63	Severe	65	5.3	0	7

TABLE 3-11.18 *continued (page 4 of 6)*
NOISE IMPACTS FOR CATEGORY 2 LAND USE
PHASE II, SEGMENT 2
DOUBLE TRACK CONFIGURATIONS

Location	City	Civil Stn	Dist to Near Track (ft)	Speed (mph)	Exist. Noise Level[1]	Project Noise Level[1]			Impact Category	Total Noise Level[1,3]	Noise Level Increase[1,3]	# of Res Impacts	
						Pred[2,3]	Impact Criteria					Imp	Sev
							Imp	Sev					
Remuda-4	Glendora	803	60	55	60	63	57	63	Severe	65	5.3	0	8
Remuda-5	Glendora	807	60	55	60	63	57	63	Severe	65	5.3	0	4
Canyon Meadows-1	Glendora	810	80	55	60	62	57	63	Impact	64	4.0	2	0
Remuda-10	Glendora	811	80	55	60	62	57	63	Impact	64	4.0	3	0
Remuda-11	Glendora	813	70	55	60	62	57	63	Impact	64	4.6	3	0
Gladstone-1	Glendora	848	64	55	60	64	57	63	Severe	65	5.9	0	1
Gladstone-2	Glendora	848	100	55	60	58	57	63	Impact	62	2.3	1	0
Gladstone-1	San Dimas	850	80	55	60	66	57	63	Severe	67	6.9	0	4
Gladstone-2	San Dimas	851	150	55	60	59	57	63	Impact	62	2.7	4	0
Gladstone-3	San Dimas	852	80	55	60	63	57	63	Impact	64	4.8	4	0
Perlanna-1	San Dimas	863	70	55	60	62	57	63	Impact	64	4.7	3	0
Highland-1	San Dimas	866	60	55	60	63	57	63	Severe	65	5.4	0	2
Village-1	San Dimas	869	120	55	60	59	57	63	Impact	62	2.6	0	0
Oakway-1	San Dimas	872	140	55	60	58	57	63	Impact	62	2.2	32	0
Eucla-3	San Dimas	888	100	55	60	62	57	63	Impact	64	4.4	0	0
Eucla-1	San Dimas	889	190	55	60	58	57	63	Impact	62	2.2	4	0
Walnut-1	San Dimas	922	70	55	65	62	61	66	Impact	67	1.9	32	0
Walnut-3	San Dimas	927	100	55	65	62	61	66	Impact	67	1.8	32	0
1st-1	La Verne	1002	60	55	65	64	61	66	Impact	68	2.7	5	0
1st-3	La Verne	1004	40	55	65	66	61	66	Impact	69	3.6	5	0
1st-5	La Verne	1006	36	55	65	67	61	66	Severe	69	3.9	0	5
1st-6	La Verne	1008	50	55	65	67	61	66	Severe	69	3.9	0	5
1st-9	La Verne	1013	56	55	65	65	61	66	Impact	68	2.9	5	0
1st-10	La Verne	1016	50	55	65	65	61	66	Impact	68	2.9	5	0
ULV-6	La Verne	1032	80	35	65	62	61	66	Impact	67	1.6	24	0
ULV-7	La Verne	1034	80	30	65	62	61	66	Impact	67	1.9	24	0

TABLE 3-11.18 *continued (page 5 of 6)*
NOISE IMPACTS FOR CATEGORY 2 LAND USE
PHASE II, SEGMENT 2
DOUBLE TRACK CONFIGURATIONS

Location	City	Civil Stn	Dist to Near Track (ft)	Speed (mph)	Exist. Noise Level[1]	Project Noise Level[1]			Impact Category	Total Noise Level[1,3]	Noise Level Increase[1,3]	# of Res Impacts	
						Pred[2,3]	Impact Criteria					Imp	Sev
							Imp	Sev					
White-1	La Verne	1050	70	55	62	63	59	64	Impact	66	3.7	3	0
Sierra-12	La Verne	1075	140	55	62	59	59	64	Impact	64	1.8	4	0
Bonita-1	Pomona	1145	110	55	62	59	58	64	Impact	64	1.9	24	0
Bonita-3	Claremont	1150	90	55	62	61	58	64	Impact	64	2.5	16	0
Bonita-5	Claremont	1157	100	55	62	60	58	64	Impact	64	2.2	16	0
Bonita-6	Claremont	1163	40	55	62	68	58	64	Severe	69	7.3	0	8
Bonita-8	Claremont	1165	100	55	62	62	58	64	Impact	65	2.9	20	0
Bonita-11 (EST FUTURE)	Claremont	1169	60	55	62	63	58	64	Impact	66	3.9	16	0
Bonita-14 (EST FUTURE)	Claremont	1173	60	55	62	63	58	64	Impact	66	3.9	16	0
Bonita-15 (EST FUTURE)	Claremont	1177	60	55	62	63	58	64	Impact	66	3.9	32	0
Bonita-16 (EST FUTURE)	Claremont	1179	60	50	62	63	58	64	Impact	66	3.6	24	0
*Claremont-1	Claremont	1228	100	55	63	60	59	64	Impact	65	1.9	3	0
*Claremont-11	Claremont	1231	80	55	63	63	59	64	Impact	66	3.1	2	0
*Claremont-4	Claremont	1231	100	55	63	63	59	64	Impact	66	3.2	4	0
*Claremont-12	Montclair	1235	70	55	63	64	59	64	Impact	66	3.6	4	0
*Claremont-7	Montclair	1235	90	55	63	62	59	64	Impact	65	2.7	5	0
*Claremont-13	Montclair	1238	80	55	63	62	59	64	Impact	65	2.5	2	0
*Claremont-9	Montclair	1239	90	55	63	61	59	64	Impact	65	2.2	5	0
*Monte Vista-2 (EST FUTURE)	Montclair	1259	80	20	63	63	59	64	Impact	66	3.1	5	0
*Monte Vista-3 (EST FUTURE)	Montclair	1263	80	28	63	65	59	64	Severe	67	4.2	0	5
*Monte Vista-4 (EST FUTURE)	Montclair	1265	80	50	63	69	59	64	Severe	70	7.5	0	5
**Claremont-1	Claremont	1230	80	55	65	63	60	66	Impact	67	2.4	8	0
**Claremont-3	Claremont	1232	60	55	65	64	60	66	Impact	67	2.7	2	0

TABLE 3-11.18 *continued (page 6 of 6)*
NOISE IMPACTS FOR CATEGORY 2 LAND USE
PHASE II, SEGMENT 2
DOUBLE TRACK CONFIGURATIONS

Location	City	Civil Stn	Dist to Near Track (ft)	Speed (mph)	Exist. Noise Level[1]	Project Noise Level[1]			Impact Category	Total Noise Level[1,3]	Noise Level Increase[1,3]	# of Res Impacts	
						Pred[2,3]	Impact Criteria					Imp	Sev
							Imp	Sev					

1. Noise levels are based on Ldn and are measured in dBA. Noise levels are rounded to the nearest decibel except for the increase in noise level, which is given to the nearest one-tenth decibel to provide a better resolution for assessing noise impact.
2. Predicted levels include a 5dBA penalty applied to audible signal noise, where applicable.
3. The reported noise levels represent the highest noise levels for each location.

* These noise-sensitive locations only apply to the Baseline Alternative (north of the Montclair Station Park and Ride).

** These noise-sensitive locations only apply to the Option G Alternative (south of the Montclair Station Park and Ride).

Source: Harris, Miller, Miller & Hanson, 2003

Similar to the Category 2 analysis, an assessment of noise impact for Category 3 receptors was also conducted for Phase II, Segment 2 LRT Double Track configurations. Although Category 3 includes parklands, since they are all used for sports and other active recreation, they would not be considered as noise-sensitive and are not included in the evaluation. This assessment was based on a comparison of the existing ambient noise level with the predicted project noise levels in terms of the peak transit hour Leq. Table 3-11.19 lists the noise impacts for institutional receptors.

TABLE 3-11.19
NOISE IMPACTS FOR CATEGORY 3 LAND USE
PHASE II, SEGMENT 2
DOUBLE TRACK CONFIGURATIONS

Location	City	Civil Stn	Dist to Near Track (ft)	Speed (mph)	Exist. Noise Level[1]	Project Noise Level[1]			Impact Category	Total Noise Level[1]	Noise Level Increase[1]
						Pred[2]	Impact Criteria				
							Imp	Sev			
Alameda-1	Azusa	563	60	23	49	59	58	64	Impact	59	10.8
Pasadena-8 (Baseball)	Azusa	584	100	55	49	60	58	64	Impact	60	11.9
Palm-0	Azusa	599	120	55	51	60	59	65	Impact	60	8.8
Grande-1	Glendora	671	60	55	51	64	58	65	Impact	64	13.6
Foothill-1	Glendora	673	60	55	51	63	58	65	Impact	64	13.0
Foothill-2	Glendora	675	50	55	51	65	58	65	Severe	65	14.2
Foothill-3	Glendora	678	60	55	51	63	58	65	Impact	64	12.9
Pasadena-6 (Future)	Glendora	709	70	55	52	63	59	65	Impact	64	11.2
Pasadena-7 (Future)	Glendora	711	60	55	52	64	59	65	Impact	65	12.5
ULV-2	La Verne	1025	70	53	57	62	61	67	Impact	63	6.5
ULV-4	La Verne	1030	20	40	57	69	61	67	Severe	70	12.6

1. Noise levels are based on Ldn and are measured in dBA. Noise levels are rounded to the nearest decibel except for the increase in noise level, which is given to the nearest one-tenth decibel to provide a better resolution for assessing noise impact.
2. Predicted levels include a 5dBA penalty applied to audible signal noise, where applicable.

This noise-sensitive location only applies to the Option G Alternative (south of the Montclair Station Park and Ride).

Source: Harris, Miller, Miller & Hanson, 2003.

The following are brief descriptions of each Category 3 land use area where a noise impact was calculated:

- Alameda: South of the rail alignment between Alameda Avenue and Dalton Avenue in Azusa, the Azusa Historical Museum would be exposed to noise impact. This museum would be impacted due to its proximity to the rail lines (80 feet), the speed of the LRT vehicles, and the exposure to audible warning signals (bells and whistles) at the Dalton Avenue grade crossing.
- Pasadena: South of the rail alignment west of Palm Drive in Azusa, one school building at Azusa Pacific University would be exposed to noise impact. This school would be exposed to impact due to its proximity to the rail lines (102 to 120 feet), the speed of the LRT vehicles, and the exposure to audible warning signals (bells and whistles) at the Palm Drive grade crossing.

