# Attachment G: Noise and Vibration Technical Report

## 1.0 Introduction

The DesertXpress Enterprises, LLC XpressWest High-Speed Train Project (Project) entails construction and operation of a high-speed passenger train system between Apple Valley, California, and Las Vegas, Nevada. The Project was originally evaluated in the following documents (collectively referenced as the DesertXpress Environmental Impact Statement [EIS]):

- March 2009 *Draft Environmental Impact Statement and 4(f) Evaluation for the proposed DesertXpress High-Speed Passenger Train* (DesertXpress DEIS)
- April 2010 *Supplemental Draft Environmental Impact Statement and 4(f) Evaluation for the proposed DesertXpress High-Speed Passenger Train* (DesertXpress SEIS)
- March 2011 *Final Environmental Impact Statement and 4(f) Evaluation for the proposed DesertXpress High-Speed Passenger Train Victorville, California to Las Vegas, Nevada* (DesertXpress FEIS)

The Federal Railroad Administration (FRA) issued the *Record of Decision DesertXpress High-Speed Passenger Train* (DesertXpress ROD) in July 2011.

This technical report describes the potential changes to noise and vibration impacts with the Project modifications.

## 2.0 Regulatory Updates

There have been two regulatory changes since publication of the DesertXpress EIS relevant to noise impacts. The first includes changes to the California Environmental Quality Act (CEQA) noise criteria, which have been updated since the DesertXpress EIS. These changes will not affect the noise and vibration assessment because the Project is exempt from state and local regulations due to Surface Transportation Board (STB) preemption.[1] The second is a change in the vibration criteria for FRA high-speed rail Projects documented in the FRA High Speed Ground Transportation Noise and Vibration Impact Assessment (September 2012) guidance manual. The FRA incorporated a set of detailed vibration criteria in the 2012 update to their guidance, which is reflected in the vibration assessment included herein. The FRA's new detailed vibration criteria assess vibration on a frequency basis, rather than assessing the overall levels. This can result in fewer vibration impacts but provides more detailed information for assessing the effectiveness of mitigation methods.

## 3.0 Impacts Evaluation Methodology

The analysis of noise and vibration described in this memorandum considers three types of changes (listed below) to determine if the new conditions would result in adverse impacts that were not identified in the Project's environmental analysis conducted for the DesertXpress EIS.

[1] The STB issued a declaratory order on June 25, 2007 regarding STB's authority under 49 U.S.C. 10901. In this order, STB declared the Project to be exempt from state and local land use and environmental requirements. Laws and policies regarding noise impacts are considered to fall within the category of "land use and environmental" requirements as broadly defined by STB.

**Regulatory Updates** – this category includes new laws, regulations, or policies enacted since the DesertXpress EIS. Federal, state, and local regulatory updates that took place after July 2011 were evaluated to determine applicability to the modified Project.

**Affected Environment Changes** – this category identifies changes in the existing physical environment that have occurred since the DesertXpress EIS. The environmental conditions were assessed to identify changes in the resources or features within the Project area. Changes in the affected environment are cited, summarized, and evaluated against the modified Project footprint to determine if new impacts would occur from Project implementation in comparison with the DesertXpress EIS. Because highway noise is dependent on traffic volumes, additional existing noise measurements were conducted in Barstow and Las Vegas to update the existing noise levels established in the DesertXpress EIS.

**Project Changes** – this includes identifying any new or modified Project footprint[2] or facilities with respect to those evaluated in the DesertXpress EIS. Analysts conducted an analysis based on new or modified Project footprint or facilities to determine if new or greater impacts would occur compared to those identified in the DesertXpress EIS. Because of the numerous changes to the Project, including new and relocated stations, new track locations, new vehicle assumptions, new operational assumptions and new assumptions regarding train speeds, an updated noise and vibration assessment was conducted along the entire Project corridor.

## 3.1 ASSESSMENT METHODOLOGY

This section summarizes the models used to project future noise and vibration levels for potential sources of community impact related to the DesertXpress Project. The models for both noise and vibration are described below and are the same as those used in Section 3.12.2.1 of the DesertXpress FEIS.

### 3.1.1 HIGH SPEED RAIL NOISE

The primary component of wayside noise from high-speed train operations for the electric multiple unit (EMU) vehicles is wheel/rail noise, which results from the steel wheels rolling on steel rails. Secondary sources, such as vehicle air-conditioning and other ancillary equipment, would sometimes be audible, but are not expected to be significant factors. The projection of wayside noise from high-speed train operations was carried out using the model specified in the FRA Guidance Manual, with the following assumptions:

- Based on information provided by DesertXpress Enterprises, LLC, the predictions assume a 16-car EMU train (the DesertXpress EIS assumed a 10-car train) using the reference levels found in Chapter 4 of the FRA Noise and Vibration Manual.
- The operating times for Project service would be between 5:30 am and 1:00 am (the DesertXpress EIS assumed 6:00 am to midnight). The operating plan for high-speed rail service specifies headways of 22.5 minutes (the DesertXpress EIS assumed 30-minute headways). 16-car trains would operate throughout the day.

[2] The Project footprint components include the proposed train trackway, station sties, maintenance facility sites, power facilities, roadway modifications (including overcrossings and interchange) and temporary construction easements required to construction and operate the Project.

- Speeds were based on information provided by DesertXpress Enterprises, LLC, with a maximum operating speed of 180 miles per hour (mph) (the DesertXpress EIS assumed 160 mph).
- The entire Project would be grade-separated and therefore there would be no noise from horns or bells at grade-crossings.
- There are locations where turnouts or crossovers[3] exist along the alignment that would allow trains traveling from either direction to utilize transition from the double track to single track sections of the corridor. For receivers near crossovers, 6 dB is added to the noise assessment to account for the additional noise from wheels running over the gap in the tracks. However, there are no receivers located near any of the crossover locations.
- Based on FRA criteria, the potential for surprise (i.e. startle) effects for humans would be limited to areas within 27 feet of the track centerline, and startle effects for wildlife would be limited to areas within 40 feet of the track centerline.

### 3.1.2 TRAFFIC NOISE

For operational traffic noise, traffic volumes for the no action alternative and Project were used to identify locations where the change in traffic volume would result in an increase in noise of 3 decibels (dB) or greater, which represents a noticeable change in noise level. A 3-dB change in noise represents a doubling of traffic volume due to the Project. For locations where there would be a 3 dB increase in traffic and where there are sensitive receptors, a noise assessment was conducted, using a screening distance of 100 feet for station access roads. For any locations with sensitive receptors within that screening distance, a general noise assessment was conducted.

### 3.1.3 VIBRATION

The potential vibration impact from high-speed rail operations was assessed using the FRA criteria. The following factors were used in determining potential vibration impacts along the modified rail alignment:

- Vibration propagation tests were conducted at three sites along the corridor near sensitive receptors (see Figure 4.1-1, Figure 4.1-2, and Figure 4.1-3 for locations of vibration propagation tests). These tests measured the response of the ground to an input force. The results of these tests were combined with vibration source data for the X2000 high-speed rail vehicle, which was deemed to be the most similar vehicle to the EMU (based on their similar configurations and maximum speeds) for which data are available in the literature, to Project vibration levels from vehicles operating along the modified Project corridor.
- The assumed vehicle vibration characteristics were combined with the ground vibration propagation test results to Project vibration levels as a function of distance from the tracks.
- Speeds were based on information provided by DesertXpress Enterprises, LLC, with a maximum operating speed of 180 mph.
- There are locations where turnouts or crossovers exist along the alignment that would allow trains traveling from either direction to the transition from the double track to single track sections of the corridor. For receivers near crossovers, 10 VdB is added to the vibration assessment to account for

[3] In this context, 'crossovers' refer to railroad-specific facilities that connect two parallel rail tracks and allows a train on one track to cross over to the other.

the additional vibration from wheels running over the gap in the tracks, however there are no receivers located near any of the crossover locations.

- Based on the detailed vibration criteria for residential nighttime occupancy, a vibration criterion of 72 vibration decibels (VdB) (on a 1/3-octave band basis) was used for the assessment.

## 3.1.4 CONSTRUCTION

### CONSTRUCTION NOISE

Construction noise varies greatly depending on the construction process, type, condition of equipment used, and layout of the construction site. Overall, construction noise levels are governed primarily by the noisiest pieces of equipment. For special activities such as impact pile driving and pavement breaking, noise generated by the actual process dominates.

Projecting construction noise requires a construction scenario of the equipment likely to be used and the average utilization factors or duty cycles (i.e., the percentage of time during operating hours that the equipment operates under full power during each phase). Using typical sound emission characteristics, it is then possible to estimate equivalent sound level (Leq) or Day Night Sound Level (Ldn) at various distances from the construction site. The noise impact assessment for a construction site is based on:

- An estimate of the type of equipment that would be used during each phase of the construction and the average daily duty cycle for each category of equipment,
- Typical noise emission levels for each category of equipment, and
- An estimate of noise attenuation as a function of distance from the construction site.

Based on a typical construction scenario for ballast-and-tie track construction, an 8-hour Leq of 88 A-weighted decibels (dBA) should be expected at a distance of 50 feet from the geometric center of the work site. With at-grade track construction, the duration of the activities at a specific location along the alignment would be relatively limited, usually a matter of several weeks. As a result, even when there may be noise impacts, the limited duration of the construction can mean that some forms of mitigation are not cost effective. Mitigation has been included that incorporates effective, best-practice noise control measures during construction.

### CONSTRUCTION VIBRATION

Unlike typical high-speed rail operations, there is the potential for damage to nearby structures due to construction vibration from activities such as pile driving, hoe ram demolition, vibratory compaction and loaded truck movements. Most limits on construction vibration are based on reducing the potential for damage to nearby structures. Although construction vibrations are only temporary, it is still reasonable to assess the potential for human annoyance and damage.

Since there are no buildings in the study area that would be considered to be the highest sensitivity for vibration damage, a criterion of 94 VdB has been used to assess potential damage impact and 72 VdB has been used to assess potential vibration annoyance from construction activities (See Table 10-6 in the FRA guidance manual [FRA 2012]). The construction activity with the highest vibration levels is impact pile driving, which generates PPV of 0.644 in/s and a vibration level of 104 VdB at a distance of 25 feet.

# 4.0 Affected Environment

## 4.1 NOISE

Existing ambient noise levels in the Project area were characterized through direct measurements at selected sites along the modified alignment during two periods – from July 24 through July 27, 2006 and September 24 through September 25, 2019. New noise measurements were conducted at locations primarily in Barstow and Las Vegas, where there have been changes to the traffic levels or where the alignment location has changed since the DesertXpress EIS. Estimating existing noise exposure is an important step in the noise impact assessment since, as indicated above, the thresholds for noise impact are based on the existing levels of noise exposure. The measurements consisted of long-term (24-hour) monitoring of the A-weighted sound level at representative noise-sensitive locations.

Measurement sites were located in noise-sensitive areas and were selected to represent a range of existing noise conditions along the corridor. Figure 4.1-1, Figure 4.1-2 and Figure 4.1-3 show the general locations of the eight long-term (LT) and one short-term (ST) measurement sites. 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, with the exception of existing noise barriers, which are a part of the existing condition.

