

5.12 NOISE AND VIBRATION

5.12.1 INTRODUCTION

This section discusses the existing regulatory settings and environmental settings, and evaluates the Project's potential to generate a substantial temporary or permanent increase in ambient noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies, result in generation of excessive groundborne vibration or groundborne noise levels, and expose people residing or working in the Project area to excessive noise levels if within two miles of a public airport or within the vicinity of an airport land use plan.

Where significant impacts remain despite compliance with the existing regulatory framework, feasible mitigation measures are recommended to avoid or reduce the Project's potentially significant environmental impacts.

Proposed General Plan

Proposed General Plan-related information in this section is based on methodology and information discussed in **Section 5.12.3** and **Section 5.12.4**, respectively. General Plan Noise modeling results are provided in **Appendix 5.12 GP-1: Noise Monitoring and Modeling Data**.

Barstow International Gateway (BIG)

BIG-related information in this section is based in part on the following studies:

- *Barstow International Gateway Noise and Vibration Technical Report*; see **Appendix 5.12 BIG-1: Noise and Vibration Technical Report**

Summary of Findings: Proposed General Plan

With no airport or large industrial base, Barstow is a quiet community with few noise sources other than the vehicles on roadways and freeways and train movement on train tracks. As the City of Barstow (City) grows, more construction noise will occur along with the potential to disturb sensitive receptors. Mitigating noise usually means creating a physical barrier between the noise source and the receptor. Design elements can be introduced into new projects that can help reduce noise; however, roadway noise increases can affect existing development with few feasible methods of noise reduction. For this reason, construction and traffic noise remain significant and unavoidable impacts of the proposed General Plan.

Summary of Findings – Barstow International Gateway

BIG would result in a significant and unavoidable impact concerning noise during kV electrical line construction due to temporary noise barrier infeasibility and nighttime construction noise even with mitigation measures. Further, BIG operational noise would result in a significant and unavoidable impact because long-term operational noise levels would exceed applicable exterior/interior noise standards and/or result in a substantial noise increase at nearby sensitive receptors. However, BIG would result in a

less than significant impact concerning vibration due to distance from nearby receptors. Further, due to the distance from the closest public airport [17 miles away in Daggett], BIG would result in a less than significant impact concerning airport noise because BIG would not expose people working in the BIG footprint to excessive airport- or airstrip-related noise levels.

5.12.2 REGULATORY SETTING

5.12.2.1 Federal

Federal Highway Administration

Proposed federal or federal-aided highway construction projects at a new location, or the physical alteration of an existing highway that significantly changes the horizontal or vertical alignment or increases the number of through-traffic lanes, require an assessment of noise and consideration of noise abatement per 23 Code of Federal Regulations (CFR) Part 772, “Procedures for Abatement of Highway Traffic Noise and Construction Noise.” The Federal Highway Administration (FHWA) has adopted noise abatement criteria for sensitive receptors—such as picnic areas, recreation areas, playgrounds, active sport areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals—when “worst-hour” noise levels approach or exceed 67 dBA L_{eq} (Caltrans, 2020).

United States Environmental Protection Agency

In addition to FHWA standards, the U.S. Environmental Protection Agency (U.S. EPA) has identified the relationship between noise levels and human response. The U.S. EPA has determined that over a 24-hour period, a L_{eq} of 70 dBA will result in some hearing loss. Interference with activity and annoyance will not occur if exterior levels are maintained at a L_{eq} of 55 dBA and interior levels at or below 45 dBA. These levels are relevant to planning and design and useful for informational purposes, but they are not land use planning criteria because they do not consider economic cost, technical feasibility, or the needs of the community; therefore, they are not mandated.

The U.S. EPA also set 55 dBA L_{dn} as the basic goal for exterior residential noise intrusion. However, other federal agencies, in consideration of their own program requirements and goals, as well as the difficulty of actually achieving a goal of 55 dBA L_{dn} , have settled on the 65 dBA L_{dn} level as their standard. At 65 dBA L_{dn} , activity interference is kept to a minimum, and annoyance levels are still low. It is also a level that can realistically be achieved.

United States Department of Housing and Urban Development

The U.S. Department of Housing and Urban Development (HUD) has set a goal of 65 dBA L_{dn} as a desirable maximum exterior standard for residential units developed under HUD funding. The State of California also generally accepts this level. While HUD does not specify acceptable interior noise levels, standard construction of residential dwellings constructed under Title 24 standards typically provides in excess of 20 dBA of attenuation with the windows closed. Based on this premise, the interior L_{dn} should not exceed 45 dBA.