- Foothill / Vermont: Between Foothill Boulevard and Vermont Avenue on the north and south sides of the rail alignment in Glendora, two medical buildings would be exposed to noise impact, one senior center educational building would be exposed to severe noise impact, and one medical building would be exposed to severe noise impact. These buildings all would be impacted due to their proximity to the rail lines (44 to 76 feet) and the speed of the LRT vehicles. The medical building north Foothill Boulevard also would be exposed to audible warning signals (bells and whistles) at the Foothill Boulevard and Grand Avenue grade crossing.
- Pasadena (future): South of the rail alignment to the west of Pasadena Avenue in Glendora, a future preschool and future medical building would be exposed to noise impact. These buildings would be impacted due to their proximity to the rail lines (80 to 90 feet), the speed of the LRT vehicles, and their exposure to audible warning signals (bells and whistles) at Pasadena Avenue grade crossing.
- University of La Verne: Between B Street and Fairplex Drive north of the rail alignment at the University of La Verne a school building would be exposed to noise impact. This school building would be exposed to impact due to its proximity to the near track (20 and 70 feet), the speed of the LRT vehicles, and audible warning signals (bells and whistles) at D Street.

Vibration

Table 3-11.20 lists the vibration impacts for Category 2 land use for Phase II, Segment 2 LRT Double Track configurations. Although the forecasted impacts at specific locations are different, the same locations as in the Triple Track configurations are affected. The locations are the same as previously described for the Triple Track configurations following Table 3-11.11.

TABLE 3-11.20
VIBRATION IMPACTS FOR CATEGORY 2 LAND USE
PHASE II, SEGMENT 2
DOUBLE TRACK CONFIGURATIONS

Location	City	Civil Stn	Dist to Near Track (ft)	Speed (mph)	Project Vibration Level[1,2]	Vibration Impact Criterion[1]	No. of Res. Impacts
6th-3	Azusa	528	70	55	74	72	2
6th-5	Azusa	533	100	55	76	72	4
6th-4	Azusa	533	50	55	77	72	4
Lime-1	Azusa	537	90	55	72	72	2
Foothill-3	Azusa	543	90	55	77	72	6
Foothill-4	Azusa	543	140	55	72	72	2
Foothill-1	Azusa	543	60	55	76	72	20
Foothill-2	Azusa	546	60	55	80	72	5
Foothill-7	Azusa	549	140	55	72	72	5
Foothill-6	Azusa	550	70	55	79	72	4
Foothill-8	Azusa	551	100	55	76	72	2
San Gabriel-2	Azusa	551	90	40	76	72	1
San Gabriel-3	Azusa	551	130	40	72	72	1
San Gabriel-1	Azusa	551	40	40	81	72	1
San Gabriel-6	Azusa	552	100	38	75	72	16
Dalton-5	Azusa	567	120	55	74	72	12

TABLE 3-11.20 *continued (page 2 of 4)*
VIBRATION IMPACTS FOR CATEGORY 2 LAND USE
PHASE II, SEGMENT 2
DOUBLE TRACK CONFIGURATIONS

Location	City	Civil Stn	Dist to Near Track (ft)	Speed (mph)	Project Vibration Level[1,2]	Vibration Impact Criterion[1]	No. of Res. Impacts
Dalton-2	Azusa	568	120	35	73	72	1
Soldano-1	Azusa	572	50	45	80	72	4
Soldano-2	Azusa	573	110	48	74	72	3
Pasadena-1	Azusa	574	40	50	83	72	18
Pasadena-2	Azusa	575	110	55	75	72	12
Pasadena-7	Azusa	578	60	55	80	72	24
Pasadena-5	Azusa	579	130	55	73	72	36
9th-1 (EST FUTURE)	Azusa	580	80	55	78	72	15
9th-2 (EST FUTURE)	Azusa	583	80	55	78	72	15
9th-3 (EST FUTURE)	Azusa	586	80	55	78	72	15
9th-4 (EST FUTURE)	Azusa	590	80	55	78	72	15
9th-5 (EST FUTURE)	Azusa	593	80	55	78	72	15
9th-6 (EST FUTURE)	Azusa	596	80	48	76	72	15
9th-7 (EST FUTURE)	Azusa	599	80	40	76	72	12
Palm-1	Azusa	602	100	55	76	72	12
9th-8 (EST FUTURE)	Azusa	603	80	30	75	72	12
9th-10 (EST FUTURE) (NEAR STAT)	Azusa	611	80	35	74	72	15
9th-11 (EST FUTURE)	Glendora	614	80	55	78	72	15
Amber Oaks-1	Glendora	616	70	35	77	72	16
9th-12 (EST FUTURE)	Glendora	619	80	55	78	72	15
Meadow Oaks-1	Glendora	620	90	48	76	72	12
Ranger-1	Glendora	623	60	53	80	72	3
9th-13 (EST FUTURE)	Glendora	623	80	55	78	72	15
Carera-1	Glendora	626	70	55	79	72	3
9th-14 (EST FUTURE)	Glendora	627	80	55	78	72	15
Carera-2	Glendora	628	70	55	79	72	4
Oakbank-1	Glendora	631	60	55	80	72	2
9th-15 (EST FUTURE)	Glendora	631	80	55	78	72	15
Ashworth-1	Glendora	634	60	55	80	72	5
9th-16 (EST FUTURE)	Glendora	634	80	55	78	72	12
Ashworth-2	Glendora	636	110	55	75	72	2
Marcile-2	Glendora	640	110	55	75	72	5
Marcile-1	Glendora	641	60	55	80	72	4
Lowell-1	Glendora	644	60	55	80	72	6
Grande-2	Glendora	677	100	55	75	72	8
Vermont-3	Glendora	688	100	50	75	72	4
Glendora-1	Glendora	701	120	55	74	72	4
Lemon-1	Glendora	703	50	55	82	72	3
Lemon-2	Glendora	706	60	55	80	72	12
Lemon-4	Glendora	708	140	55	72	72	4
Pasadena-1	Glendora	710	60	55	80	72	2

TABLE 3-11.20 *continued (page 3 of 4)*
VIBRATION IMPACTS FOR CATEGORY 2 LAND USE
PHASE II, SEGMENT 2
DOUBLE TRACK CONFIGURATIONS

Location	City	Civil Stn	Dist to Near Track (ft)	Speed (mph)	Project Vibration Level[1,2]	Vibration Impact Criterion[1]	No. of Res. Impacts
Pasadena-2	Glendora	710	100	55	76	72	2
Pasadena-4	Glendora	713	40	55	84	72	4
Pasadena-5	Glendora	713	120	55	74	72	7
Lemon-6	Glendora	716	120	55	73	72	10
Lemon-5	Glendora	716	56	55	81	72	8
Lemon-7	Glendora	721	120	55	73	72	7
Alosta-1	Glendora	721	70	55	79	72	1
Alosta-4	Glendora	725	100	55	76	72	0
Lemon-8	Glendora	726	60	55	82	72	7
Lemon-11	Glendora	729	64	55	81	72	2
Glenwood-1	Glendora	734	70	55	80	72	4
Glenwood-3	Glendora	737	90	55	77	72	4
Elwood-1	Glendora	741	60	55	82	72	3
Alosta-5	Glendora	745	96	55	76	72	3
Lemon-14B	Glendora	746	64	55	81	72	6
Lemon-15	Glendora	746	50	55	84	72	6
Lemon-18	Glendora	755	60	55	82	72	7
Lemon-19	Glendora	757	50	55	84	72	7
Alosta-7	Glendora	762	90	55	77	72	2
St. Vladimir-1	Glendora	768	60	55	82	72	6
Alosta-10	Glendora	769	100	55	75	72	2
Alosta-12	Glendora	770	110	55	74	72	0
St. Vladimir-2	Glendora	775	90	55	77	72	6
Compromise Line-1	Glendora	778	40	55	87	72	4
Compromise Line-3	Glendora	780	30	55	90	72	4
Compromise Line-5	Glendora	784	64	55	81	72	5
Alosta-13	Glendora	789	110	55	74	72	3
Elkhorn-1	Glendora	794	100	55	75	72	1
Remuda-2	Glendora	796	110	55	74	72	2
Remuda-3	Glendora	797	60	55	82	72	7
Remuda-4	Glendora	803	60	55	82	72	8
Remuda-6	Glendora	806	110	55	74	72	3
Remuda-5	Glendora	807	60	55	82	72	4
Remuda-7	Glendora	809	110	55	74	72	4
Canyon Meadows-1	Glendora	810	80	55	78	72	2
Remuda-10	Glendora	811	80	55	78	72	3
Remuda-11	Glendora	813	70	55	80	72	3
Gladstone-1	Glendora	848	64	55	81	72	1
Gladstone-2	Glendora	848	100	55	75	72	1
Gladstone-1	San Dimas	850	80	55	78	72	4
Gladstone-3	San Dimas	852	80	55	78	72	4
Perlanna-1	San Dimas	863	70	55	80	72	3

TABLE 3-11.20 *continued (page 4 of 4)*
VIBRATION IMPACTS FOR CATEGORY 2 LAND USE
PHASE II, SEGMENT 2
DOUBLE TRACK CONFIGURATIONS

Location	City	Civil Stn	Dist to Near Track (ft)	Speed (mph)	Project Vibration Level[1,2]	Vibration Impact Criterion[1]	No. of Res. Impacts
Highland-1	San Dimas	866	60	55	82	72	2
Village-1	San Dimas	869	120	55	73	72	0
Eucla-3	San Dimas	888	100	55	75	72	0
Walnut-1	San Dimas	922	70	55	80	72	32
Walnut-3	San Dimas	927	100	55	75	72	32
1st-1	La Verne	1002	60	55	82	72	5
1st-3	La Verne	1004	40	55	76	72	5
1st-5	La Verne	1006	36	55	77	72	5
1st-6	La Verne	1008	50	55	73	72	5
1st-9	La Verne	1013	56	55	72	72	5
1st-10	La Verne	1016	50	55	73	72	5
Sierra-10	La Verne	1073	140	55	74	72	5
Garey-1	Pomona	1104	160	55	72	72	54
Roderick-2	Pomona	1126	150	55	73	72	6
Bonita-6	Claremont	1163	40	55	80	72	8
Bonita-11 (EST FUTURE)	Claremont	1169	60	55	73	72	16
Bonita-14 (EST FUTURE)	Claremont	1173	60	55	73	72	16
Bonita-15 (EST FUTURE)	Claremont	1177	60	55	73	72	32
Bonita-16 (EST FUTURE)	Claremont	1179	60	50	82	72	24
*Claremont-2	Claremont	1228	150	55	73	72	3
*Claremont-5	Claremont	1231	150	55	73	72	1
*Claremont-11	Claremont	1231	80	55	73	72	2
*Claremont-7	Montclair	1235	90	55	72	72	5
*Claremont-12	Montclair	1235	70	55	74	72	4
*Claremont-8	Montclair	1236	90	55	78	72	5
*Claremont-13	Montclair	1238	80	55	73	72	2
*Claremont-9	Montclair	1239	90	55	72	72	5
*Monte Vista-2 (EST FUTURE)	Montclair	1259	80	20	74	72	5
*Monte Vista-3 (EST FUTURE)	Montclair	1263	80	28	77	72	5
*Monte Vista-4 (EST FUTURE)	Montclair	1265	80	50	82	72	5
**Claremont-1	Claremont	1230	80	55	73	72	8
**Claremont-3	Claremont	1232	60	55	76	72	2

1. Vibration levels are measured in VdB referenced to 1 µin/sec.
2. The reported vibration level represents the maximum vibration level for each location.