The results of the existing ambient noise measurements, summarized in Table 4.1-1, serve as the basis for determining the existing noise conditions at all noise-sensitive receptors along the modified rail alignment. The results at each site are described below. Most land uses along the Project corridor with noise-sensitive receptors consists of residential, which includes single-family and multi-family residences, hotels and other land use with nighttime sensitivity. There are scattered institutional land uses, including churches and schools and one highly-sensitive land use, the Halloran Springs Petroglyphs. Where measurements have been duplicated at locations in the DesertXpress EIS, they are noted in the table below. At all other locations, either the previous measurements were used, or new measurements, in new locations, were conducted for this assessment.

**Table 4.1-1 Summary of Existing Ambient Noise Measurement Results**

| Site No. | Measurement Location | Start of Measurement | | Duration (hours) | Noise Level (dBA) | |
|---|---|---|---|---|---|---|
| | | Date | Time | | Ldn | Leq |
| LT-1 | 21191 Willow Springs Avenue, Apple Valley, CA | 9/24/2019 | 13:00 | 24 | 56 | 47 |
| LT-2 | 27480 Church Avenue, Barstow, CA | 9/24/2019 | 11:00 | 24 | 65 (62)*** | 60 |
| LT-3 | 936 Las Amigas Drive, Barstow, CA | 9/24/2019 | 12:00 | 24 | 63 (66)*** | 58 |
| LT-4* | 38748 E Williams Street, Yermo, CA | 7/25/2006 | 13:00 | 24 | 63 | 65 |
| LT-5* | Bun Boy Hotel, Baker, CA**** | 7/25/2006 | 14:00 | 24 | 65 | 67 |
| LT-6 | 3014 W Saffredi Lane, Las Vegas, NV | 9/24/2019 | 20:00 | 24 | 66 | 60 |
| LT-7 | Enchanted Rock Lane and Prickly Pear Drive, Las Vegas, NV | 9/24/2019 | 15:00 | 24 | 58 | 53 |

| Site No. | Measurement Location | Start of Measurement | | Duration (hours) | Noise Level (dBA) | |
|---|---|---|---|---|---|---|
| | | Date | Time | | Ldn | Leq |
| LT-8 | Hilton Garden Inn Las Vegas Strip South, Las Vegas, NV | 9/24/2019 | 15:51 | 3 | 58 | 57** |
| ST-1 | Halloran Springs, CA | 9/25/2019 | 14:08 | 24 | 48 | 50 |

*These measurements were conducted for the DesertXpress EIS.
**This noise level was calculated from 3 1-hour measurements in accordance with the FTA guidance manual.
***The numbers in parenthesis are the noise measurements conducted at the same locations for the DesertXpress EIS.
****The Bun Boy Hotel is no longer in operation and is now vacant.

Source: CSA 2019

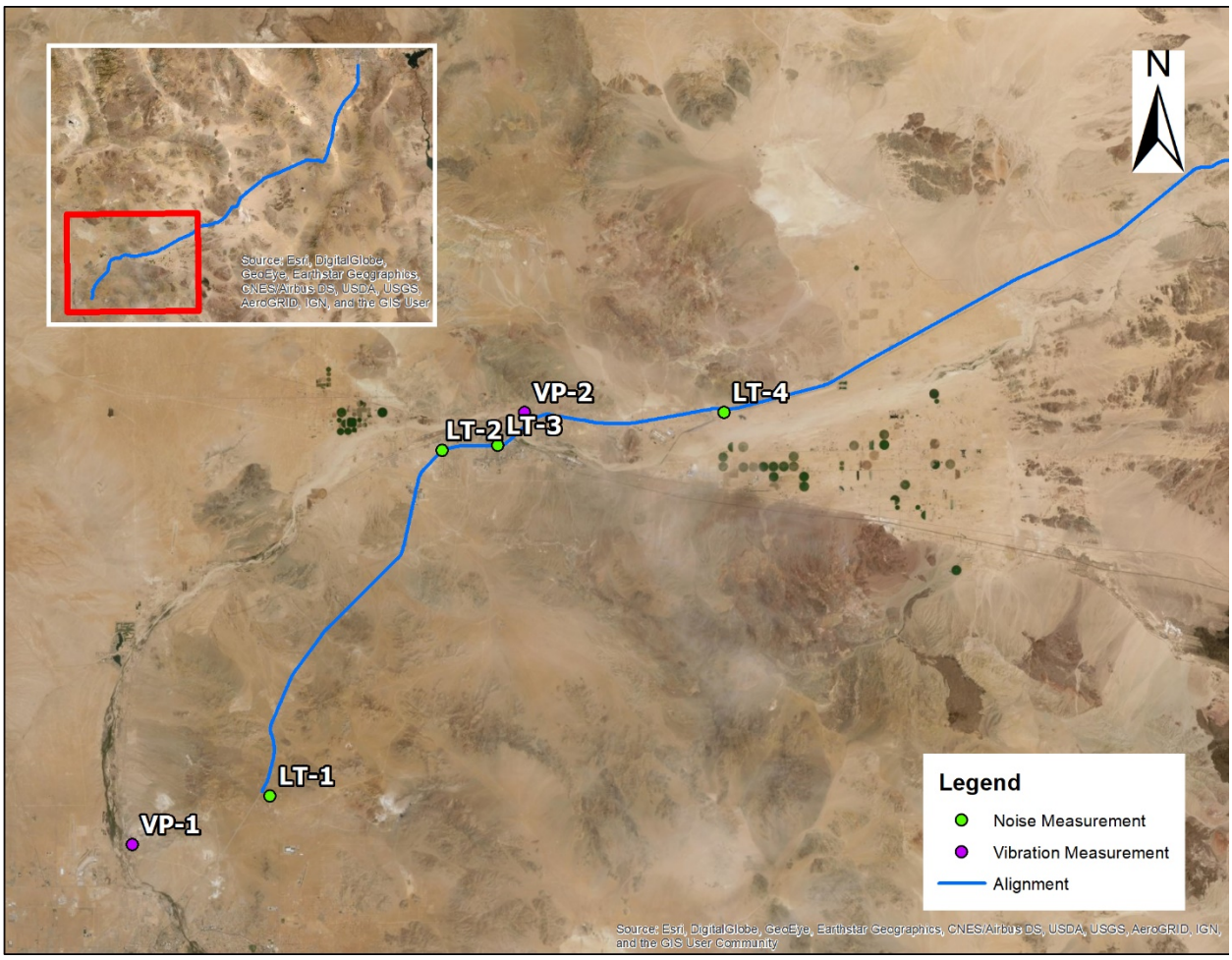


**Figure 4.1-1 Noise and Vibration Measurement Locations (1 of 3)**


**Figure 4.1-2 Noise and Vibration Measurement Locations (2 of 3)**

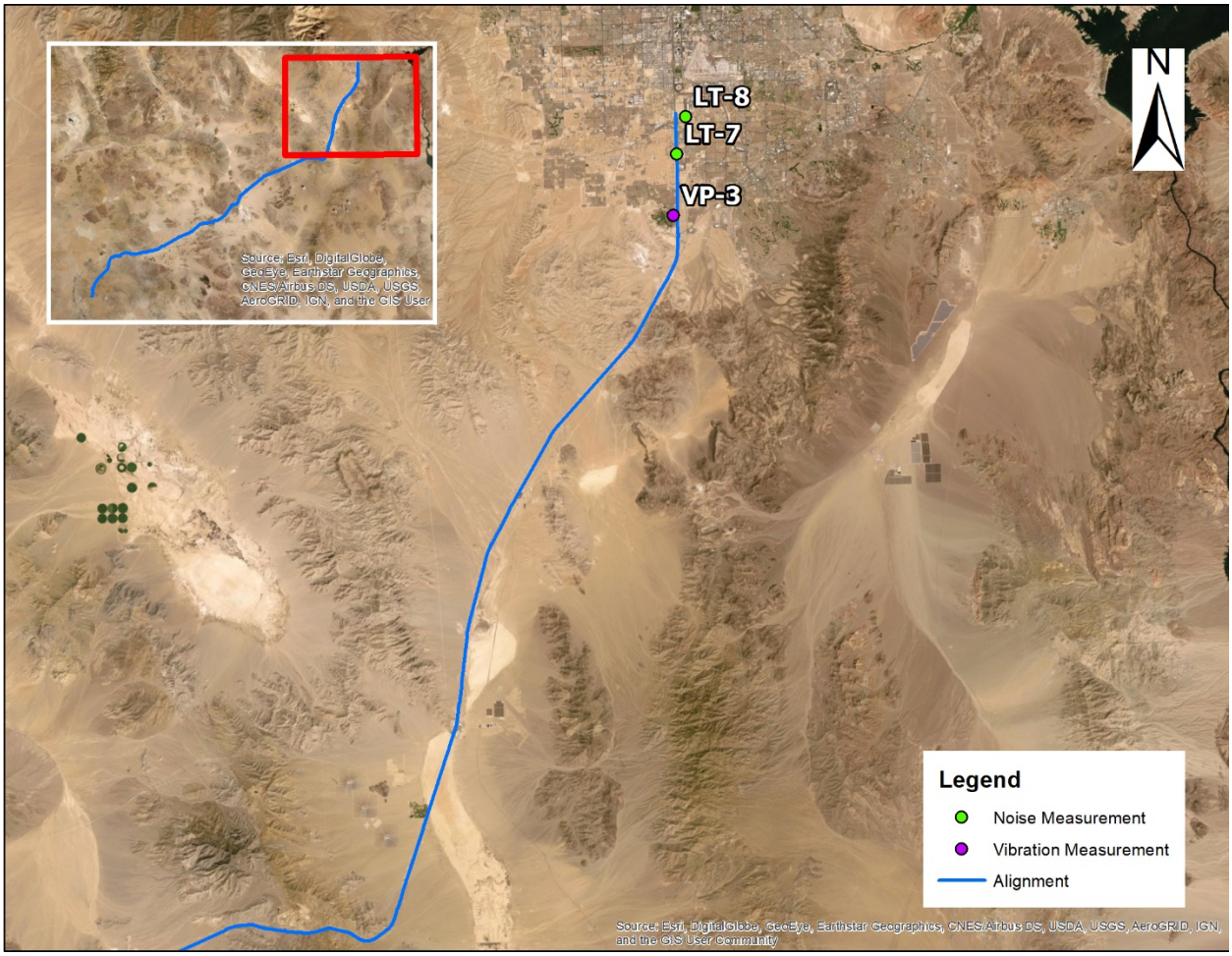


**Figure 4.1-3 Noise and Vibration Measurement Locations (3 of 3)**

### 4.1.2 SEGMENT 1

**Apple Valley, CA:** The land use around the Dale Evans Station and Operations Maintenance and Storage Facility (OMSF) site is primarily rural single-family residences. There are no institutional land uses in this area. The noise site that is used to represent this area is LT-1, which is described below.