Noise Control Act of 1972

The Noise Control Act of 1972 (42 United States Code [USC] § 4910) was the first comprehensive statement of national noise policy. The act declared “it is the policy of the U.S. to promote an environment for all Americans free from noise that jeopardizes their health or welfare.” Although the act, as a funded program, was ultimately abandoned at the federal level, it served as the catalyst for comprehensive noise studies and the generation of noise assessment and mitigation policies, regulations, ordinances, standards and guidance for many states, counties, and even municipal governments.

Code of Federal Regulations Title 40 (Parts 201, 202, 204, and 205) and Title 49 (Part 210)

Federal regulations related to noise are codified in the *U.S. CFR*. The FHWA sets federal regulations related to noise limits for medium and heavy trucks and locomotives. Federal noise regulations for medium and heavy trucks are contained in 40 CFR Part 201 and railroad noise regulations are contained in 49 CFR Part 210. The regulations set noise limits for locomotives and are implemented through regulatory controls on locomotive manufacturers. Federal regulations regarding motor carriers engaged in interstate commerce are contained in Title 40 of the CFR Part 202. The regulations set noise limits for motor carriers engaged in interstate commerce, including setting standards for highway operations. Federal regulations also establish noise limits for medium and heavy trucks (more than 4.5 tons, gross vehicle weight rating) under 40 CFR Part 205, Subpart B. The federal truck pass-by noise standard is 80 decibels (dB) at 15 meters from the vehicle pathway centerline. These controls are implemented through regulatory controls on truck manufacturers.

Federal Railroad Administration Guidelines

The U.S. Federal Railroad Administration (FRA) has jurisdiction over all freight and passenger rail (FRA, 2019). According to the FRA’s *Guidance on Assessing Noise and Vibration Impacts*, the noise standards and methodologies from the Federal Transit Authority (FTA) “Transit Noise and Vibration Impact Assessment Manual,” herein referenced as the “FTA guidelines,” are relied on by FRA in evaluating improvements to conventional passenger and freight rail lines.

Section 7 of the FTA guidelines provides standards for determining construction noise for rail projects. FTA detailed construction assessment criteria were used for this report and are consistent with Section 7.1 of the FTA guideline. According to FTA guidelines a “detailed” assessment is warranted when a project has “potentially severe” impacts within the proximity of sensitive land uses.

Table 5.12-1: Federal Transit Administration Construction Noise Assessment Criteria shows the FTA’s “detailed” impact assessment construction noise criteria. According to the FTA guidelines, a detailed analysis of construction noise is warranted when “...many noise sensitive sites are adjacent to a construction project or where contractors are faced with stringent local ordinances or heightened public concerns expressed in early outreach efforts.”

Table 5.12-1: Federal Transit Administration Construction Noise Assessment Criteria		
Land Use	8-hour L_{eq} , dBA	
	Day	Night
Residential	80	70
Commercial	85	85
Industrial	90	90
Notes: dBA = A-weighted decibels; L_{dn} = day-night sound level; L_{eq} = equivalent sound level See Appendix 5.12 BIG-1: Noise and Vibration Technical Report, Table 3.1 for Noise descriptor definitions.		
Source: FTA. 2018. <i>Transit Noise and Vibration Impact Assessment Manual</i> .		

Occupational Safety and Health Administration Occupational Noise Exposure

The Occupational Safety and Health Administration (OSHA) has set legal limits on noise exposure in the workplace. These limits are based on a worker's 8-hour time-weighted average over a workday. For noise, OSHA's permissible 8-hour time weighted average exposure limit is 90 dBA (29 CFR Part 1910.95). Areas where levels exceed 85 dBA must be designated and labeled as high-noise-level areas where hearing protection is required. This noise exposure criterion for workers would apply to construction activities.

U.S. Environmental Protection Agency Railroad Noise Standards

The U.S. EPA is charged with the regulation of railroad noise under the Noise Control Act. U.S. EPA-set noise standards are found in 40 CFR Part 201. Enforcement of the regulations shifted to the FRA in 1982 when the U.S. EPA Office of Noise Abatement and Control was closed. Since that time, the U.S. EPA's role in regulating rail noise primarily involves setting national standards and coordinating federal efforts, rather than directly enforcing regulations. **Table 5.12-2: Summary of U.S. Environmental Protection Agency and Federal Railroad Administration Railroad Noise Standards** summarizes the U.S. EPA operating noise standards for railroad equipment and set noise limit standards for new equipment.