* These noise-sensitive locations only apply to the Baseline Alternative (north of the Montclair Station Park and Ride).

** These noise-sensitive locations only apply to the Option G Alternative (south of the Montclair Station Park and Ride).

Source: Harris, Miller, Miller & Hanson, 2003.

Similar to the Category 2 analysis, an assessment of vibration impact for Category 3 receptors was also conducted for Phase II, Segment 2 LRT Double Track configurations. Table 3-11.21 lists the vibration impacts for Category 3 land use for Phase II, Segment 2 LRT Double Track configurations.

TABLE 3-11.21
VIBRATION IMPACTS FOR CATEGORY 3 LAND USE
PHASE II, SEGMENT 2
DOUBLE TRACK CONFIGURATIONS

Location	City	Civil Stn	Dist to Near Track (ft)	Speed (mph)	Project Vibration Level[1,2]	Vibration Impact Criterion[1]	No. of Impacts
Lime-3	Azusa	539	100	55	76	75	1
Grande-1	Glendora	671	60	55	82	75	1
Foothill-1	Glendora	673	60	55	82	75	1
Foothill-2	Glendora	675	50	55	84	75	1
Foothill-3	Glendora	678	60	55	82	75	1
Pasadena-6 (Future)	Glendora	709	70	55	80	75	1
Pasadena-7 (Future)	Glendora	711	60	55	82	75	1
ULV-4	La Verne	1030	20	40	88	75	1

1. Vibration levels are measured in VdB referenced to 1 µin/sec.
2. The reported vibration level represents the maximum vibration level for each location.

Source: Harris, Miller, Miller & Hanson, 2003.

The following are brief descriptions of each Category 3 land use area where a vibration impact was calculated:

- Lime: South of the rail alignment at station number 538+00 in Azusa, a medical building would be exposed to vibration impact. This building is located 100 feet from the near track. The vibration impact would be due to the proximity of the building to the near track and the speed of the LRT vehicles.
- Grande: East of Grande Avenue from station numbers 670+00 to 679+00, three medical buildings and one school building would be exposed to vibration impact. These buildings are located 50 to 60 feet from the near track. The vibration impacts would be due to the proximity of the buildings to the near track and the speed of the LRT vehicles.
- Pasadena (future): West of Pasadena Avenue on the south side of the alignment in Glendora, a future medical building and a future preschool would be expected to be impacted by vibration. These future buildings are estimated to be 60 to 70 feet from the near track. The vibration impact of these buildings would be due to the proximity of the buildings to the near track and the speed of the LRT vehicles.
- University of La Verne: North of the rail alignment at station number 1080+00, one school building at the University of La Verne would be exposed to vibration impact. This building is located 20 feet from the near track. The vibration impact would be due to the proximity of the building to the near track and the speed of the LRT vehicles.

Summary of Double Track Impacts for Full Build LRT Alternative

In Segments 1 and 2 of the Double Track configurations for the Full Build Alternative, there would be a total of 869 residences subject to noise impact and an additional 333 residences that would be exposed to severe noise impact. A total of 1,575 residences also would be subject to vibration for this Alternative. Of this total, 554 residences were located in areas where the vibration measurements indicated efficient propagation conditions resulting in greater than normal number of impacts. Category 3 land use impacts include four schools impacted by noise and one school exposed to severe noise impact. Three medical buildings would be exposed to noise impact and one medical building is exposed to severe noise impact. Category 3 vibration impacts include four medical buildings and four schools.

Summary of Double Track Impacts for Build LRT Alternative to Maintenance Facility

For Segment 1 of the Double Track configurations, there would be a total of 122 residences exposed to noise impact and an additional 87 homes exposed to severe noise impact. Vibration impacts for Segment 1 would include 575 residences and one school. Of this total, 554 residences were located in areas where the vibration measurements indicated efficient propagation conditions resulting in greater than normal number of impacts. Category 3 noise impacts include one school.

3-11.2.5 Cumulative Impacts

Metrolink commuter rail service on the San Bernardino Line is part of the existing noise and vibration environment in the area between La Verne and Montclair. Under No-Build and TSM options, Metrolink operations would continue to provide service as needed and there would be no cumulative impacts associated with the project. Metrolink service does not extend to Phase II Segment 1. Under the Full Build Alternative, the only areas with potential cumulative noise and vibration impacts associated with the Phase II Extension would occur in Segment 2. Relocation of the tracks within the right-of-way could slightly increase the noise exposure and vibration levels experienced by adjacent land use. The slight change in noise and vibration levels resulting from minor track shifts would be insignificant with respect to existing conditions. When added to the proposed LRT operations, the impacts would not change from those projected as long term impacts.

3-11.2.6 Impacts Addressed by Regulatory Compliance

a. Construction Period Impacts

Impacts that would arise from construction of any of the alternatives were identified in Section 3-11.2.3, above. Elimination or reduction of these construction period impacts would occur through two steps, as follows: (1) compliance with local, state or federal regulations or permits that have been developed by agencies to manage construction impacts, to meet legally established environmental impact criteria or thresholds, and/or to ensure that actions occurring under agency approvals or permits are in compliance with laws and policies, and (2) implementation of the proposed alternatives with additional construction period mitigation measures defined in Section 3-11.3.1. Following is a discussion of the construction period impacts for each of the alternatives that would be addressed by the first step, regulatory compliance.

No Build Alternative

For the No Build Alternative, only the planned construction of the Eastside LRT Extension would include construction-period noise impacts. These impacts are addressed in the Draft Supplemental Environmental Impact Statement/Draft Subsequent Environmental Impact Report for that project (FTA and LACMTA 2001). The other elements of the No Build Alternative include only minor construction activities for such items as new or improved bus shelters. Construction or improvements to shelters would typically require only a few days work. These short-term construction activities would not be expected to generate substantial amounts of noise. Other than the Eastside LRT construction in Los Angeles, no other construction period impacts noise impacts that would be adverse under NEPA or significant under CEQA would be expected in the other cities in Phase I, or in any of the cities in Phase II. It is assumed that any construction would occur during daytime hours, and under typical contractor conditions that include measures to limit the noise generated by equipment, which is consistent with local noise ordinances.

Transportation System Management (TSM) Alternative

Construction elements of the TSM Alternative would also be limited to possible bus shelters construction, which would be limited to a few days. This alternative does not include elements that would generate construction noise that would be of sufficient magnitude to be adverse under NEPA or significant under CEQA.

It is assumed that any construction would occur during daytime hours, and under typical contractor conditions that include measures to limit the noise generated by equipment, which is consistent with local noise ordinances.

LRT, Triple Track Configuration

There are no specific state or federal regulations concerning noise generated by construction activities. The FTA guidance manual offers some information on construction noise levels and mitigation options, which are discussed in more detail in the accompanying noise and vibration technical report.

At the local level, many cities and towns, including some along the Pasadena Gold Line Phase II Extension, have sections in their General Plans related to noise, and in some cases to construction noise specifically. These noise sections are typically guidance aimed at reducing noise within communities. Examples of these types of regulations include:

- Pasadena Revised Noise Element of the General Plan limits the hours of construction activity and requires contractors to “employ techniques to minimize noise.”
- Arcadia General Plan Chapter 5 has noise level restrictions for activities within the city.
- San Dimas General Plan Section VIII Noise Element states that for construction activities lasting less than 2-3 months the impact is minimal, but limits late night and weekend disturbance from construction activities.
- Limiting construction activities to weekday daytime hours (7 AM to 6 PM typically), and employing typical measures for limiting noise during construction would meet most, if not all local regulations and guidelines for construction activities. It should be noted that the Construction Authority is technically not subject to local ordinances, but would voluntarily comply with the ordinances to the extent possible. Limiting construction hours and using typical

construction practices, combined with the mitigation recommendations below in Section 3-11.3.1 would mitigate all construction noise impacts.

Phase I — The Cities Affected and the Results of Regulatory Compliance

The cities in Phase I are Los Angeles, South Pasadena, and Pasadena. There are no elements of the Triple Track configuration in the cities of Los Angeles, South Pasadena or in Pasadena west of the Sierra Madre Villa Station, so there would be no construction period impacts and no regulatory compliance.

Phase II, Segment 1 — The Cities Affected and the Results of Regulatory Compliance

Limiting construction activities to weekday daytime hours (usually 7 AM to 6 PM), and employing typical construction period noise-limiting practices, combined with the mitigation recommendations below in Section 3-11.3.1 would mitigate all construction noise impacts.

Phase II, Segment 2 – The Cities Affected and the Results of Regulatory Compliance

Limiting construction activities to weekday daytime hours (usually 7 AM to 6 PM), and employing typical construction period noise-limiting practices, combined with the mitigation recommendations below in Section 3-11.3.1 will mitigate all construction noise impacts.

Summary of Construction Period Impacts for Full Build Alternative, Triple Track Configuration, Addressed by Regulatory Compliance

Limiting construction activities to weekday daytime hours (usually 7 AM to 6 PM), and employing, typical construction period noise-limiting practices, combined with the mitigation recommendations below in Section 3-11.3.1 will mitigate all construction noise impacts for the cities in Segments 1 and 2.

Summary of Construction Period Impacts for Build LRT Alternative to Maintenance Facility, Triple Track Configuration Addressed by Regulatory Compliance

Construction period impacts in Segment 1 cities would be mitigated by limiting construction activities to weekday daytime hours (usually 7 AM to 6 PM), and employing, typical construction period noise-limiting practices, combined with the mitigation recommendations below in Section 3-11.3.1

LRT, Double Track Configurations

The regulatory compliance issues for the Double Track configurations are the same as described for the Tripe Track configuration.