**Site LT-1: 21191 Willow Springs Avenue - Apple Valley, CA.** The Ldn measured at this location was 56 dBA. Noise levels were measured for 24 hours in the front yard of the residence. The dominant noise sources were traffic on the Interstate 15 (I-15) freeway and dogs at the residence. This noise measurement site is representative of all noise-sensitive land uses near the Dale Evans Station and OMSF site.

### 4.1.3 SEGMENT 2

**Barstow, CA:** The land uses in Barstow include a sparsely populated area on the west side of Barstow and a more densely populated area on the east side of Barstow. Most of the noise sensitive land use is separated from the I-15 freeway by a noise barrier or embankment. The noise and vibration sensitive land uses include the Church of the Nazarene, the Oasis Missionary Baptist Church, the Mojave River Valley Museum, and single and multi-family residences. The noise sites that are used to represent this area include LT-2 and LT-3. Below are the descriptions of each site.

**Site LT-2: 27480 Church Avenue – Barstow, CA.** The Ldn measured at this location was 65 dBA. Noise levels were measured for 24 hours on the west side of the residence behind a noise barrier. The dominant noise source was traffic on the I-15 freeway. This noise measurement site is representative of all noise-sensitive land uses between Lenwood Road and D Street.

**Site LT-3: 936 Las Amigas Drive – Barstow, CA.** The Ldn measured at this location was 63 dBA. Noise levels were measured for 24 hours in the backyard of the residence behind a noise barrier. The dominant noise sources were traffic on the I-15 freeway and dogs at the residence. This noise measurement site is representative of all noise-sensitive land uses between D Street and Soapmine Road.

**Yermo, CA:** The land uses in Yermo include a sparsely populated area with single-family residences along the I-15 freeway. There are no institutional land uses in this area. The noise site that is used to represent this area is LT-4, which is described below.

**Site LT-4: 38748 E Williams Street – Yermo, CA.** The Ldn measured at this location was 63 dBA. Noise levels were measured for 24 hours in the back yard of the residence. The dominant noise sources were traffic on the I-15 freeway and freight trains. This noise measurement site is representative of all noise-sensitive land uses between the Mojave River and Pima Avenue.

### 4.1.4 SEGMENT 3

**Baker, CA:** The land uses in Baker include residential and commercial uses with sparsely populated rural areas outside of town. The noise and vibration sensitive land uses are single-family residences. There are no institutional land uses in this area. The noise site that is used to represent this area is LT-5, which is described below.

**Site LT-5: Bun Boy Hotel – Baker, CA.** The Ldn measured at this location was 65 dBA. Noise levels were measured for 24 hours at the hotel site. The dominant source of noise was traffic on the I-15 freeway.

This noise measurement site is representative of all residential noise-sensitive land uses between Baker and Jean.

### 4.1.5 SEGMENT 4

The land uses along the alignment in Segment 4 include the National Mojave Preserve and Mountain Pass. The noise and vibration sensitive land uses are the Halloran Springs Petroglyph and single-family residences. The noise sites that are used to represent this area include LT-5 and ST-1. Below is the description of ST-1, and the description of LT-5 can be found under the Segment 3 noise sites.

**Site ST-1: Halloran Springs, CA.** The Leq measured at this location was 50 dBA. Noise levels were measured for an hour at the Halloran Springs Petroglyphs. The dominant source of noise was traffic on the I-15 freeway. The noise measurement site is representative of the noise at the Halloran Springs Petroglyphs.

### 4.1.6 SEGMENT 5

**Primm and Jean, NV:** The land uses in and between Primm and Jean include sparsely populated rural areas between Primm and Jean and residential and commercial areas in the towns. The noise and vibration sensitive land uses include Terrible's Hotel and Casino. There are no institutional land uses in this area. The noise site that is used to represent this area is LT-5, which is described under the Segment 3 noise sites.

### 4.1.7 SEGMENT 6

**Las Vegas, NV:** The land uses along the alignment in Las Vegas are mostly residential with a few commercial properties. The noise and vibration sensitive land uses include hotels and single- and multi-family residences. The Dennis Ortwein Elementary School is located in this area.. The noise sites that are used to represent this area include LT-6, LT-7, and LT-8. Below are the descriptions of each site.

**Site LT-6: 3014 W Saffredi Lane – Las Vegas, NV.** The Ldn measured at this location was 66 dBA. Noise levels were measured for 24 hours on the east side of the house. The dominant noise sources were traffic on the I-15 freeway and local traffic. This noise measurement site is representative of all noise-sensitive land uses between E Larson Lane and W Cactus Avenue.

**Site LT-7: Enchanted Rock Lane and Prickly Pear Drive – Las Vegas, NV.** The Ldn measured at this location was 58 dBA. Noise levels were measured for 24 hours on the north side of the multi-use building in the neighborhood. The dominant noise sources were traffic on the I-15 freeway and aircraft. This noise measurement site is representative of all noise sensitive land uses between W Cactus Avenue and Blue Diamond Road.

**Site LT-8: Hilton Garden Inn Las Vegas Strip South – Las Vegas, NV.** The Ldn measured at this location was 58 dBA. Noise levels were measured three times on the east side of the hotel, with each measurement conducted over a one-hour period. The dominant noise sources were local traffic, aircraft, and air-conditioning units at the hotel. This noise measurement site is representative of all noise-sensitive land uses near the Warm Springs Station site.

## 4.2 VIBRATION

Significant sources of existing vibration along the modified rail alignment are limited to freight trains that operate along certain Segments of the alignment. However, to best predict ground vibration levels

from high-speed train operations, the vibration measurements for this Project focused on characterizing the vibration propagation properties of the soil at representative locations along the corridor. Three vibration propagation tests, at the locations shown in Figure 4.1-1, Figure 4.1-2 and Figure 4.1-3, were selected to represent the range of soil conditions in areas along the corridor that include a significant number of vibration-sensitive receptors. At each of these sites, ground-borne vibration propagation tests were conducted by impacting the ground and measuring the input force and corresponding ground vibration response at various distances. The resulting force-response transfer function was combined with the known input force characteristics of the X-2000 high-speed rail vehicle to predict future vibration levels at locations along the modified Project corridor.

Descriptions of the vibration propagation test sites are as follows:

### 4.2.1 SEGMENT 1

Site VP-1 was located at the intersection of Olive Street and First Street in Oro Grande. The vibration measurements at this location are representative of the areas in Victorville, Apple Valley, Oro Grande and Helendale. While this site was located in Segment 1A, which has been withdrawn from further consideration in the DesertXpress EIS, it was used to assess the vibration impacts in Apple Valley in Segment 1.

### 4.2.2 SEGMENT 2

Site VP-2 was located at the intersection of Fern Street and Balsa Avenue in Barstow. The vibration measurements at this location are representative of the areas in Barstow, Yermo, Baker, Mountain Pass, and Jean (although some of these locations are in other Segments).

### 4.2.3 SEGMENT 3-5

No vibration propagation measurements were conducted in these Segments because there are no vibration sensitive land uses close enough to the Project location to require testing.

### 4.2.4 SEGMENT 6

Site VP-3 was located just north of Alpine Lily Drive in Las Vegas, in a new housing development. The vibration measurements in this area are representative of the areas in Las Vegas.

# 5.0 Effects Analysis for Noise and Vibration

A noise and vibration impact assessment was performed based on FRA criteria and on the projections described above. The assessment methods and results for the various modified Project sources are described below.

## 5.1 HIGH-SPEED RAIL NOISE

The assessment of noise impact from high-speed rail operations is based on a comparison of existing and projected future noise exposure for different land use categories. The following steps were performed to assess train noise impact:

- A detailed land use survey was conducted along the modified Project corridor to identify and classify all noise-sensitive receptors according to the categories defined above. Most of these receptors are

single- and multi-family residences. The remainder are institutional sites, along with a highly sensitive site in the Mojave Desert (the Halloran Springs Petroglyphs).
- The receptors were clustered based on distance to the tracks, acoustical shielding between the receptors and the tracks, and train operational parameters.
- The existing noise exposure at each cluster of receptors was estimated based on the ambient noise measurements discussed above and was used to determine the thresholds for impact and severe impact using the FRA criteria.
- Projections of future high-speed rail noise at each cluster of receptors were developed based on distance from the tracks; train schedule and train speed using the methods described above.
- In areas where the projections showed either degree of impact, mitigation options were evaluated and new projections were developed assuming implementation of mitigation measures.

For the modified Project, detailed comparisons of the existing and future noise levels are presented in tables below. In addition to the location (or name for institutional land uses) and distance to the near track, each table includes the existing noise level, the projected noise level from high-speed rail 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 high-speed rail service. Each table also includes an inventory of the number of impacts and severe impacts at each sensitive receptor location. The noise impact locations are shown in Figure 5.1-1 through Figure 5.1-4.

The DesertXpress EIS established that the Project would result in 106 moderate noise impacts, 12 severe noise impacts, and no vibration impacts. The Project modifications would result in 273 moderate noise impacts, 91 severe noise impacts, and no vibration impacts. The two main areas where there are differences in the number of noise impacts are in Barstow/Yermo (Segment 2) and in Las Vegas (Segment 6), with most additional impacts in Las Vegas.

In Barstow/Yermo, the primary differences for the additional noise impacts are due to:

- The increase in the length of the trains. Ten car trains were assessed previously, and 16 car trains are assumed now. Longer trains result in more noise exposure and higher noise levels.
- More frequent service as compared with the previous assessment. More frequent service results in higher noise exposure levels from the modified Project.
- Lower existing noise levels from highway traffic. Lower existing noise levels increase the likelihood and magnitude of impacts.

In Las Vegas, the primary differences for the additional noise impacts, in addition to those noted for Barstow/Yermo, also include:

- The shift in the alignment to the median or east side of the I-15 freeway, where there are more residences (including more multi-family buildings with more impacts) and where the residences are located closer to tracks.

The Project modifications would result in additional moderate and severe noise effects at locations that were not identified in the DesertXpress EIS. There would also be some noise effects eliminated due to the Project modifications, primarily south of the Dale Evans Station and OMSF site and in Las Vegas on the west side of the I-15 freeway. With implementation of revised mitigation measures developed in the DesertXpress EIS described in Section 6.0, Mitigation Measures, the Project modifications would not result in substantial changes in the magnitude of operational noise impacts relative to the DesertXpress EIS evaluation.