Table 5.12-2: Summary of U.S. Environmental Protection Agency and Federal Railroad Administration Railroad Noise Standards				
Noise Sources	Operating Conditions	Noise Metric ^{1,2}	Measured Distance (feet)	Standard (dBA)
Non-switcher locomotives built on or before 12/31/79	Stationary	L_{max} (Slow)	100	73
	Idle stationary	L_{max} (Slow)	100	93
	Non-idle moving	L_{max} (Fast)	100	95
Switcher locomotives plus non-switcher locomotives built after 12/31/79	Stationary	L_{max} (Slow)	100	70
	Idle stationary	L_{max} (Slow)	100	87
	Non-idle moving	L_{max} (Fast)	100	90
Railcars	Speed < 45 mph	L_{max} (Fast)	100	88
	Speed > 45 mph	L_{max} (Fast)	100	93
	Coupling	Adj. average max.	50	92
Notes: dBA = A-weighted decibels; L_{max} = instantaneous maximum noise level; mph = miles per hour ¹ Slow and fast exponential-time-weighting is used. ² Note that these values are in terms of L_{max} and can be considerably greater than the L_{eq} typically used in the measurement of obtrusive noise.				
Source: U.S. EPA, 1975.				

Federal Transit Administration Noise and Vibration Guidance

The FTA has published the *Transit Noise and Vibration Impact Assessment Manual* (FTA Transit Noise and Vibration Manual) to provide guidance on procedures for assessing impacts at different stages of transit project development. The evaluation of vibration impacts can be divided into two categories, human annoyance and building damage. The FRA and FTA guidelines provide ground-borne noise and vibration criteria as listed in **Table 5.12-3: Ground-Borne Vibration and Noise Impact for Affected Communities Land Use Category**. The most common metric to characterize the impact of vibration on the human body is the root mean square (RMS) amplitude. The RMS amplitude, a metric that lessens error from noise readings, is defined as the average of the signal's squared amplitude. Decibel notation (VdB) is commonly used to measure RMS; RMS is described in more detail in **Appendix 5.12 BIG-1**. The levels listed in **Table 5.12-3: Ground-Borne Vibration and Noise Impact for Affected Communities Land Use Category** represent the maximum RMS level of an event. In addition, the FTA guidelines provide criteria for special buildings that are very sensitive to ground-borne noise and vibration. The impact criteria for these special buildings are shown in **Table 5.12-4: Ground-Borne Vibration and Noise Impact Criteria for Special Buildings**.

Both **Table 5.12-3** and **Table 5.12-4** differentiate vibration impact thresholds depending on the frequency of daily vibration events, with fewer than 30 vibration events per day considered “infrequent,” between 30 and 70 events considered “occasional,” and more than 70 events considered “frequent.” These definitions were originally developed so that most commuter rail or intercity rail projects would fall into the “infrequent” category and most urban transit projects (subway and light rail transit) would more typically be in the “frequent” category.

Table 5.12-3: Ground-Borne Vibration and Noise Impact for Affected Communities Land Use Category						
Land Use Category	Ground-Borne Vibration Impact Levels (VdB re 1 micro inch/second)			Ground-Borne Noise Impact Levels (VdB re 20 µPa)		
	Frequent Events¹	Occasional Events²	Infrequent Events³	Frequent Events¹	Occasional Events²	Infrequent Events³
Category 1: Buildings where vibration would interfere with interior operations	65 VdB ⁴	65 VdB ⁴	65 VdB ⁴	N/A ⁴	N/A ⁴	N/A ⁴
Category 2: Residences and buildings where people normally sleep	72 VdB	75 VdB	80 VdB	35 dBA	38 dBA	43 dBA
Category 3: Institutional land uses with primarily daytime use	75 VdB	78 VdB	83 VdB	40 dBA	43 dBA	48 dBA
Notes: ¹ “Frequent events” are defined as more than 70 vibration events of the same kind per day. ² “Occasional events” are defined as between 30 and 70 vibration events of the same kind per day. ³ “Infrequent events” are defined as fewer than 30 vibration events of the same kind per day. ⁴ This criterion limit is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. Vibration-sensitive manufacturing or research would require detailed evaluation to define the acceptable vibration levels. Ensuring lower vibration levels in a building often requires special design of the heating, ventilation, and air conditioning systems and stiffened floors. dB = decibel; N/A = not applicable; VdB = vibration velocity level, decibels; µPa = micropascals						
Sources: FTA. 2018. Transit Noise and Vibration Impact Assessment Manual.						