Summary of Construction Period Impacts for Full Build Alternative, Double Track Configurations, Addressed by Regulatory Compliance

Construction period impacts in Phase II Segment 1 and 2 cities would be mitigated by limiting construction activities to weekday daytime hours (usually 7 AM to 6 PM), and employing, typical

construction period noise-limiting practices, combined with the mitigation recommendations below in Section 3-11.3.1.

Summary of Construction Period Impacts for Build LRT Alternative to Maintenance Facility, Double Track Configurations, Addressed by Regulatory Compliance

Construction period impacts in Phase II Segment 1 cities would be mitigated by limiting construction activities to weekday daytime hours (usually 7 AM to 6 PM), and employing, typical construction period noise-limiting practices, combined with the mitigation recommendations below in Section 3-11.3.1.

b. Long Term Impacts

Long term impacts associated with the alternatives were identified in Section 3-11.2.4, above. Elimination or reduction of these long-term impacts would occur through two steps, as follows: (1) compliance with local, state or federal regulations or permits that have been developed by agencies to manage construction impacts, to meet legally established environmental impact criteria or thresholds, and/or to ensure that actions occurring under agency approvals or permits are in compliance with laws and policies. (2) implementation of the proposed alternatives with additional mitigation measures defined in Section 3-11.3.2. Following is a discussion of the long-term impacts for each of the alternatives that would be addressed by the first step, regulatory compliance.

The No Build and TSM Alternatives do not include any elements that would result in long-term noise impacts and thus no regulatory compliance is required. There are no elements of the Triple Track or Double Track LRT Alternatives that result in long-term noise impacts after mitigation and thus no regulatory compliance is required. Additionally, there are no federal or state regulations pertaining to noise and/or vibration impacts from LRT operations. The California Public Utilities Commission (CPUC) General Order requires the sounding of at-grade warning devices during LRT operation. The effect of the General Order has been included in the noise impact analysis.

3-11.3 Potential Mitigation

3-11.3.1 Construction Period Mitigation Measures

Section 3-11.2.6a identified construction period impacts for which compliance with local, state, and federal regulations, permits, or similar types of requirements would eliminate or reduce such impacts. The following sections identify potential mitigation measures that would need to be implemented in order to address any remainder impacts (i.e., impacts that would still exist after regulatory compliance). The combination of regulatory compliance and these construction period mitigation measures would result in the reduction of construction period impacts to levels that would be not adverse under NEPA and less than significant under CEQA.

a. No Build Alternative

Other than the planned Eastside LRT Extension, the No Build Alternative does not require construction-period noise and vibration mitigation measures. These measures are defined in the environmental document for that project. It is assumed that construction of other elements of the No Build Alternative would occur during daytime hours, and under typical contractor conditions that include measures to limit the noise generated by equipment, and no further mitigation measures would be required.

b. Transportation Systems Management (TSM) Alternative Construction Period Mitigation

It is assumed that construction of all elements of the TSM Alternative would occur during daytime hours, and under typical contractor conditions that include measures to limit the noise generated by equipment, and no further mitigation measures would be required.

c. LRT, Triple Track Configuration Construction Period Mitigation

Phase I — The Cities Affected and Proposed Measures

The LRT, Triple Track configuration does not include any elements in the cities of Los Angeles, South Pasadena or in Pasadena west of the Sierra Madre Villa Station. No construction period measures are required.

Phase II, Segment 1 — The Cities Affected and Proposed Measures

The cities in Phase II, Segment 1 are Pasadena, Arcadia, Monrovia, Duarte, and Irwindale. In addition to the noise reduction that would result from voluntary regulatory compliance, consideration can be given to:

(1) including specific residential property line noise limits in the construction specifications for this project, and

(2) performing noise monitoring during construction to verify compliance with the limits. This approach allows the contractor flexibility to meet the noise limits in the most efficient and cost effective manner. Experience suggests that community annoyance with construction noise will be minimal if: the Resident Engineer is committed to minimizing excessive noise; noise

monitoring is performed to verify compliance with the noise limits; and a complaint resolution procedure is in place to rapidly address any problems that may develop. Avoiding vibration impacts during construction can be achieved through numeric limits in the construction specifications. The noise and Vibration Technical Report in the Appendices has more detail about construction activities, impact criteria, noise level limits and mitigation strategies.

Phase II, Segment 2 — The Cities Affected and Proposed Measures

The cities in Phase II, Segment 2 are Azusa, Glendora, San Dimas, La Verne, Pomona, Claremont, Montclair, and Upland. The recommended mitigation measures for these cities are the same as described for Segment 1.

Summary of Construction Period Mitigation Measures for Full Build LRT Alternative, Triple Track Configuration

For the Full Build LRT Triple Track configuration, in addition to typical noise limiting measures described under regulatory compliance, the following draft measures can be considered:

- including specific residential property line noise limits in the construction specifications for this project, and
- performing noise monitoring during construction to verify compliance with the limits.

Summary of Construction Period Mitigation Measures for Built LRT Alternative to Maintenance Facility, Triple Track Configuration

For the Built LRT Triple Track configuration to Maintenance Facility, in addition to typical noise limiting measures described under regulatory compliance, the following draft measures can be considered:

- including specific residential property line noise limits in the construction specifications for this project, and
- performing noise monitoring during construction to verify compliance with the limits.

d. LRT, Double Track Configurations Construction Period Mitigation

The same mitigations measures are recommended for the Double Track configurations as were described for the Triple Track configuration.

3-11.3.2 Long Term Mitigation

Section 3-11.2.6 identified long-term impacts for which compliance with local, state and federal regulations, permits, or similar types of requirements would eliminate or reduce such impacts. The following sections identify potential mitigation measures that would need to be implemented in order to address any remainder impacts (i.e., impacts that would still exist after regulatory compliance). The combination of regulatory compliance and these mitigation measures would result in the reduction of long term impacts to levels that would be not adverse under NEPA and less than significant under CEQA.

a. No Build Alternative

The No Build Alternative does not require long-term noise and vibration mitigation measures because no long-term impacts were identified for this alternative.

b. Transportation Systems Management (TSM) Alternative

The TSM Alternative does not require long-term noise and vibration mitigation measures because no impacts were identified for this alternative

c. LRT, Triple Track Configuration

There are no elements of the Triple Track configuration in the Phase I cities of Los Angeles, South Pasadena or Pasadena. The following measures would apply in Phase II cities only.

Noise Impact Mitigation

Potential mitigation measures for reducing noise impacts from LRT operations are described below. During Preliminary Engineering, more detailed noise impact analysis would be conducted to determine where and how these potential measures would be most effectively used to reduce impacts to less than the impact threshold. For instance, the final definition of the length and height of a noise barrier at a specific location would need to account for topography (the elevation of the LRT compared to the affected property), distance from track to property border, track curvature, any changes in assumptions about LRT operating speed, whether or not the location is also influenced by the sounding of at-grade warning devices, etc.

- **Noise Barriers -** This is a common approach to reducing noise impacts from surface transportation sources. The primary requirements for an effective noise barrier are that (1) the barrier must be high enough and long enough to break the line-of-sight between the sound source and the receiver, (2) the barrier must be of an impervious material with a minimum surface density of 4 lb/sq. ft. and (3) the barrier must not have any gaps or holes between the panels or at the bottom. Because numerous materials meet these requirements, the selection of materials for noise barriers is usually dictated by aesthetics, durability, cost, and maintenance considerations. Depending on the proximity of the barrier to the tracks and on the track elevation, transit system noise barriers typically range in height from between four and eight feet.
- **Building Sound Insulation** - Sound insulation of residences and institutional buildings to improve the outdoor-to-indoor noise reduction has been widely applied around airports and has seen limited application for transit projects. Although this approach has no effect on noise in exterior areas, it may be the best choice for sites where noise barriers are not feasible or desirable, and for buildings where indoor sensitivity is of most concern. Substantial improvements in building sound insulation (on the order of 5 to 10 dBA) can often be achieved by adding an extra layer of glazing to the windows, by sealing any holes in exterior surfaces that act as sound leaks, and by providing forced ventilation and air-conditioning so that windows do not need to be opened.

- **Relocation of Crossovers or Special Trackwork at Crossovers** - Because the impacts of LRT wheels over rail gaps at track crossover locations increases LRT noise by about 6 dBA, crossovers are a major source of noise impact when they are located in sensitive areas. If crossovers cannot be relocated away from residential areas, another approach is to use spring rail or moveable point frogs in place of standard rigid frogs at turnouts. These devices allow the flangeway gap to remain closed in the main traffic direction for revenue service trains.
- **LRT Speed Reductions in Sensitive Areas** - Speed reductions will always lower community noise levels, but they are not often implemented for noise control because of the negative impact on the LRT operating schedule. Thus, their impact on the operating schedule would need to be evaluated with respect to their potential noise mitigation benefits.
- **Grade Separation or Closure of Grade Crossings** – One of the largest components of noise is the bells and whistles used for safety reasons at grade crossings. Elimination of this noise would reduce the noise impact near grade crossings. Grade crossing noise can be eliminated by grade separations (elevated structures or underpasses), or by closure of grade crossings.
- **Modifications to At-grade Warning Devices and Operations**- Subject to the approval on a case-by-case basis by the CPUC, warning devices or their operation may be modified in ways that may reduce impacts in the vicinity of at-grade crossings. For instance, rather than using a whistle that broadcasts sound over a wide area, it may be possible to use a directional horn which focuses sound along an intersecting street. The time period during which warning bells sound as crossing gates are actuated (descend and arise) may also be modified by CPUC. A recent approval in how bells must be sounded at intersections in proximity to stations in Phase I cities, resulted in a much shorter time period in which the warning bells sound.

As discussed in Section 3-11.2.2, FTA states that in implementing noise impact criteria, severe impacts should be mitigated unless there are no practical means to do so. At the moderate impact level, more discretion should be used, and other project-specific factors should be included in the consideration of mitigation. These other factors can include the predicted increase over existing noise levels, the types and number of noise-sensitive land uses affected, existing outdoor-to-indoor sound insulation and the cost-effectiveness of mitigating noise to more acceptable levels.

Based on the results of the noise assessment, potential mitigation measures have been identified. The primary mitigation measure would be the construction of sound barrier walls to shield areas where impact is projected. **Tables 3-11.22 and 3-11.25** indicate the approximate noise barrier locations, lengths, and side of track as well as the number of moderate and severe impacts that would be reduced for Segment 1 and Segment 2, respectively. However, because barriers would not be practical for shielding receptors near grade crossings from the train and warning signal noise, sound insulation may need to be applied to such residences. **Tables 3-11.23 and 3-11.26** indicate areas that may be candidates for sound insulation for Segment 1 and Segment 2, respectively.