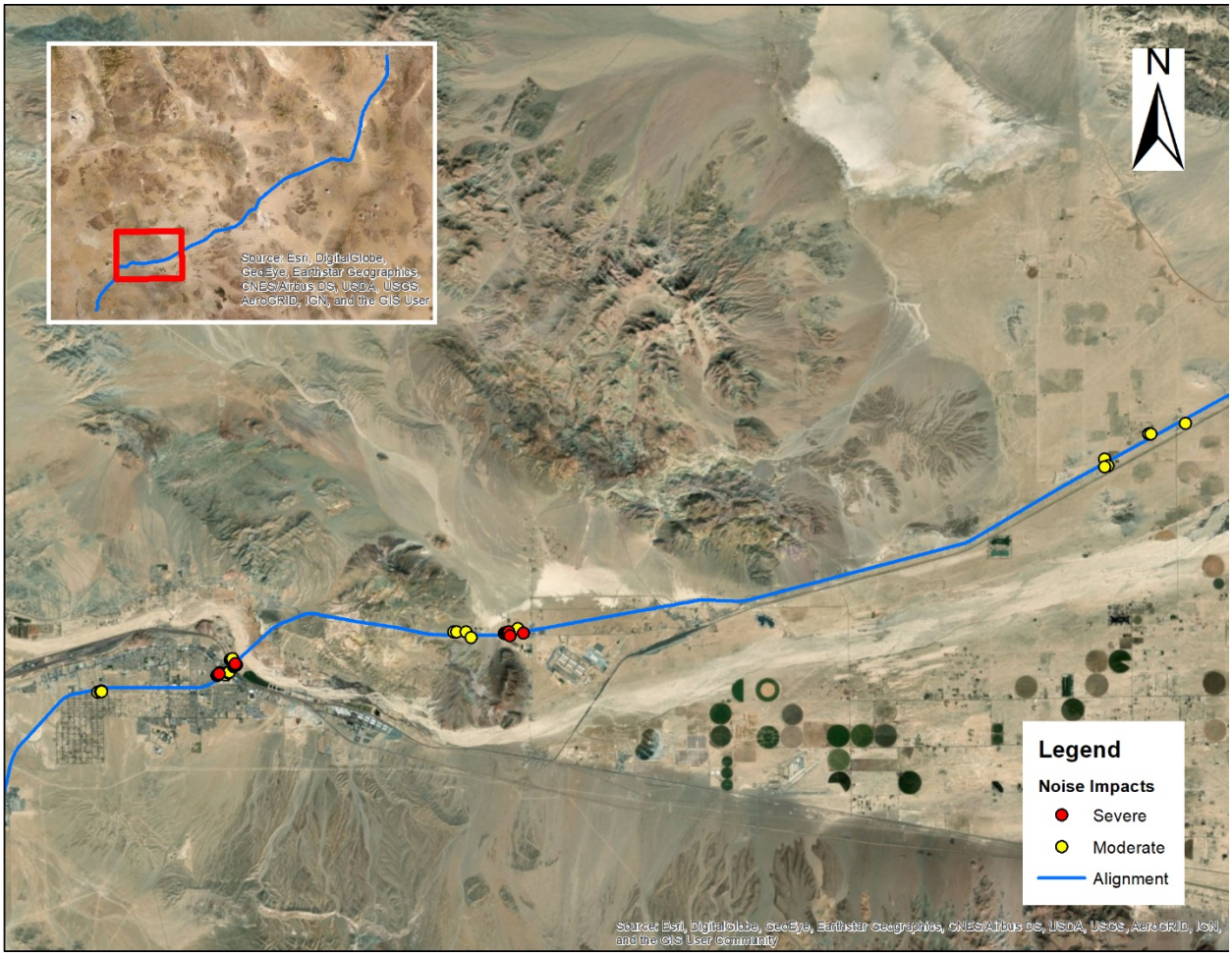


**Figure 5.1-1 Noise Impact Locations (1 of 4)**


**Figure 5.1-2 Noise Impact Locations (2 of 4)**


**Figure 5.1-3 Noise Impact Locations (3 of 4)**

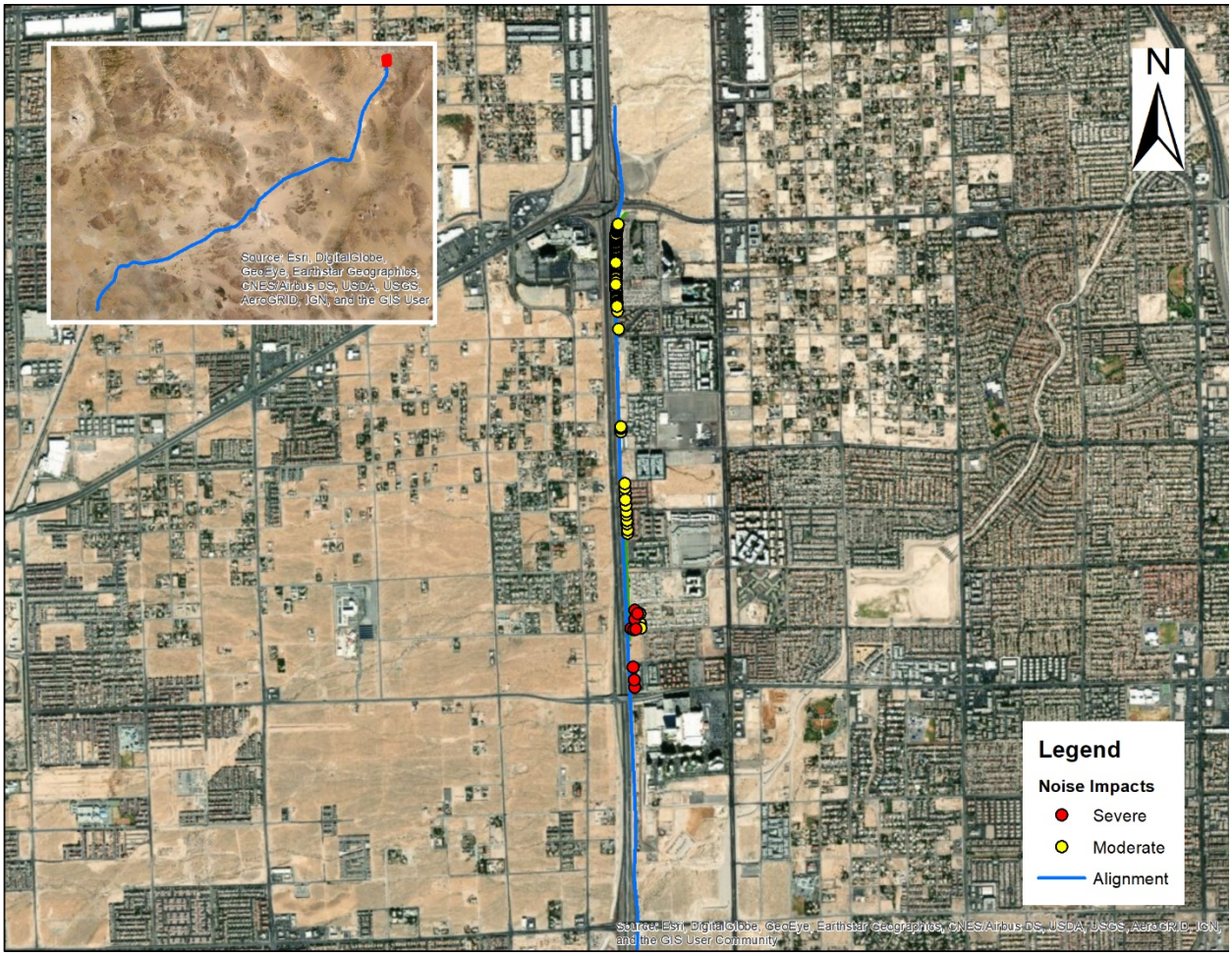


**Figure 5.1-4 Noise Impact Locations (4 of 4)**

## SEGMENT 1

A summary of the modified Project noise impacts for Segment 1 is shown in Table 5.1-2. There are no institutional receivers in Segment 1. There are no sensitive receptors located near the OMSF.

**Table 5.1-2 Residential Noise Impacts for Segment 1**

| Location | Side of Track | Dist to Near Track (ft) | Max Train Speed (mph) | Existing Noise Level (dBA) | Noise Level (dBA) | | | Type and # of Impacts | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Project | Impact Criteria | | | |
| | | | | | | Mod. | Sev. | Mod. | Sev. |
| Dale Evans Station and OMSF | NB | 2406 | 25 | 56 | 43 | 56 | 62 | 0 | 0 |
| Dale Evans Station and OMSF | SB | No noise sensitive receivers. | | | | | | | |
| Modified Project Total: | | | | | | | | 0 | 0 |
| DesertXpress EIS Total: | | | | | | | | 3 | 0 |

## SEGMENT 2

A summary of the modified Project noise impacts for Segment 2 is shown in Table 5.1-3 and Table 5.1-4 for residential and institutional receivers, respectively. A brief discussion of each area projected to have noise impacts follows the tables.

**Table 5.1-3 Residential Noise Impacts for Segment 2**

| Location | Side of Track | Dist to Near Track (ft) | Max Train Speed (mph) | Existing Noise Level (dBA) | Noise Level (dBA) | | | Type and # of Impacts | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Project | Impact Criteria | | | |
| | | | | | | Mod. | Sev. | Mod. | Sev. |
| Lenwood Rd to Highway 58 | NB | 549 | 110 | 65 | 56 | 61 | 66 | 0 | 0 |
| Lenwood Rd to Highway 58 | SB | 252 | 110 | 65 | 57 | 61 | 66 | 0 | 0 |
| P St to L St | NB | 149 | 90 | 65 | 53 | 61 | 66 | 0 | 0 |
| P St to L St | SB | No noise sensitive receivers. | | | | | | | |
| L St to H St | NB | 293 | 90 | 65 | 63 | 61 | 66 | 4 | 0 |
| L St to H St | SB | 313 | 90 | 65 | 54 | 61 | 66 | 0 | 0 |
| H St to D St | NB | 655 | 90 | 65 | 58 | 61 | 66 | 0 | 0 |
| H St to D St | SB | No noise sensitive receivers. | | | | | | | |
| D St to Agarita Ave | NB | 281 | 90 | 63 | 49 | 59 | 65 | 0 | 0 |
| D St to Agarita Ave | SB | 162 | 90 | 63 | 53 | 59 | 65 | 0 | 0 |