Table 5.12-4: 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/second)		Ground-Borne Noise Impact Levels (VdB re 20 µPa)	
	Frequent Events ¹	Occasional or Infrequent Events ²	Frequent Events ¹	Occasional or Infrequent Events ²
Concert halls	65 VdB	65 VdB	25 dBA	25 dBA
Television 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" are defined as more than 70 vibration events of the same kind per day. ² "Occasional or infrequent events" are defined as fewer than 70 vibration events of the same kind per day. dBA = A-weighted decibel; VdB = root mean square vibration velocity level, decibels; µPa = micropascals				
Source: FTA. 2018. Transit Noise and Vibration Impact Assessment Manual.				

Existing vibration is not accounted for in the criteria given in **Table 5.12-3** and **Table 5.12-4**. Although rail projects commonly use parts of existing rail routes, the criteria given in these tables do not indicate how to account for existing vibration on such routes. Methods of handling representative scenarios include the following:

- **Infrequently used rail route**—Use the vibration criteria from **Table 5.12-3** and **Table 5.12-4** when the existing rail traffic consists of five or fewer trains per day.
- **Moderately used rail route**—If the existing rail traffic consists of 5 to 12 trains per day with vibration that substantially exceeds the impact criteria, there would be no effect as long as the project vibration levels estimated using the procedures outlined in Section 6 of the FTA guidelines are at least 5 vibration decibels (VdB) less than the existing vibration. Vibration from existing trains could be estimated using the General Assessment procedures in Section 6 of the FTA guidelines; however, measuring vibration from existing train traffic is usually preferable.
- **Heavily used rail route**—If the existing traffic exceeds 12 trains per day and if the project would not substantially increase the number of vibration events (less than doubling the number of trains is usually considered not substantial), there would be no additional effect unless the project vibration, estimated using the procedures of Section 6 of the FTA guidelines, would be higher than the existing vibration. When the project would cause vibration more than 5 VdB greater than the existing source, the existing source can be ignored and the vibration criteria in **Table 5.12-3** and **Table 5.12-4** can be applied to the project.
- **Moving existing tracks**—Another scenario where existing vibration can be substantial is a new rail line within an existing rail right-of-way that requires shifting the location of existing tracks. Where the track relocation would cause higher vibration levels at sensitive receptors, the projected vibration levels from both rail systems must be compared to the appropriate impact criterion to determine if there would be a new effect. If an effect were judged to have existed prior to moving the tracks, new effects would be assessed only if the relocation would result in more than a 3 VdB increase in vibration level. Although the impact thresholds given in

Table 5.12-3 and **Table 5.12-4** are based on experience with vibration from rail transit systems, the thresholds can be applied to freight train vibrations as well. However, locomotive and railcar vibration should be considered separately. Because locomotive vibration only lasts for a few seconds, the infrequent-event limit is appropriate, but for a typical line haul freight train where the railcar vibration lasts for several minutes, the frequent-event limits should be applied to the railcar vibration. Some judgment must be exercised to make sure that the approach is reasonable. For example, some spur rail lines carry very little rail traffic (sometimes only one train per week) or have short trains, in which case the infrequent-event limits are appropriate.

Additionally, construction activities can result in varying degrees of ground vibration, depending on the equipment and method employed. The vibration associated with general construction activities is not likely to damage building structures, but it could cause cosmetic building damage. Consequently, construction vibration impact on a building is generally assessed in terms of peak particle velocity (PPV). **Table 5.12-5: Construction Vibration Building Damage Criteria** summarizes the FTA’s construction vibration criteria.

Table 5.12-5: Construction Vibration Building Damage Criteria		
Building Category	PPV (inches per second)	Approximate L _v ¹
I. Reinforced-concrete, steel or timber (no plaster)	0.50	102 VdB
II. Engineered concrete and masonry (no plaster)	0.30	98 VdB
III. Non-engineered timber and masonry buildings	0.20	94 VdB
IV. Buildings extremely susceptible to vibration damage	0.12	90 VdB
Notes:		
¹ VdB re 1 micro-inch per second		
L _v = velocity level; PPV = peak particle velocity; VdB = root mean square vibration velocity level, decibels		
Sources: FTA. 2018. Transit Noise and Vibration Impact Assessment Manual.		