A number of residential areas on the corridor have existing noise barriers/privacy walls. The noise impact analysis did not include any noise reduction from existing walls along the corridor. The existing barriers were not included because it is not possible to assess the effectiveness of any barriers/privacy walls without more detailed plan and profile mapping of the corridor. In addition, many of the walls may not be effective as noise barriers due to construction, height, or any gaps that are present. During the final design of the project, the effectiveness of the existing barriers/privacy walls should be assessed and incorporated into any mitigation recommendations. It may be determined that a number of the existing barriers are effective for mitigation, or that some may only need to be repaired or raised slightly to provide the appropriate level of noise reduction. Thus, the recommendations in **Tables 3-11.22 and 3-11.25** could range from new noise barriers to slight modifications of existing walls to no action needed to provide adequate noise reduction.

Figures 3-11.9 through 3-11.22 show the approximate locations of the forecasted noise impacts and, correspondingly, where mitigation would likely be provided. As noted before, the final locations of noise impacts and of mitigation would be determined during Preliminary Engineering, and reported in the Final EIS/EIR.

FIGURE 3-11.9: PRELIMINARY NOISE IMPACT AREAS (1 OF 13)

CLICK HERE TO VIEW FIGURE 3-11.9

FIGURE 3-11.10: PRELIMINARY NOISE IMPACT AREAS (2 OF 13)

CLICK HERE TO VIEW FIGURE 3-11.10

FIGURE 3-11.11: PRELIMINARY NOISE IMPACT AREAS (3 OF 13)

CLICK HERE TO VIEW FIGURE 3-11.11

FIGURE 3-11.12: PRELIMINARY NOISE IMPACT AREAS (4 OF 13)

CLICK HERE TO VIEW FIGURE 3-11.2

FIGURE 3-11.13: PRELIMINARY NOISE IMPACT AREAS (5 OF 13)

CLICK HERE TO VIEW FIGURE 3-11.13

FIGURE 3-11.14: PRELIMINARY NOISE IMPACT AREAS (6 OF 13)

CLICK HERE TO VIEW FIGURE 3-11.14

FIGURE 3-11.15: PRELIMINARY NOISE IMPACT AREAS (7 OF 13)

CLICK HERE TO VIEW FIGURE 3-11.15

FIGURE 3-11.16: PRELIMINARY NOISE IMPACT AREAS (8 OF 13)

CLICK HERE TO VIEW FIGURE 3-11.16

FIGURE 3-11.17: PRELIMINARY NOISE IMPACT AREAS (9 OF 13)

CLICK HERE TO VIEW FIGURE 3-11.17

FIGURE 3-11.18: PRELIMINARY NOISE IMPACT AREAS (10 OF 13)

CLICK HERE TO VIEW FIGURE 3-11.18

FIGURE 3-11.19: PRELIMINARY NOISE IMPACT AREAS (11 OF 13)

CLICK HERE TO VIEW FIGURE 3-11.19

FIGURE 3-11.20: PRELIMINARY NOISE IMPACT AREAS (12 OF 13)

CLICK HERE TO VIEW FIGURE 3-11.20

FIGURE 3-11.21: PRELIMINARY NOISE IMPACT AREAS (13 OF 13)

CLICK HERE TO VIEW FIGURE 3-11.21

Vibration Impact Mitigation

Potential mitigation measures for reducing vibration impacts from LRT operations are described below. In general, vibration mitigation measures would occur with the rail right-of-way, rather than on private property.

- **LRT Speed Reductions in Sensitive Areas** - Speed reductions will always lower ground-borne vibration levels, but they are not always a feasible vibration control measure because of the negative impact on the LRT operating schedule. Thus, their impact on the operating schedule will need to be evaluated with respect to their potential vibration mitigation benefits.
- **Ballast Mats** - A ballast mat consists of a pad made of rubber or rubber-like material placed on an asphalt or concrete base with the normal ballast, ties and rail on top. The reduction in ground-borne vibration provided by a ballast mat is strongly dependent on the frequency content of the vibration and design and support of the mat.
- **Tire Shred or Recycled Rubber Chip Underlay:** A 12-inch-thick resilient layer of recycled rubber chips placed beneath the sub-ballast layer of standard open ballast and tie track could be incorporated into the track design. This mitigation method would provide results similar to ballast mats, and would also be strongly dependent on the frequency content of the vibration.
- **Floating Slabs** - Floating slabs consist of thick concrete slabs supported by resilient pads on a concrete foundation; the tracks are mounted on top of the floating slab. Most successful floating slab installations are in subways, and their use for at-grade track is less common. Although floating slabs are designed to provide vibration reduction at lower frequencies than ballast mats, they are extremely expensive.
- **Relocation of Crossovers or Special Trackwork** - Because the impacts of wheels over rail gaps at track crossover locations increases vibration by about 10 VdB, crossovers are a major source of vibration impact when they are located in sensitive areas. If crossovers cannot be relocated away from residential areas, another approach is to use spring-rail or moveable point frogs in place of standard rigid frogs at turnouts. These devices allow the flangeway gap to remain closed in the main traffic direction for revenue service trains.
- **Property Acquisitions or Easements** – Additional options for avoiding vibration impacts (and noise impacts also) are for the transit agency to purchase residences likely to be subject to severe impact by train operations or to acquire easements for such residences by paying the homeowners to accept the future train vibration conditions. These approaches are usually taken only in isolated cases where other mitigation options are infeasible, impractical, or too costly.

Vibration impacts that exceed FTA criteria are considered to be significant and to warrant mitigation, if reasonable and feasible. **Tables 3-11.24 and 3-11.27** indicate the civil stations along the corridor where mitigation has been recommended to reduce the vibration levels, for Segment 1 and Segment 2, respectively. At a minimum, mitigation would require the installation of ballast mats. However, more extensive mitigation may be required to adequately reduce the vibration levels to below the FTA vibration impact criterion. In addition, localized speed reductions may reduce vibration levels to below the FTA vibration impact criterion. Vibration mitigation will be addressed in more detail during final design.

Phase I — The Cities Affected and Proposed Measures

Since there are no noise and vibration impacts in Phase I cities as a result of the Triple Track configuration, no mitigation measures are proposed.

Phase II, Segment 1 — The Cities Affected and Proposed Measures

Noise

Table 3-11.22 lists the preliminary locations for potential noise barrier mitigation along Phase II, Segment 1, including the length of barrier in feet. Specific detail of noise barriers, including the height, would be determined during Preliminary Engineering, when more information is available. Noise barriers will be designed to adequately reduce the noise levels to below the FTA noise impact criteria. **Table 3-11.23** lists preliminary locations of potential sound insulation for noise mitigation along Phase II, Segment 1, where noise barriers would not be practical or cost effective, primarily near grade crossings and where sound insulation would be necessary. Although the intent of sound insulation is to reduce forecasted noise to less than the impact threshold, there may be circumstances where impacts cannot be reduced to less than the threshold, such as close proximity of particular location to a grade-crossing.

TABLE 3-11.22
PRELIMINARY LOCATIONS FOR
POTENTIAL NOISE BARRIER MITIGATION TREATMENT
PHASE II, SEGMENT 1
TRIPLE TRACK CONFIGURATION

Location	City	Side of Track	Civil Station	Approx. Length (ft)	Number of Impacts[1]	
					Impact	Severe
San Luis Rey	Arcadia	South	139 to156	1700	11	4
Cornell	Arcadia	North	150 to 157	700	22	0
2nd	Arcadia	North	183 to 188	300	Hotel	0
Arcadia High	Arcadia/ Monrovia	South	191 to 217	2600	0	24 & 1 Park
Anita/ Alamitas/ Mayflower	Monrovia	South	225 to 240	2100	9	12
Montana/Diamond	Monrovia	North	218 to 240	2200	8	58
Mayflower	Monrovia	South	241 to 246	500	0	40
Hamilton	Duarte	North	324 to 328	400	7	0
Hamilton	Duarte	North	333 to 338	500	7	0
Duarte	Duarte	South	316 to 337	2100	13	0
Hamilton	Duarte	North	339 to 359	2000	27	6
Duarte	Duarte	South	342 to 348	600	15	0

1. Number of impacts mitigated by the proposed noise barrier.

Source: Harris, Miller, Miller & Hanson, 2003

TABLE 3-11.23
PRELIMINARY LOCATIONS FOR
POTENTIAL SOUND INSULATION MITIGATION TREATMENT LOCATIONS
PHASE II, SEGMENT 1
TRIPLE TRACK CONFIGURATION

Location	City	Side of Track	Civil Station	Number of Impacts[1]	
				Impact	Severe
Anita	Monrovia	South	221	0	4
Diamond	Monrovia	North	231	0	5
Diamond	Monrovia	North	237	0	6
Mayflower	Monrovia	South	240	4	2
Mayflower	Monrovia	North	241	0	1
Genoa	Monrovia	South	250	0	20
Duarte	Duarte	South	315	4	0

1. Number of impacts mitigated by the proposed sound insulation.

Source: Harris, Miller, Miller & Hanson, 2003.

Vibration

Table 3-11.24 lists the locations for potential vibration mitigation along Phase II, Segment 1, including the length of mitigation in feet. At a minimum, vibration mitigation would require the installation of ballast mats. However, more extensive mitigation may be required to adequately reduce the vibration levels to below the FTA vibration impact criterion. Specific recommendations on vibration mitigation will be addressed in more detail during final design.

TABLE 3-11.24
PRELIMINARY LOCATIONS FOR
POTENTIAL VIBRATION MITIGATION TREATMENT,
PHASE II, SEGMENT 1
TRIPLE TRACK CONFIGURATION

Location	City	Civil Station	Approx. Length (ft)	Number of Impacts[1]
Arboleda	Pomona	34 to 41	700	15
Foothill	Arcadia	52 to 161	10900	192
2nd	Arcadia	183 to 187	400	2 Hotels
3rd	Arcadia	197 to 206	900	34 & High School
Contented	Monrovia	206 to 253	4700	313
Hamilton	Duarte	346 to 359	1300	21

1. Number of impacts mitigated by the proposed vibration mitigation.

Source: Harris, Miller, Miller & Hanson, 2003

Phase II, Segment 2 — The Cities Affected and Proposed Measures

Noise

Table 3-11.25 lists the preliminary locations for potential noise barrier mitigation along Phase II, Segment 2, including the approximate length of barrier in feet. Specific detail of noise barriers, including the height, need to be determined during Preliminary Engineering, when more information is available. Noise barriers will be designed to adequately reduce the noise levels to below the FTA noise impact criteria. **Table 3-11.26** lists preliminary locations of potential sound insulation for noise mitigation along Phase II, Segment 2, where noise barriers would not be practical or cost effective, primarily near grade crossings and where noise insulation would be necessary. Although the intent of sound insulation is to reduce forecasted noise to less than the impact threshold, there may be circumstances where impacts cannot be reduced to less than the threshold, such as a property in close proximity to an at-grade crossing.