| Location | Side of Track | Dist to Near Track (ft) | Max Train Speed (mph) | Existing Noise Level (dBA) | Noise Level (dBA) | | | Type and # of Impacts | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Project | Impact Criteria | | | |
| | | | | | | Mod. | Sev. | Mod. | Sev. |
| Agarita Ave to Barstow Rd | NB | 235 | 90 | 63 | 51 | 59 | 65 | 0 | 0 |
| Agarita Ave to Barstow Rd | SB | 142 | 90 | 63 | 54 | 59 | 65 | 0 | 0 |
| Barstow Rd to Arroyo Dr | NB | 129 | 90 | 63 | 54 | 59 | 65 | 0 | 0 |
| Barstow Rd to Arroyo Dr | SB | 693 | 90 | 63 | 39 | 59 | 65 | 0 | 0 |
| Arroyo Dr to Muriel Dr | NB | 148 | 90 | 63 | 54 | 59 | 65 | 0 | 0 |
| Arroyo Dr to Muriel Dr | SB | 125 | 90 | 63 | 55 | 59 | 65 | 0 | 0 |
| Muriel Dr to Elizabeth St | NB | 267 | 90 | 63 | 50 | 59 | 65 | 0 | 0 |
| Muriel Dr to Elizabeth St | SB | 280 | 90 | 63 | 49 | 59 | 65 | 0 | 0 |
| Elizabeth St to Main St | NB | 244 | 90 | 63 | 64 | 59 | 65 | 11 | 0 |
| Elizabeth St to Main St | SB | 210 | 90 | 63 | 65 | 59 | 65 | 4 | 3 |
| Main St to the Mojave River | NB | 174 | 90 | 63 | 66 | 59 | 65 | 2 | 2 |
| Main St to the Mojave River | SB | 367 | 90 | 63 | 62 | 59 | 65 | 6 | 0 |
| the Mojave River to Soapmine Rd | NB | 170 | 90 | 63 | 58 | 60 | 65 | 0 | 0 |
| the Mojave River to Soapmine Rd | SB | No noise sensitive receivers. | | | | | | | |
| Fort Irwin Rd to Old Yermo Cutoff | NB | 293 | 110 | 63 | 61 | 60 | 65 | 1 | 0 |
| Fort Irwin Rd to Old Yermo Cutoff | SB | 325 | 110 | 63 | 60 | 60 | 65 | 3 | 0 |
| Meadow Grove Rd to Ghost Town Rd | NB | 155 | 110 | 63 | 69 | 60 | 65 | 0 | 2 |
| Meadow Grove Rd to Ghost Town Rd | SB | 139 | 110 | 63 | 69 | 60 | 65 | 1 | 6 |
| Mule Canyon Rd to Calico Rd | NB | 702 | 110 | 63 | 55 | 60 | 65 | 0 | 0 |

| Location | Side of Track | Dist to Near Track (ft) | Max Train Speed (mph) | Existing Noise Level (dBA) | Noise Level (dBA) | | | Type and # of Impacts | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Project | Impact Criteria | | | |
| | | | | | | Mod. | Sev. | Mod. | Sev. |
| Mule Canyon Rd to Calico Rd | SB | 414 | 125 | 63 | 59 | 60 | 65 | 0 | 0 |
| Yermo Rd to Minneola Rd | NB | 518 | 125 | 63 | 58 | 60 | 65 | 0 | 0 |
| Yermo Rd to Minneola Rd | SB | No noise sensitive receivers. | | | | | | | |
| | | | | | | | Modified Project Total: | 32 | 13 |
| | | | | | | | DesertXpress EIS Total: | 80 | 0 |

**Table 5.1-4 Institutional Noise Impacts for Segment 2**

| Name | Location | Side of Track | Dist to Near Track (ft) | Train Speed (mph) | Existing Noise Level (dBA) | Noise Level (dBA) | | | Impact |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Project | Impact Criteria | | |
| | | | | | | | Mod. | Sev. | |
| Church of the Nazarene | Agarita Ave to Barstow Rd | SB | 160 | 90 | 58 | 50 | 61 | 67 | 0 |
| Oasis Missionary Baptist Church | Agarita Ave to Barstow Rd | SB | 540 | 90 | 58 | 36 | 61 | 67 | 0 |
| Mojave River Valley Museum | Agarita Ave to Barstow Rd | SB | 637 | 90 | 58 | 35 | 61 | 67 | 0 |

**L Street to H Street (NB):** There are four single-family residences along the northbound side of the modified alignment between L Street and H Street in Barstow that are projected to have moderate noise impacts. These impacts are due to the elevated structure and the proximity of the tracks.

**Elizabeth Street to Main Street (NB):** There are eleven single-family residences along the northbound side of the modified alignment between Elizabeth Street and Main Street in Barstow that are projected to have moderate noise impacts. These impacts are due to the elevated structure.

**Elizabeth Street to Main Street (SB):** There are seven single- and multi-family residences along the southbound side of the modified alignment between Elizabeth Street and Main Street in Barstow that are projected to have moderate and severe noise impacts. These impacts are due to the elevated structure.

**Main Street to the Mojave River (NB):** There are four single-family residences along the northbound side of the modified alignment between Main Street and the Mojave River in Barstow that are projected to have moderate and severe noise impacts. These impacts are due to the elevated structure.

**Main Street to the Mojave River (SB):** There are six single-family residences along the southbound side of the modified alignment between Main Street and the Mojave River in Barstow that are projected to have moderate noise impacts. These impacts are due to the elevated structure.

**Fort Irwin Road to Old Yermo Cutoff (NB):** There is one single-family residence along the northbound side of the modified alignment between Fort Irwin Road and the Old Yermo Cutoff that is projected to have a moderate noise impact. This noise impact is due to the proximity of the track and the speed of the train.

**Fort Irwin Road to Old Yermo Cutoff (SB):** There are three single-family residences along the southbound side of the modified alignment between Fort Irwin Road and the Old Yermo Cutoff that are projected to have moderate noise impacts. These noise impacts are due to the proximity of the track and the speed of the train.

**Meadow Grove Road to Ghost Town Road (NB):** There are two single-family residences along the northbound side of the modified alignment between Meadow Grove Road and Ghost Town Road that are projected to have severe noise impacts. This noise impacts are due to the proximity of the track, the speed of the train, and the elevated structure.

**Meadow Grove Road to Ghost Town Road (SB):** There are seven single-family residences along the southbound side of the modified alignment between Meadow Grove Road and Ghost Town Road that are projected to have moderate and severe noise impacts. This noise impacts are due to the proximity of the track, the speed of the train, and the elevated structure.

## SEGMENT 3

A summary of the modified Project noise impacts at residential receivers for Segment 3 is shown in Table 5.1-5. There are no institutional noise receivers in Segment 3. A brief discussion of each area projected to have noise impacts follows the table.

**Table 5.1-5 Residential Noise Impacts for Segment 3**

| Location | Side of Track | Dist to Near Track (ft) | Max Train Speed (mph) | Existing Noise Level (dBA) | Noise Level (dBA) | | | Type and # of Impacts | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Project | Impact Criteria | | | |
| | | | | | | Mod. | Sev. | Mod. | Sev. |
| Minneola Rd to Coyote Lake Rd | NB | 487 | 110 | 63 | 57 | 59 | 65 | 0 | 0 |
| Minneola Rd to Coyote Lake Rd | SB | No noise sensitive receivers. | | | | | | | |
| Mountain View Rd to Tami Rd | NB | 393 | 180 | 63 | 61 | 59 | 65 | 2 | 0 |
| Mountain View Rd to Tami Rd | SB | 345 | 180 | 63 | 62 | 59 | 65 | 1 | 0 |
| Tami Rd to Harvard Rd | NB | No noise sensitive receivers. | | | | | | | |
| Tami Rd to Harvard Rd | SB | 357 | 180 | 63 | 62 | 59 | 65 | 2 | 0 |
| Harvard Rd to Pima Ave | NB | 458 | 180 | 63 | 60 | 59 | 65 | 1 | 0 |

| Location | Side of Track | Dist to Near Track (ft) | Max Train Speed (mph) | Existing Noise Level (dBA) | Noise Level (dBA) | | | Type and # of Impacts | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Project | Impact Criteria | | | |
| | | | | | | Mod. | Sev. | Mod. | Sev. |
| Harvard Rd to Pima Ave | SB | No noise sensitive receivers. | | | | | | | |
| Baker | NB | 288 | 125 | 65 | 61 | 61 | 66 | 1 | 0 |
| Baker | SB | No noise sensitive receivers. | | | | | | | |
| Modified Project Total: | | | | | | | | 7 | 0 |
| DesertXpress EIS Total: | | | | | | | | 0 | 0 |

**Mountain View Road to Tami Road (NB):** There are two single-family residences along the northbound side of the modified alignment between Mountain View Road and Tami Road that are projected to have moderate noise impacts. These noise impacts are due to the proximity of the track and the speed of the train.

**Mountain View Road to Tami Road (SB):** There is one single-family residence along the southbound side of the modified alignment between Mountain View Road and Tami Road that is projected to have a moderate noise impact. This noise impact is due to the proximity of the track and the speed of the train.

**Tami Road to Harvard Road (SB):** There are two single-family residences along the southbound side of the modified alignment between Tami Road and Harvard Road that are projected to have moderate noise impacts. These noise impacts are due to the proximity of the track and the speed of the train.

**Harvard Road to Pima Avenue (NB):** There is one single-family residence along the northbound side of the modified alignment between Harvard Road and Pima Avenue that is projected to have a moderate noise impact. This noise impact is due to the proximity of the track and the speed of the train.

**Baker (NB):** There is one single-family residence along the northbound side of the modified alignment in Baker that is projected to have a moderate noise impact. This noise impact is due to the proximity of the track and the speed of the train.

## SEGMENT 4

A summary of the modified Project noise impacts for Segment 4 is shown in Table 5.1-6 and Table 5.1-7 for residential and institutional receivers, respectively.

**Table 5.1-6 Residential Noise Impacts for Segment 4**

| Location | Side of Track | Dist to Near Track (ft) | Max Train Speed (mph) | Existing Noise Level (dBA) | Noise Level (dBA) | | | Type and # of Impacts | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Project | Impact Criteria | | | |
| | | | | | | Mod. | Sev. | Mod. | Sev. |
| Halloran Springs Rd | NB | No noise sensitive receivers. | | | | | | | |
| Halloran Springs Rd | SB | No noise sensitive receivers. | | | | | | | |
| Clark Mountain Rd | NB | No noise sensitive receivers. | | | | | | | |

| Location | Side of Track | Dist to Near Track (ft) | Max Train Speed (mph) | Existing Noise Level (dBA) | Noise Level (dBA) | | | Type and # of Impacts | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Project | Impact Criteria | | | |
| | | | | | | Mod. | Sev. | Mod. | Sev. |
| Clark Mountain Rd | SB | 335 | 110 | 65 | 60 | 61 | 66 | 0 | 0 |
| Modified Project Total: | | | | | | | | 0 | 0 |
| DesertXpress EIS Total: | | | | | | | | 0 | 0 |

**Table 5.1-7 Institutional Noise Impacts for Segment 4**

| Name | Location | Side of Track | Dist to Near Track (ft) | Train Speed (mph) | Existing Noise Level (dBA) | Noise Level (dBA) | | | Impact |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Project | Impact Criteria | | |
| | | | | | | | Mod. | Sev. | |
| Halloran Springs Petroglyphs | Halloran Springs Rd | SB | 693 | 135 | 49.8 | 53.0 | 53.3 | 59.5 | 0 |

## SEGMENT 5

A summary of the modified Project noise impacts for Segment 5 is shown in Table 5.1-8.

**Table 5.1-8 Noise Impacts for Segment 5**

| Location | Side of Track | Dist to Near Track (ft) | Max Train Speed (mph) | Existing Noise Level (dBA) | Noise Level (dBA) | | | Type and # of Impacts | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Project | Impact Criteria | | | |
| | | | | | | Mod. | Sev. | Mod. | Sev. |
| Jean | NB | 417 | 180 | 65 | 59 | 61 | 66 | 0 | 0 |
| Jean | SB | No noise sensitive receivers. | | | | | | | |
| Modified Project Total: | | | | | | | | 0 | 0 |
| DesertXpress EIS Total: | | | | | | | | 0 | 0 |

## SEGMENT 6

A summary of the modified Project noise impacts at residential receivers for Segment 6 is shown in Table 5.1-9. There are no institutional receivers in Segment 6. A brief discussion of each area projected to have noise impacts follows the table.

**Table 5.1-9 Residential Noise Impacts for Segment 6**

| Location | Side of Track | Dist to Near Track (ft) | Max Train Speed (mph) | Existing Noise Level (dBA) | Noise Level (dBA) | | | Type and # of Impacts | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Project | Impact Criteria | | | |
| | | | | | | Mod. | Sev. | Mod. | Sev. |
| E Larson Ln to St Rose Pkwy | NB | No noise sensitive receivers. | | | | | | | |
| E Larson Ln to St Rose Pkwy | SB | 258 | 125 | 66 | 63 | 61 | 67 | 14 | 0 |
| St Rose Pkwy to E Neal Ave | NB | No noise sensitive receivers. | | | | | | | |
| St Rose Pkwy to E Neal Ave | SB | 338 | 80 | 66 | 57 | 61 | 67 | 0 | 0 |
| E Neal Ave to W Cactus Ave | NB | No noise sensitive receivers. | | | | | | | |
| E Neal Ave to W Cactus Ave | SB | 348 | 80 | 66 | 57 | 61 | 67 | 0 | 0 |
| W Cactus Ave to W Silverado Ranch Blvd | NB | 378 | 70 | 58 | 60 | 57 | 63 | 0 | 0 |
| W Cactus Ave to W Silverado Ranch Blvd | SB | No noise sensitive receivers. | | | | | | | |
| W Silverado Ranch Blvd to E Pebble Rd | NB | 103 | 80 | 58 | 69 | 57 | 63 | 44 | 78 |
| W Silverado Ranch Blvd to E Pebble Rd | SB | 483 | 80 | 58 | 59 | 57 | 63 | 0 | 0 |
| E Pebble Rd to Blue Diamond Rd | NB | 29 | 70 | 58 | 62 | 57 | 63 | 92 | 0 |
| E Pebble Rd to Blue Diamond Rd | SB | No noise sensitive receivers. | | | | | | | |
| Las Vegas Station | NB | 2636 | 20 | 58 | 42 | 57 | 63 | 0 | 0 |
| Las Vegas Station | SB | No noise sensitive receivers. | | | | | | | |
| Modified Project Total: | | | | | | | | 150 | 78 |
| DesertXpress EIS Total: | | | | | | | | 23 | 12 |

**East Larson Lane to St Rose Parkway (SB):** There are 14 single-family residences along the southbound side of the proposed alignment between East Larson Lane and St Rose Parkway in Las Vegas, NV projected to have moderate noise impacts. These impacts are due to the proximity of the tracks and the speed of the train.

**West Silverado Ranch Boulevard to East Pebble Road (NB):** There are 122 single and multi-family residences along the northbound side of the modified alignment between West Silverado Ranch

Boulevard and East Pebble Road in Las Vegas that are projected to have moderate and severe noise impacts. This represents 24 buildings. These impacts are due to the elevated track and proximity of the tracks.

**East Pebble Road to Blue Diamond Road (NB):** There are 92 single and multi-family residences along the northbound side of the modified alignment between East Pebble Road and Blue Diamond Road in Las Vegas that are projected to have moderate noise impacts. This represents 55 buildings. These impacts are due to the proximity of the tracks.

**Table 5.1-10 Institutional Noise Impacts for Segment 6**

| Name | Location | Side of Track | Dist to Near Track (ft) | Train Speed (mph) | Existing Noise Level (dBA) | Noise Level (dBA) | | | Impact |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Impact Criteria | | |
| | | | | | | Project | Mod. | Sev. | |
| Dennis Ortwein Elementary School | E Neal Ave to W Cactus Ave | SB | 413 | 80 | 60 | 52 | 63 | 68 | 0 |

## 5.2 TRAFFIC NOISE

All of the changes in traffic-related noise are located near the Dale Evans Station and OMSF site and Warm Springs Station site. For the roadways near the Warm Springs Station site, there are no locations where the change in traffic conditions resulting from the Project modifications would be substantial enough to result in traffic noise impact (defined in Section 3.1.2) and no further noise assessment was conducted.

Two locations near the Dale Evans Station and OMSF site are projected to have significant increases in traffic and were assessed for traffic noise impacts. The first location included the area of residences along Dale Evans Parkway between the I-15 freeway and Stoddard Wells Road, and the second location included the area of residences along Colusa Road between Willow Springs Avenue and Dale Evans Parkway. While the increase in traffic volume resulting from the Project modifications is substantial at both locations; the residences are all located outside the 100-foot screening distances for station access roads. Therefore, the Project modifications would not result in substantial changes in the evaluation of traffic noise impacts of the DesertXpress EIS.

## 5.3 VIBRATION

The potential vibration impact from Project operations was assessed on an absolute basis using the FRA criterion of 72 VdB for residential land uses with frequent events. The vibration impact criterion is the same as was used in the DesertXpress EIS and is shown in Table F-3.12-1 of the DesertXpress FEIS. The approach used for assessing vibration impact generally follows the approach used for the noise impact, except that existing vibration is not considered when evaluating impact. For the modified Project, the estimated root mean square (RMS) velocity levels (VdB re 1 µin./sec) for sensitive receptors at the receptor closest to the tracks in each Segment is presented in Table 5.3-1 below; this table summarizes the results of the analysis in terms of anticipated exceedances of FRA criteria for the closest residence in each Segment of the modified Project.

Table 5.3-1 lists the locations of the closest receptor for each Segment, the distance to the near track, and the projected vibration level in each Segment. The Project vibration level listed in the table is the highest vibration level for that Segment. The vibration levels for other impacted receptors are lower than the reported values. The Project modifications would not result in vibration impacts, and therefore would not result in substantial changes in the evaluation of operational vibration impacts of the DesertXpress EIS.

**Table 5.3-1 Vibration Impact Summary**

| Segment | Location | Distance to Near Track (ft) | Max Train Speed (mph) | Project Levels (VdB) | Criteria | # of Impacts |
|---|---|---|---|---|---|---|
| 1 | Dale Evans Station | 2406 | 25 | 53 | 72 | 0 |
| 2 | Arroyo Dr to Muriel Dr | 90 | 126 | 63 | 72 | 0 |
| 3 | Mountain View Rd to Tami Rd | 180 | 468 | 61 | 72 | 0 |
| 4 | Clark Mountain Rd | 530 | 110 | 57 | 72 | 0 |
| 5 | Jean | 432 | 125 | 51 | 72 | 0 |

| Segment | Location | Distance to Near Track (ft) | Max Train Speed (mph) | Project Levels (VdB) | Criteria | # of Impacts |
|---|---|---|---|---|---|---|
| 6 | E Pebble Rd to Blue Diamond Rd | 70 | 32 | 70 | 72 | 0 |
| | | | | | Modified Project Total: | 0 |
| | | | | | DesertXpress EIS Total: | 0 |

## 5.4 CONSTRUCTION NOISE

The Project modifications would not result in new or previously unevaluated construction noise impacts beyond those identified in the DesertXpress EIS because construction techniques and areas where construction noise impacts would occur have not changed. The Project modifications would not result in substantial changes in the evaluation of construction noise impacts of the DesertXpress EIS.

## 5.5 CONSTRUCTION VIBRATION

The Project modifications would not result in new or previously unevaluated construction vibration impacts beyond those identified in the DesertXpress EIS because construction techniques and areas where construction vibrations impacts would occur have not changed. The Project modifications would not result in substantial changes in the evaluation of construction vibration impacts of the DesertXpress EIS.

# 6.0 Mitigation Measures

The mitigation measures to address operation and construction impacts are provided below from the DesertXpress EIS.[4] Because of the changes in impacts to noise and vibration, revisions to Mitigation Measure NV-1 is required with changes shown using ~~strikeout~~ underline. While there are additional impacts identified, based on new operations and new alignment alternatives, the magnitude of the impacts is similar, and with the inclusion of mitigation, there would be no residual impacts.

The DesertXpress EIS included Mitigation Measures NV-1, NV-3, and NV-4 (outlined below) to reduce moderate and severe noise impacts. These mitigation measures would still apply to the Project to reduce potential noise impacts; however, as discussed below, the noise barrier locations originally identified in Mitigation Measure NV-1 in the DesertXpress EIS would be relocated to reduce severe and moderate noise effects associated with the Project modifications. With implementation of Mitigation Measures NV-1, NV-3, and NV-4, the Project would not result in new or unevaluated noise effects.

**Mitigation Measure NV-1: Noise Barriers**

~~The Applicant~~ DesertXpress Enterprises, LLC shall install noise barriers at least four feet in height relative to the top of rail elevation along the at-grade portions of the rail alignment and on the elevated

[4] Note: Mitigation Measures NV-5 through NV-9, initially identified in the DesertXpress EIS, applied only to a locomotive technology option (diesel-electric multiple unit or DEMU) that was not included in the Selected Alternative. Accordingly, mitigation specific to the DEMU technology is not included here.

structures to reduce severe noise impacts. The noise barriers shall be installed prior to the commencement of train operations along the rail alignment to reduce adverse noise effects.

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 four pounds per square foot, 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.

~~The Applicant~~ DesertXpress Enterprises, LLC shall install noise barriers meeting the above criteria at the locations identified in Table 6.1-1 and shown in Figure 6.1-1, Figure 6.1-2, Figure 6.1-3, and Figure 6.1-4. Table 6.1-1 includes the side of track, location, length, and height of the proposed barriers. At other locations where impacts have been identified, noise barriers would not be effective and other mitigation options would need to be implemented. ~~the Final EIS (A list of these locations was provided as Final EIS Table F-3.12-5; an illustration of the locations of these barriers was provided in Final EIS Figures F-3.12-1 through F-3.12-3).~~

**~~Table F-3.12-5 Noise Barrier Locations~~**

| ~~Location~~ | ~~Side of Track~~ | ~~Civil Station~~ | ~~Length (ft)~~ | ~~Relevant Figure~~ |
|---|---|---|---|---|
| **~~Preferred Alternative Terminating at Las Vegas Southern Station or Las Vegas Central Station B~~** | | | | |
| ~~Lenwood Road~~ | ~~NB~~ | ~~1557 – 1563~~ | ~~600~~ | ~~F-3.12-1~~ |
| ~~Lenwood Road~~ | ~~SB~~ | ~~1580 – 1587~~ | ~~700~~ | ~~F-3.12-1~~ |
| ~~L Street to H Street~~ | ~~SB~~ | ~~1735 – 1743~~ | ~~3,000~~ | ~~F-3.12-1~~ |
| ~~Grace Street~~ | ~~NB~~ | ~~1791 – 1821~~ | ~~800~~ | ~~F-3.12-1~~ |
| ~~Coolwater Lane~~ | ~~SB~~ | ~~1882 – 1892~~ | ~~1,000~~ | ~~F-3.12-1~~ |
| ~~Western Whip Court to Kelly Drive~~ | ~~SB~~ | ~~1842 – 1886~~ | ~~4,400~~ | ~~F-3.12-1~~ |
| ~~Elephant Mountain Road~~ | ~~SB~~ | ~~2225 – 2235~~ | ~~1,000~~ | ~~F-3.12-1~~ |
| ~~Ghost Town Road~~ | ~~NB~~ | ~~2245 – 2255~~ | ~~1,000~~ | ~~F-3.12-1~~ |
| ~~South of Blue Diamond Rd~~ | ~~SB~~ | ~~9715 – 9732~~ | ~~1,700~~ | ~~F-3.12-3~~ |
| **~~Preferred Alternative Terminating at Las Vegas Central Station B Only (In Addition to Mitigation Above)~~** | | | | |
| ~~South of W Tropicana Ave~~ | ~~SB~~ | ~~9926 – 9934~~ | ~~800~~ | ~~F-3.12-3~~ |
| **~~Total Noise Mitigation Length~~** | | | | |
| ~~*Total (terminating at Las Vegas Southern Station)*~~ | | | ~~15,250~~ | |
| ~~*Total (terminating at Las Vegas Central Station B)*~~ | | | ~~20,400~~ | |

Source: HMMH, 2010.