TABLE 3-11.25
PRELIMINARY LOCATIONS FOR
POTENTIAL NOISE BARRIER MITIGATION TREATMENT,
PHASE II, SEGMENT 2
TRIPLE TRACK CONFIGURATION

Location	City	Side of Track	Civil Station	Approx. Length (ft)	Number of Impacts[1]	
					Impact	Severe
6th/ Lime/ Foothill	Azusa	South	528 to 553	2500	35 + Med	0
San Gabriel	Azusa	North	549 to 551	200	0	1
9th	Azusa	North	573 to 601	2800	126	0
Pasadena	Azusa	South	582 to 585	300	0	Park
Palm	Azusa	South	602 to 606	400	8	0
Palm	Azusa	North	602 to 605	300	12	0
9th	Glendora	North	612 to 638	2600	32	57
9th	Glendora	South	614 to 637	2300	38	17
Marcile	Glendora	South	638 to 647	900	0	5
Alosta	Glendora	South	720 to 726	600	1 Hotel	1
Alosta	Glendora	South	760 to 763	300	2	0
Alosta	Glendora	South	767 to 772	500	2 & 1 Hotel	0
St. Vladimir	Glendora	North	771 to 776	500	6	0
Compromise Line	Glendora	North	783 to 787	400	0	5
Remuda	Glendora	North	794 to 816	2200	8	19
Gladstone	Glendora	South	847 to 849	200	1	1
Gladstone	San Dimas	South	850 to 853	300	4	0
Gladstone	San Dimas	North	850 to 854	400	4	0
Highland	San Dimas	North	862 to 875	1300	35	2
Walnut	San Dimas	North	920 to 930	1000	96	0
1st	La Verne	North	998 to 1010	1200	10	10
1st	La Verne	North	1011 to 1016	500	10	0
Univ. La Verne	La Verne	North	1024 to 1029	500	Park	0
White	La Verne	North	1049 to 1052	300	3	0
Sierra	La Verne	South	1074 to 1077	300	4	0

TABLE 3-11.25 *continued*
PRELIMINARY LOCATIONS FOR POTENTIAL NOISE BARRIER MITIGATION TREATMENT, PHASE II, SEGMENT 2 TRIPLE TRACK CONFIGURATION

Location	City	Side of Track	Civil Station	Approx. Length (ft)	Number of Impacts[1]	
					Impact	Severe
Bonita	Claremont	South	1149 to 1153	400	16	0
Bonita	Claremont	North	1163 to 1181	1800	108	0
*Claremont	Claremont	North	1226 to 1233	700	7	0
*Claremont	Claremont	North	1235 to 1241	600	10	0
*Claremont	Claremont	South	1230 to 1233	300	2	0
*Claremont	Claremont	South	1234 to 1241	700	6	0
*Claremont	Claremont	North	1257 to 1269	1200	5	10
**Claremont	Claremont	South	1229 to 1232	300	8	0
**Claremont	Claremont	North	1230 to 1233	300	2	0

1. Number of impacts mitigated by the proposed noise barrier.
* These noise-sensitive locations only apply to the Baseline Alternative (north of the Montclair Station Park and Ride).
** These noise-sensitive locations only apply to the Option G Alternative (south of the Montclair Station Park and Ride).

TABLE 3-11.26
PRELIMINARY LOCATIONS FOR POTENTIAL SOUND INSULATION MITIGATION TREATMENT, PHASE II, SEGMENT 2 TRIPLE TRACK CONFIGURATION

Location	City	Side of Track	Civil Station	Number of Impacts[1]	
				Impact	Severe
6th	Azusa	South	524 to 526	5	0
San Gabriel	Azusa	North	552	16	0
Dalton	Azusa	South	570 to 573	4	0
Pasadena	Azusa	South	574 to 577	0	18
Palm	Azusa	South	593 to 601	1 School	0
Marcile	Glendora	South	638 to 647	0	10
Foothill	Glendora	South	672 to 679	1 School & 1 Medical	1 Medical
Grande	Glendora	North	670	0	1 Medical
Grande	Glendora	North	675 to 685	11	0
Vermont	Glendora	South	687	4	0
Glendora	Glendora	North	700 to 712	10	17
Pasadena	Glendora	South	708 to 711	1 School & 1 Medical	0
Lemon	Glendora	North	712 to 734	10	28
Glenwood	Glendora	North	734 to 740	0	8
Lemon	Glendora	North	740 to 758	7	22
St. Vladimir	Glendora	North	767 to 771	0	6

TABLE 3-11.26 *continued*
PRELIMINARY LOCATIONS FOR POTENTIAL SOUND INSULATION MITIGATION TREATMENT, PHASE II, SEGMENT 2 TRIPLE TRACK CONFIGURATION

Location	City	Side of Track	Civil Station	Number of Impacts[1]	
				Impact	Severe
Compromise Line	Glendora	North	775 to 783	0	8
Eucla	San Dimas	South	888	1 Hotel	0
Univ. La Verne	La Verne	North	1030 to 1035	48 & 1 School	0
Bonita	Claremont	North	1159 to 1163	0	8

1. Number of impacts mitigated by the proposed sound insulation.

Source: Harris, Miller, Miller & Hanson, 2003

Vibration

Table 3-11.27 lists the preliminary locations for potential vibration mitigation along Phase II, Segment 2, including the approximate length of mitigation in feet. At a minimum, vibration mitigation would require the installation of ballast mats. However, more extensive mitigation may be required to adequately reduce the vibration levels to below the FTA vibration impact criterion. Specific recommendations on vibration mitigation will be addressed in more detail during Preliminary Engineering.

TABLE 3-11.27
PRELIMINARY LOCATIONS FOR POTENTIAL VIBRATION MITIGATION TREATMENT, PHASE II, SEGMENT 2 TRIPLE TRACK CONFIGURATION

Location	City	Civil Station	Approx. Length (ft)	Number of Impacts[1]
6th/ Lime/Foothill	Azusa	524 to 553	2900	80 & 1 Medical
Dalton/ Pasadena/ 9th	Azusa	566 to 612	4600	251
9th/ Ranger/ Ashworth	Glendora	612 to 646	3400	152
Foothill	Glendora	670 to 688	1800	12 & 1 School & 3 Medical
Glendora to I-210	Glendora	700 to 816	11600	185 & 2 Hotels & 1 Medical & 1 School
Gladstone	Glendora	847 to 849	200	2
1st	La Verne	999 to 1016	1700	30
Univ. La Verne	La Verne	1029 to 1031	200	School
Garey	Pomona	1103 to 1107	400	54
Roderick	Pomona	1125 to 1130	500	6
Bonita	Pomona	1145 to 1163	1800	92
Bonita	Pomona	1168 to 1180	1200	88
*Claremont	Montclair	1228 to 1232	400	10

TABLE 3-11.27 *continued*
PRELIMINARY LOCATIONS FOR POTENTIAL VIBRATION MITIGATION TREATMENT, PHASE II, SEGMENT 2 TRIPLE TRACK CONFIGURATION

Location	City	Civil Station	Approx. Length (ft)	Number of Impacts[1]
**Claremont	Claremont	1230 to 1233	300	2
**Claremont	Montclair	1235 to 1240	500	21
**Monte Vista	Montclair	1257 to 1268	1100	15

1. Number of impacts mitigated by the proposed vibration mitigation.
* These locations only apply to the Baseline Alternative (north of the Montclair Station Park and Ride).
** These locations only apply to the Option G Alternative (south of the Montclair Station Park and Ride).

Source: Harris, Miller, Miller & Hanson, 2003

Summary of Long Term Mitigation Measures for Full Build LRT Alternative, Triple Track Configuration

Based on initial forecasts, for Segments 1 and 2 of the Triple Track configuration, there is a total of approximately 44,800 feet of noise barrier needed for noise mitigation and 286 residences where sound insulation would be needed to provide mitigation. Combinations of potential vibration mitigation measures described in this section along approximately 51,500 feet of the alignment would provide mitigation for the 1575 identified vibration impacts.

Summary of Long Term Mitigation Measures for Built LRT Alternative to Maintenance Facility, Triple Track Configuration

Based on initial forecasts, for Segment 1 of the Triple Track configuration, there would be approximately 15,700 feet of noise barrier needed to mitigate 263 noise impacts and 46 residences that would need sound insulation mitigation. Combinations of potential vibration mitigation measures described in this section along about 18,900 feet of the alignment would provide mitigation for the 575 identified vibration impacts in Segment 1.

d. LRT, Double Track Configurations

Potential mitigation measures for reducing noise impacts from LRT operations for the Double Tack configurations are the same as described for the Triple Track configuration.

Based on the initial results of the noise assessment, potential mitigation measures have been identified. The primary mitigation measure would be the construction of sound barrier walls to shield areas where impact is projected. **Tables 3-11.28 and 3-11.31** indicate the approximate noise barrier locations, lengths, and side of track as well as the number of moderate and severe impacts that would be reduced for Segment 1 and Segment 2, respectively. However, because barriers would not be practical for shielding receptors near grade crossings from the train and warning signal noise, sound insulation may need to be applied to such residences. **Tables 3-11.29 and 3-11.32** indicate areas that may be candidates for sound

insulation for Segment 1 and Segment 2, respectively. Although the intent of sound insulation is to reduce forecasted noise to less than the impact threshold, there may be circumstances where impacts cannot be reduced to less than the threshold.

A number of residential areas on the corridor have existing noise barriers/privacy walls. The noise impact analysis did not include any noise reduction from existing walls along the corridor. The existing barriers were not included because it is not possible to assess the effectiveness of any barriers/privacy walls without more detailed plan and profile mapping of the corridor. In addition, many of the walls may not be effective as noise barriers due to construction, height, or any gaps that are present. During the final design of the project, the effectiveness of the existing barriers/privacy walls should be assessed and incorporated into any mitigation recommendations. It may be determined that a number of the existing barriers are effective for mitigation, or that some may only need to be repaired or raised slightly to provide the appropriate level of noise reduction. Thus, the recommendations in **Table 3-11.28 and 3-11.31** could range from new noise barriers to slight modifications of existing walls to no action needed to provide adequate noise reduction.