**Table 6.1-1 Noise Barrier Locations**

| Noise Barrier Location | Side of Track | Civil Station | Length (ft) |
|---|---|---|---|
| L St to H St, Barstow* | NB | 7916+00 to 7926+00 | 1,000 |
| Elizabeth St to Main St, Barstow* | NB | 7766+50 to 77760+50 | 950 |
| Elizabeth St to Main St, Barstow* | SB | 7773+50 to 7783+00 | 950 |
| Main St to the Mojave River, Barstow* | NB | 7755+00 to 7763+00 | 800 |
| Main St to the Mojave River, Barstow* | SB | 7754+00 to 7764+00 | 1,000 |
| Meadow Grove Road to Ghost Town Road, Yermo* | NB | 7405+00 to 7430+00 | 2,200 |
| Meadow Grove Road to Ghost Town Road, Yermo* | SB | 7415+00 to 7436+50 | 2,150 |
| E Larson Lane to St Rose Parkway* | SB | 445+00 to 456+50 | 1,150 |
| W Silverado Ranch Boulevard to E Pebble Road, Las Vegas* | NB | 238+50 to 246+50 | 800 |
| W Silverado Ranch Boulevard to E Pebble Road, Las Vegas* | NB | 225+50 to 233+50 | 800 |
| W Silverado Ranch Boulevard to E Pebble Road, Las Vegas** | NB | 197+00 to 211+50 | 1,450 |
| E Pebble Road to Blue Diamond Road, Las Vegas*** | NB | 184+00 to 189+50 | 550 |
| E Pebble Road to Blue Diamond Road, Las Vegas*** | NB | 140+00 to 166+00 | 2,600 |
| Total Length: | | | 16,750 |
| Total Length from FEIS: | | | 20,400 |

*4 ft barrier on elevated structure
**Extension of current barrier highway noise barrier
***Detailed analysis of existing barriers needed to determine barrier needs (additional height, etc.)

~~**Mitigation Measure NV-2: Location of Crossovers or Special Trackwork at Crossovers**~~

~~To reduce severe noise impacts, the Applicant shall locate crossovers away from residential areas where feasible, or use spring-rail or moveable point frogs in place of standard rigid frogs at turnouts where relocation of crossovers is not feasible. Because the impacts of wheels over rail gaps at track crossover locations or turn-outs for passing tracks increases vibration by about 6 dBA, crossovers are a major source of vibration 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. The Applicant shall incorporate these measures into design-build Project plans.~~

- **Crossovers were included in the vibration assessment conducted for the Project modifications, which determined that vibration impacts would not occur. Therefore, Mitigation Measure NV-2 no longer applies to the Project modifications.**

**Mitigation Measure NV-3: Building Sound Insulation**

Where sensitive receptors would be dispersed or limited in nature, and with the agreement and consent of property owners, ~~the Applicant~~ DesertXpress Enterprises, LLC may choose to install building sound insulation rather than implementing noise barriers defined under Mitigation Measure NV-1 to mitigate severe noise impacts. Sound insulation to improve the outdoor-to-indoor noise reduction has been

widely applied around airports and has seen limited application for rail 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.

**Mitigation Measure NV-4: Property Acquisitions or Easements**

Where sensitive receptors would be dispersed or limited in nature, ~~the Applicant~~ DesertXpress Enterprises, LLC may choose to implement property acquisitions or easements rather than Mitigation Measure NV-1 to mitigate severe noise impacts. ~~The Applicant~~ DesertXpress Enterprises, LLC may purchase residences likely to be impacted by train operations or to acquire easements for such residences by paying the homeowners to accept the future train noise conditions. These approaches are usually taken only in isolated cases where other mitigation options are infeasible, impractical, or too costly.

**Mitigation Measure NV-10: Construction Noise and Vibration Measures**

~~The Applicant~~ DesertXpress Enterprises, LLC shall develop specific residential property line noise limits that comply with applicable local noise regulations to the extent feasible during the design-build process, include these noise limits in the construction specifications for the Project, and perform 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. Noise control measures that would be applied as needed to meet the noise limits include the following:

- Avoiding nighttime construction in residential neighborhoods.
- Using specially quieted equipment with enclosed engines and/or high-performance mufflers.
- Locating stationary construction equipment as far as possible from noise-sensitive sites.
- Constructing noise barriers, such as temporary walls or piles of excavated material, between noisy activities and noise-sensitive receivers.
- Re-routing construction-related truck traffic along roadways that will cause the least disturbance to residents.
- Avoiding impact pile driving near noise-sensitive areas, where possible. Drilled piles or the use of a sonic or vibratory pile driver are quieter alternatives where the geological conditions permit their use. If impact pile drivers must be used near noise-sensitive receptors, their use will be limited to the periods between 8:00 AM and 5:00 PM on weekdays.

With the incorporation of the appropriate noise mitigation measures, impacts from construction-generated noise should not be adverse. To provide added assurance, ~~the Applicant~~ DesertXpress Enterprises, LLC shall institute a complaint resolution procedure to rapidly address any noise problems that may develop during construction.