Vibration Impact Mitigation

Potential mitigation measures for reducing vibration impacts from LRT operations for Double Track configurations are the same as described for the Triple Track configuration.

Phase I — The Cities Affected and Proposed Measures

Since there are no noise and vibration impacts in Phase I cities as a result of the Double Track configuration, no mitigation measures are proposed.

Phase II, Segment 1 — The Cities Affected and Proposed Measures

Noise

Although the Double Track configuration would generate different noise levels at specific locations, compared to the Triple Track configuration, the locations of impacts and the degree of effect (impact or severe) are the same. Accordingly, Figures 3-11.9 through 3-11.18 show the locations of forecasted noise impacts and of potential mitigation for any of the LRT configurations.

Table 3-11.28 lists the preliminary locations for potential noise barrier mitigation along Phase II, Segment 1, including the approximate length of barrier in feet. Specific detail of noise barriers, including the height, need to be determined during Preliminary Engineering, when more information is available. Noise barriers will be designed to adequately reduce the noise levels to below the FTA noise impact criteria. **Table 3-11.29** lists preliminary locations of potential sound insulation for noise mitigation along Phase II, Segment 1, where noise barriers would not be practical or cost effective, primarily near grade crossings and where noise insulation would be necessary. Although the intent of sound insulation is to reduce forecasted noise to less than the impact threshold, there may be circumstances where impacts cannot be reduced to less than the threshold, such as property in close proximity to an at-grade crossing..

TABLE 3-11.28
PRELIMINARY LOCATIONS FORPOTENTIAL NOISE BARRIER MITIGATION TREATMENT
PHASE II, SEGMENT 1
DOUBLE TRACK CONFIGURATIONS

Location	City	Side of Track	Civil Station	Approx, Length (ft)	Number of Impacts[1]	
					Impact	Severe
San Luis Rey	Arcadia	South	139 to156	1700	11	4
Cornell	Arcadia	North	150 to 157	700	22	0
2nd	Arcadia	North	183 to 188	300	Hotel	0
Arcadia High	Arcadia/ Monrovia	South	191 to 217	2600	0	24 & 1 Park
Anita/ Alamitas/ Mayflower	Monrovia	South	225 to 240	2100	9	12
Montana/Diamond	Monrovia	North	218 to 240	2200	8	58
Mayflower	Monrovia	South	241 to 246	500	0	40
Hamilton	Duarte	North	324 to 328	400	7	0
Hamilton	Duarte	North	333 to 338	500	7	0
Duarte	Duarte	South	316 to 337	2100	13	0
Hamilton	Duarte	North	339 to 359	2000	22	11
Duarte	Duarte	South	342 to 348	600	15	0

1. Number of impacts mitigated by the proposed noise barrier.

TABLE 3-11.29
PRELIMINARY LOCATIONS FOR
POTENTIAL SOUND INSULATION MITIGATION TREATMENT
PHASE II, SEGMENT 1
DOUBLE TRACK CONFIGURATIONS

Location	City	Side of Track	Civil Station	Number of Impacts[1]	
				Impact	Severe
Anita	Monrovia	South	221	0	4
Diamond	Monrovia	North	231	0	5
Diamond	Monrovia	North	237	0	6
Mayflower	Monrovia	South	240	4	2
Mayflower	Monrovia	North	241	0	1
Genoa	Monrovia	South	250	0	20
Duarte	Duarte	South	315	4	0

1. Number of impacts mitigated by the proposed sound insulation.

Vibration

Table 3-11.30 lists the preliminary locations for potential vibration mitigation along Phase II, Segment 1, including the approximate length of mitigation in feet. At a minimum, vibration mitigation would require the installation of ballast mats. However, more extensive mitigation may be required to adequately reduce the vibration levels to below the FTA vibration impact criterion. Specific recommendations on vibration mitigation will be addressed in more detail during Preliminary Engineering.

TABLE 3-11.30
PRELIMINARY LOCATIONS FOR
POTENTIAL VIBRATION MITIGATION TREATMENT
PHASE II, SEGMENT 1
DOUBLE TRACK CONFIGURATIONS

Location	City	Civil Station	Approx. Length (ft)	Number of Impacts[1]
Arboleda	Pomona	34 to 41	700	15
Foothill	Arcadia	52 to 161	10900	192
2nd	Arcadia	183 to 187	400	2 Hotels
3rd	Arcadia	197 to 206	900	34 & 1 School
Contented	Monrovia	206 to 253	4700	313
Hamilton	Duarte	346 to 359	1300	21

1. Number of impacts mitigated by the proposed vibration mitigation.

Phase II, Segment 2 — The Cities Affected and Proposed Measures

Noise

Table 3-11.31 lists the preliminary locations for potential noise barrier mitigation along Phase II, Segment 2, including the approximate length of barrier in feet. Specific detail of noise barriers, including the height, need to be determined during Preliminary Engineering, when more information is available. Noise barriers will be designed to adequately reduce the noise levels to below the FTA noise impact criteria. **Table 3-11.32** lists locations of potential sound insulation for noise mitigation along Phase II, Segment 2, where noise barriers would not be practical or cost effective, primarily near grade crossings and where noise insulation would be necessary. Although the intent of sound insulation is to reduce forecasted noise to less than the impact threshold, there may be circumstances where impacts cannot be reduced to less than the threshold, such as a property in close proximity to an at-grade crossing.

TABLE 3-11.31
PRELIMINARY LOCATIONS FOR
POTENTIAL NOISE BARRIER MITIGATION TREATMENT
PHASE II, SEGMENT 2
DOUBLE TRACK CONFIGURATIONS

Location	City	Side of Track	Civil Station	Approx. Length (ft)	Number of Impacts[1]	
					Impact	Severe
6th/ Lime/ Foothill	Azusa	South	528 to 553	2500	35 + Med	0
San Gabriel	Azusa	North	549 to 551	200	0	1
9th	Azusa	North	573 to 601	2800	126	0
Pasadena	Azusa	South	582 to 585	300	0	Park
Palm	Azusa	South	602 to 606	400	8	0
Palm	Azusa	North	602 to 605	300	12	0
9th	Glendora	North	612 to 638	2600	32	57

TABLE 3-11.31 *continued*
PRELIMINARY LOCATIONS FOR POTENTIAL NOISE BARRIER MITIGATION TREATMENT PHASE II, SEGMENT 2 DOUBLE TRACK CONFIGURATIONS

Location	City	Side of Track	Civil Station	Approx. Length (ft)	Number of Impacts[1]	
					Impact	Severe
9th	Glendora	South	614 to 637	2300	38	17
Marcile	Glendora	South	638 to 647	900	0	5
Alosta	Glendora	South	720 to 726	600	Hotel	1
Alosta	Glendora	South	744 to 746	200	3	0
Alosta	Glendora	South	758 to 763	500	5	0
Alosta	Glendora	South	767 to 772	500	2 + Hotel	0
St. Vladimir	Glendora	North	771 to 776	500	6	0
Compromise Line	Glendora	North	783 to 787	400	0	5
Alosta	Glendora	South	787 to 795	800	4 + Park	0
Remuda	Glendora	North	794 to 816	2200	8	19
Canyon Meadows	Glendora	South	807 to 811	400	2	0
Gladstone	Glendora	South	847 to 849	200	1	1
Gladstone	San Dimas	South	850 to 853	300	4	0
Gladstone	San Dimas	North	850 to 854	400	4	0
Highland	San Dimas	North	862 to 875	1300	35	2
Village	San Dimas	South	868 to 873	500	Hotel	0
Walnut	San Dimas	North	920 to 930	1000	64	0
1st	La Verne	North	998 to 1010	1200	10	10
1st	La Verne	North	1011 to 1016	500	10	0
Univ. La Verne	La Verne	North	1024 to 1029	500	Park	0
White	La Verne	North	1049 to 1052	300	3	0
Sierra	La Verne	South	1074 to 1077	300	4	0
Bonita	Pomona/Claremont	North	1144 to 1159	1500	56	0
Bonita	Claremont	North	1163 to 1181	1800	108	0
*Claremont	Claremont	North	1226 to 1233	700	7	0
*Claremont	Claremont	North	1235 to 1241	600	10	0
*Claremont	Claremont	South	1230 to 1233	300	2	0
*Claremont	Claremont	South	1234 to 1241	700	6	0
*Claremont	Claremont	North	1257 to 1269	1200	5	10
**Claremont	Claremont	South	1229 to 1232	300	8	0
**Claremont	Claremont	North	1230 to 1233	300	2	0

1. Number of impacts mitigated by the proposed noise barrier.
* These noise-sensitive locations only apply to the Baseline Alternative (north of the Montclair Station Park and Ride).
** These noise-sensitive locations only apply to the Option G Alternative (south of the Montclair Station Park and Ride).
Source: Harris, Miller, Miller & Hanson, 2003.

TABLE 3-11.32
PRELIMINARY LOCATIONS FOR
POTENTIAL SOUND INSULATION MITIGATION TREATMENT,
PHASE II, SEGMENT 2
DOUBLE TRACK CONFIGURATIONS

Location	City	Side of Track	Civil Station	Number of Impacts[1]	
				Impact	Severe
6th	Azusa	South	524 to 526	5	0
San Gabriel	Azusa	North	552	16	0
Dalton	Azusa	South	570 to 573	4	0
Pasadena	Azusa	South	574 to 577	0	18
Palm	Azusa	South	593 to 601	1 School	0
Marcile	Glendora	South	638 to 647	0	10
Foothill	Glendora	South	672 to 679	1 School & 1 Medical	1 Medical
Grande	Glendora	North	670	0	1 Medical
Vermont	Glendora	South	687	4	0
Glendora	Glendora	North	700 to 712	10	17
Pasadena	Glendora	South	708 to 711	1 School & 1 Medical	0
Lemon	Glendora	North	712 to 734	10	28
Glenwood	Glendora	North	734 to 740	0	8
Lemon	Glendora	North	740 to 758	7	22
St. Vladimir	Glendora	North	767 to 771	0	6
Compromise Line	Glendora	North	775 to 783	0	8
Gladstone	San Dimas	South	850	0	4
Eucla	San Dimas	South	888	Hotel	0
Eucla	San Dimas	North	890	4	0
Univ. La Verne	La Verne	North	1030 to 1035	48 & 1 School	0
Bonita	Claremont	North	1159 to 1163	0	8

1. Number of impacts mitigated by the proposed sound insulation.

Vibration

Table 3-11.33 lists the preliminary locations for potential vibration mitigation along Phase II, Segment 2, including the approximate length of mitigation in feet. At a minimum, vibration mitigation would require the installation of ballast mats. However, more extensive mitigation may be required to adequately reduce the vibration levels to below the FTA vibration impact criterion. Specific recommendations on vibration mitigation will be addressed in more detail during Preliminary Engineering.

TABLE 3-11.33
PRELIMINARY LOCATIONS FOR
POTENTIAL VIBRATION MITIGATION TREATMENT
PHASE II, SEGMENT 2
DOUBLE TRACK CONFIGURATIONS

Location	City	Civil Station	Approx. Length (ft)	Number of Impacts[1]
6th/ Lime/Foothill	Azusa	524 to 553	2900	80 & 1 Medical
Dalton/ Pasadena/ 9th	Azusa	566 to 612	4600	251
9th/ Ranger/ Ashworth	Glendora	612 to 646	3400	152
Foothill	Glendora	670 to 688	1800	12 & 1 School & 3 Medical
Glendora to I-210	Glendora	700 to 816	11600	185 & 2 Hotels & 1 Medical & 1 School
Gladstone	Glendora	847 to 849	200	2
1st	La Verne	999 to 1016	1700	30
Univ. La Verne	La Verne	1029 to 1031	200	1 School
Garey	Pomona	1103 to 1107	400	54
Roderick	Pomona	1125 to 1130	500	6
Bonita	Pomona	1145 to 1163	1800	92
Bonita	Pomona	1168 to 1180	1200	88
*Claremont	Montclair	1228 to 1232	400	10
**Claremont	Claremont	1230 to 1233	300	2
**Claremont	Montclair	1235 to 1240	500	21
**Monte Vista	Montclair	1257 to 1268	1100	15

1. Number of impacts mitigated by the proposed vibration mitigation.
* These locations only apply to the Baseline Alternative (north of the Montclair Station Park and Ride).
** These locations only apply to the Option G Alternative (south of the Montclair Station Park and Ride).

Source: Harris, Miller, Miller & Hanson, 2003.

Summary of Long Term Mitigation Measures for Full Build LRT Alternative, Double Track Configurations

Based on the initial assessment, for Segments 1 and 2 of the Double Track configuration without freight operations, there is a total of approximately 48,000 feet of potential noise barrier needed for noise mitigation and 283 residences that would have sound insulation mitigation. Combinations of potential

vibration mitigation measures described in this section along about 51,500 feet of the alignment would provide mitigation for the 1575 identified vibration impacts.

For the Double Track configuration with time separated freight service, the impacts and mitigation may be different than the existing freight service. Since the existing freight trains do not operate under a scheduled service, the change to impact and mitigation measures cannot be quantified. If freight train service occurred entirely during the nighttime hours, than there would be no change to the impact or mitigation described for the Double Track configuration because that analysis already included the penalties associated with nighttime operation.

Summary of Long Term Mitigation Measures for Built LRT Alternative to Maintenance Facility, Double Track Configurations

Based on initial assessment, for Segment 1 of the Double Track configuration with no freight operations, approximately 15,700 feet of noise barrier would be needed to mitigate 263 noise impacts and 46 residences would need sound insulation mitigation. Combinations of potential vibration mitigation measures described in this section along about 18,900 feet of the alignment would provide mitigation for the 575 identified vibration impacts. For the Double Track configuration with time separated freight service entirely during the nighttime hours, than there would be no change to the impacts or mitigation because that analysis already included the penalties associated with nighttime operation.

3-11.4 Impact Results with Mitigation

The following sections report the result of complying with regulatory requirements and proposed mitigation measures. The intent of this section is to summarize where identified impacts have been eliminated or reduced to less than adverse/less than significant levels, or whether there may be remainder impacts.

3-11.4.1 Construction Period

Construction period impacts would be eliminated or reduced to less than adverse/less than significant levels by constructing during daytime hours, following typical contractor conditions that include measures to limit the noise generated by equipment as discussed in Section 3-11.2.6, and the additional measures to mitigate impacts identified in Section 3-11.3.1. As a result of these conditions, construction period impacts would be not adverse under NEPA and not significant under CEQA.

a. No Build Alternative

For the No Build Alternative, only the planned construction of the Eastside LRT Extension would include construction-period noise impacts. These impacts are addressed in the Draft Supplemental Environmental Impact Statement/Draft Subsequent Environmental Impact Report for that project (FTA and LACMTA 2001). For the other elements of the No Build Alternative it is assumed that any construction would occur during daytime hours, and under typical contractor conditions that include measures to limit the noise generated by equipment. Under this work approach, coupled with the additional measures to mitigate impacts identified in Section 3-11.3.1 would result in construction period impacts that would be not adverse under NEPA and not significant under CEQA.

b. TSM Alternative

Phase I — The Cities Affected and the Results of Construction Period Mitigation Measures

For elements of the TSM Alternative it is assumed that any construction would occur during daytime hours, and under typical contractor conditions that include measures to limit the noise generated by equipment. Under this work approach, coupled with the additional measures to mitigate impacts identified in Section 3-11.3.1 would result in construction period impacts that would be not adverse under NEPA and not significant under CEQA in the cities in Phase I or Phase II.

c. LRT, Triple Track Configuration

Phase I — The Cities Affected and the Results of Construction Period Mitigation Measures

Phase I includes the cities of Los Angeles, South Pasadena and Pasadena. There are no elements of the Triple Track configuration in the cities in Phase I. There would be no construction period noise and vibration impacts in Phase I cities as a result of the Triple Track configuration, so no mitigation measures were required.

Summary of Results of Construction Period Mitigation Measures for Full Build LRT Alternative, Triple Track Configuration

For the elements of the Triple Track configuration, it is assumed that any construction would occur during daytime hours, and under typical contractor conditions that include measures to limit the noise generated by equipment. Under this work approach, coupled with the additional measures to mitigate impacts identified in Section 3-11.3.1 would result in construction period impacts that would be not adverse under NEPA and not significant under CEQA to any of the cities in Phase II Segments 1 and 2.

Summary of Results of Construction Period Mitigation Measures for Build LRT Alternative to Maintenance Facility, Triple Track Configurations

Construction period impacts would be eliminated or reduced to less than adverse/less than significant levels for the Triple Track configuration for the Build Alternative to Maintenance Facility. It is assumed that any construction would occur during daytime hours, and under typical contractor conditions that include measures to limit the noise generated by equipment. Under this work approach, coupled with the additional measures to mitigate impacts identified in Section 3-11.3.1 would result in construction period impacts that would be not adverse under NEPA and not significant under CEQA to any of the cities in Phase II Segment 1.

d. LRT, Double Track Configurations

Phase I — The Cities Affected and the Results of Construction Period Mitigation Measures

Phase I includes the cities of Los Angeles, South Pasadena and Pasadena. There are no elements of the Double Track configurations that affect the Phase I cities during construction and thus no mitigation was required.

Summary of Results of Construction Period Mitigation Measures for Full Build LRT Alternative, Double Track Configurations

For the elements of the Double Track configurations, it is assumed that any construction would occur during daytime hours, and under typical contractor conditions that include measures to limit the noise generated by equipment. Under this work approach, coupled with the additional measures to mitigate impacts identified in Section 3-11.3.1 would result in construction period impacts that would be not adverse under NEPA and not significant under CEQA to any of the cities in Phase II Segments 1 and 2.

Summary of Results of Construction Period Mitigation Measures for Built LRT Alternative to Maintenance Facility, Double Track Configurations

For the elements of the Double Track configurations, it is assumed that any construction would occur during daytime hours, and under typical contractor conditions that include measures to limit the noise generated by equipment. Under this work approach, coupled with the additional measures to mitigate impacts identified in Section 3-11.3.1 would result in construction period impacts that would be not adverse under NEPA and not significant under CEQA to any of the cities in Phase II Segment 1.

3-11.4.2 Long Term

a. No Build Alternative

No long-term impacts were identified for the No Build Alternative and thus no mitigation measures were required. Impacts would remain as less than adverse under NEPA and less than significant under CEQA.

b. TSM Alternative

No long-term impacts were identified for the TSM Alternative and thus no mitigation measures were required. Impacts would remain as less than adverse under NEPA and less than significant under CEQA.

c. LRT, Triple Track Configuration

Phase I — The Cities Affected and the Results of Long Term Mitigation Measures

Phase I includes the cities of Los Angeles, South Pasadena and Pasadena. No long-term effects on the noise or vibration environments in Phase I cities were identified as a result of the Triple Track

configuration and thus no mitigation was required. Impacts would remain less than significant under NEPA and less than adverse under CEQA.

Summary of Results of Long Term Mitigation Measures for Full Build LRT Alternative, Triple Track Configuration

For cities in Segments 1 and 2 of the Full Build Alternative, Triple Track configuration, it is expected that noise and vibration impacts can be mitigated by the proposed measures, with the possible exception of properties located in closed proximity to at-grade crossings.

Summary of Results of Construction Period Mitigation Measures for Built LRT Alternative to Maintenance Facility, Triple Track Configurations

For cities in Segment 1 of the Build LRT Alternative to Maintenance Facility, Triple Track configuration, it is expected that noise and vibration construction impacts can be mitigated by the proposed mitigation measures, with the possible exception of properties located in closed proximity to at-grade crossings..

d. LRT, Double Track configurations

Phase I — The Cities Affected and the Results of Long Term Mitigation Measures

Phase I includes the cities of Los Angeles, South Pasadena, and Pasadena. No long-term effects on the noise or vibration environments in Phase I cities were identified as a result of the Triple Track configuration and thus no mitigation was required. Impacts would remain less than significant under NEPA and less than adverse under CEQA.

Summary of Results of Long Term Mitigation Measures for Full Build LRT Alternative, Double Track Configurations

For cities in Phase II Segments 1 and 2, for the Double Track configuration without freight service, it is expected that noise and vibration impacts can be mitigated by the proposed measures, with the possible exception of properties located in closed proximity to at-grade crossings. For Segment 1 and 2 of the Double Track configurations with freight service separated in time, the analysis already includes the effect of freight trains operating during nighttime hours; impacts under this scenario would also be mitigated by the proposed mitigation measures.

Summary of Results of Long Term Mitigation Measures for Built LRT Alternative to Maintenance Facility, Double Track Configurations

For cities in Phase II Segment 1, for the Double Track configuration without freight service, it is expected that noise and vibration impacts can be mitigated by the proposed measures, with the possible exception of properties located in closed proximity to at-grade crossings. For Segment 1 and 2 of the Double Track configurations with freight service separated in time, the analysis already includes the effect of freight trains operating during nighttime hours; impacts under this scenario would also be mitigated by the proposed mitigation measures.