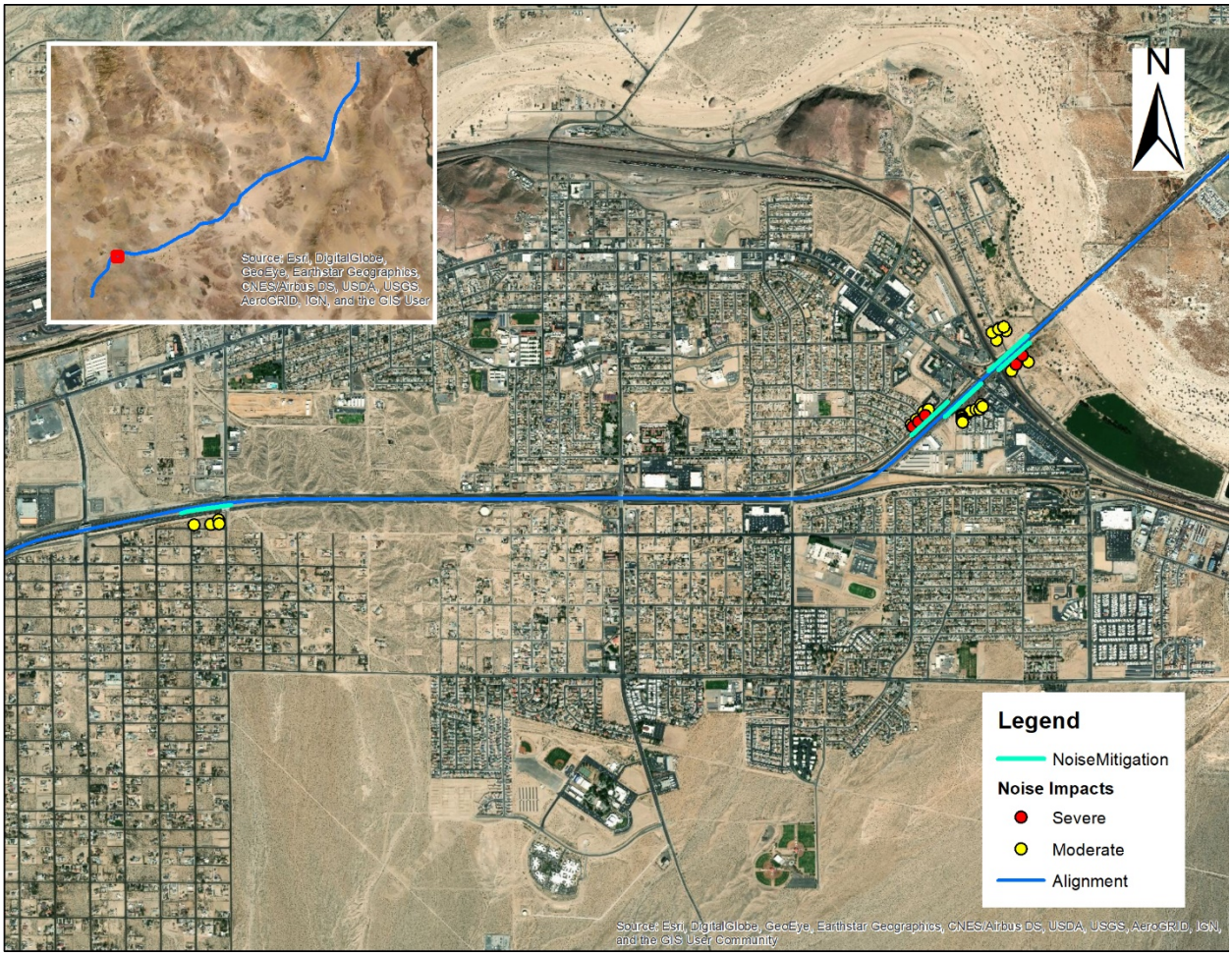


**Figure 6.1-1 Noise Mitigation Locations as Specified by MM NV-1 and NV-3 (1 of 4)**

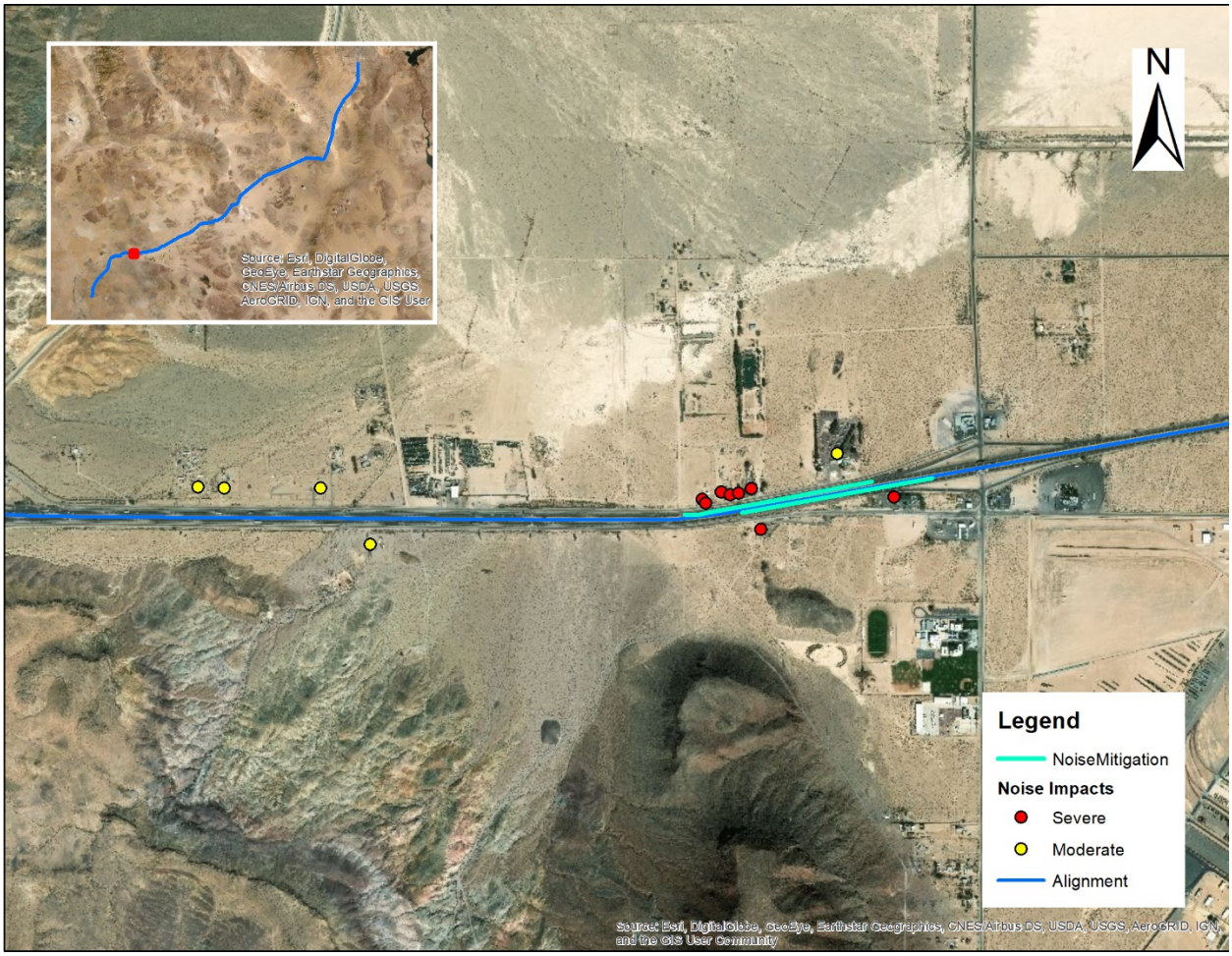


**Figure 6.1-2 Noise Mitigation Locations as Specified by MM NV-1 and NV-3 (2 of 4)**

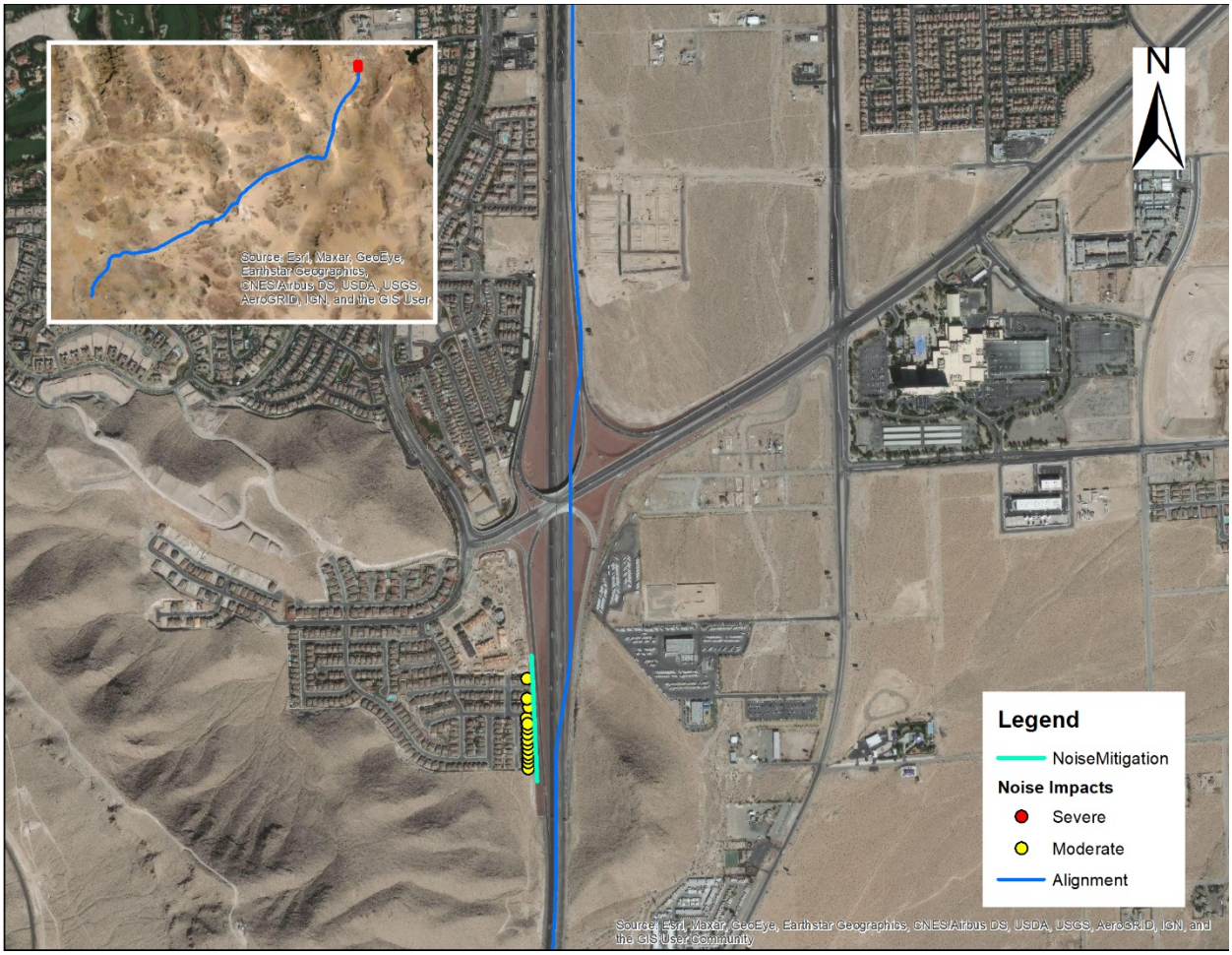


**Figure 6.1-3 Noise Mitigation Locations as Specified by MM NV-1 and NV-3 (3 of 4)**

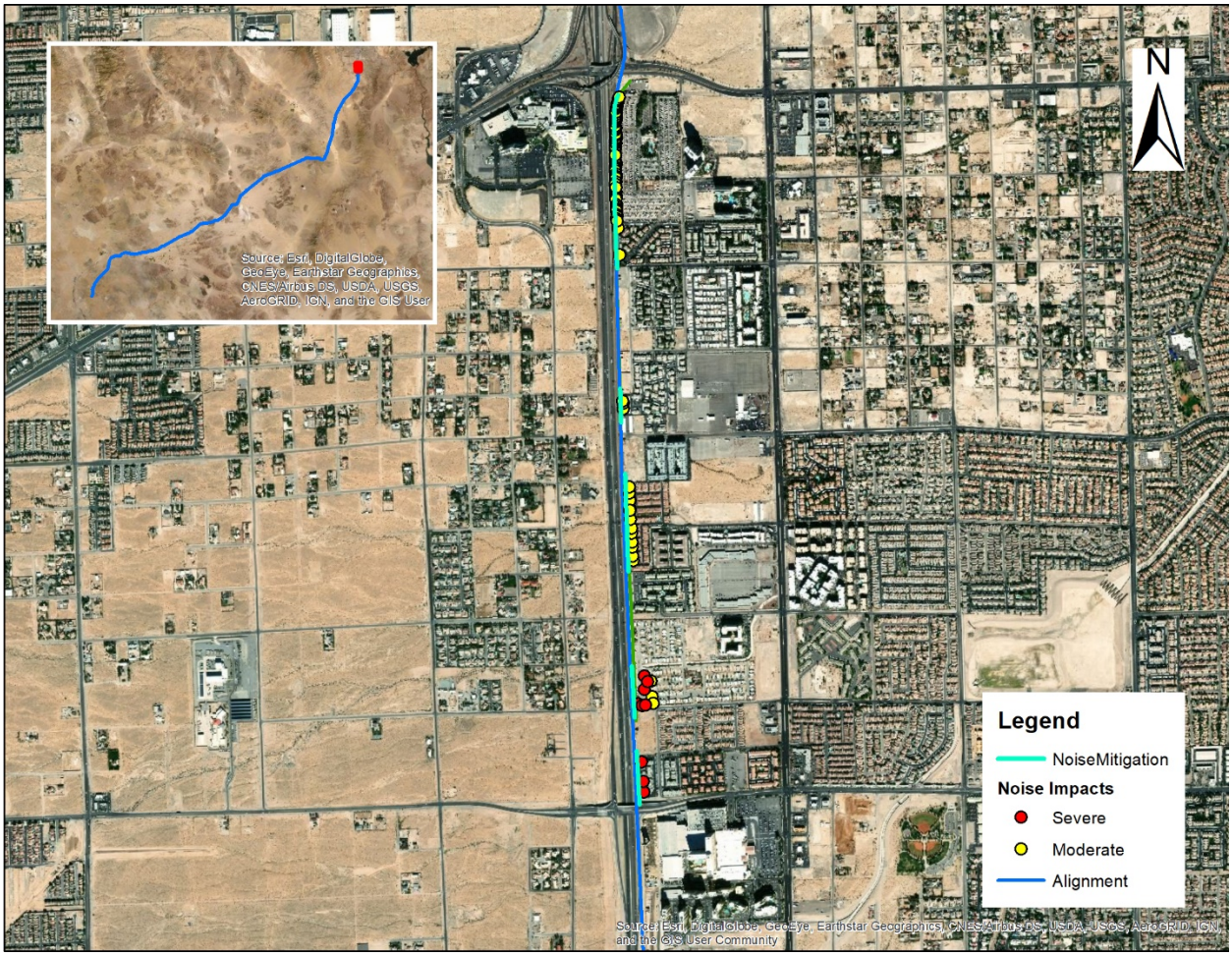


**Figure 6.1-4 Noise Mitigation Locations as Specified by MM NV-1 and NV-3 (4 of 4)**

# 7.0 References

Federal Railroad Administration (FRA). 2012. High-Speed Ground Transportation Noise and Vibration Impact Assessment. Final Report DOT/FRA/ORD-12/15.