5.12.2.2 State

State of California General Plan Guidelines

The State of California, through its General Plan Guidelines, discusses how ambient noise should influence land use and development decisions and includes a table of normally acceptable, conditionally acceptable, normally unacceptable, and clearly unacceptable uses at different noise levels. A conditionally acceptable designation implies new construction or development should be undertaken only after a detailed analysis of the noise reduction requirements for each land use and needed noise insulation features are incorporated in the design. By comparison, a normally acceptable designation indicates that standard construction can occur with no special noise reduction requirements. The General Plan Guidelines provide cities with recommended community noise and land use compatibility standards that can be adopted or modified at the local level based on conditions and types of land uses specific to that jurisdiction.

California Department of Health

The State interior and exterior noise standards for varying land uses are shown in **Table 5.12-6: State of California Interior and Exterior Noise Standards**. It is important to note that the exterior noise levels are to be attained in “habitable” exterior areas and need not encompass the entirety of a property.

Table 5.12-6: State of California Interior and Exterior Noise Standards			
Receiving Land Uses		CNEL, dBA	
Categories	Uses	Interior ¹	Exterior ²
Residential	Single-family, Duplex, Multi-family	45 ³	65
	Mobile Homes	--	65 ⁴
Commercial	Hotel, Motel, Transient Lodge	45	65 ⁵
	Commercial Retail, Bank, Restaurants	55	--
	Office Building, R & D, Professional & Government Offices	500	--
	Amphitheater, Concert Hall, Auditorium, Meeting Hall	45	--
	Gymnasium (Multipurpose)	50	--
	Sports Club	55	--
	Manufacturing, Warehousing, Wholesale, Utilities	65	--
	Movie Theaters	45	--
Institutional/ Public	Hotel, Motel, Transient Lodge	45	65 ⁵
	Commercial Retail, Bank, Restaurants	55	--
Open Space	Parks and Outdoor Active and Passive Recreation Facilities	--	65
Notes: 1. Indoor environment excluding: bathrooms, toilets, closets, and corridors 2. Outdoor environment limited to: Private yard of single-family residence. Multi-family private patio or balcony which is served by a means of exit from inside. Mobile home park. Hospital patio. Park's picnic area. School's playground. Hotel and motel recreation area. 3. Noise level requirements with closed windows. Mechanical ventilation or other means of natural ventilation shall be provided as per Chapter 12, Section 1205 of the Uniform Building Code. 4. Exterior noise level should be such that interior noise level will not exceed 45 dBA CNEL. 5. Except those areas affected by aircraft noise.			
Source: California Department of Health. 1976. Noise Element Guidelines. California Department of Health Services.			

California Building Code

The State of California provides a minimum standard for building design through Title 24, Part 2, of the California Code of Regulations (CCR), commonly referred to as the "California Building Code." The California Building Code is updated every three years. It is generally adopted on a jurisdiction-by-jurisdiction basis, subject to further modification based on local conditions. The noise limit is a maximum interior noise level of 45 dBA L_{dn} /CNEL. Where exterior noise levels exceed 60 dBA L_{dn} /CNEL, a report must be submitted with the building plans describing the noise control measures that have been incorporated into the design of the project to meet the noise limit. The State Office of Planning and Research Guidelines require the General Plan to facilitate the implementation of the California Building Code noise insulation standards. The noise metric is evaluated as either the day-night average sound level (L_{dn}) or the community noise equivalent level (CNEL), whichever is consistent with the noise element of the local general plan.

The State of California's noise insulation standards for noise sensitive uses are codified in Title 24, Chapter 1, Article 4 of the California Administrative Code (California Noise Insulation Standards) that requires noise insulation in new hotels, motels, apartment houses, and dwellings (other than single-family detached housing) provide an annual average noise level of no more than 45 dBA CNEL. When such

structures are located within a 60-dBA CNEL (or greater) noise contour, an acoustical analysis is required to ensure that interior levels do not exceed the 45-dBA CNEL annual threshold.

The State of California's noise insulation standards for non-residential uses are codified in the CCR, Title 24, Building Standards Administrative Code, Part 11, California Green Building Standards Code. California Green Building Standards Code noise standards are applied to new or renovation construction projects in California to control interior noise levels resulting from exterior noise sources. Future individual projects may use either the prescriptive method (§ 5.507.4.1) or the performance method (§ 5.507.4.2) to show compliance. Under the prescriptive method, a project must demonstrate transmission loss ratings for the wall and roof-ceiling assemblies and exterior windows when located within a noise environment of 65 dBA CNEL or higher. Under the performance method, a project must demonstrate that interior noise levels do not exceed 50 dBA $L_{eq}(1hr)$.

California Noise Control Act

The California Noise Control Act of 1973 (California Health and Safety Code, § 46010 et seq.) directs the Office of Noise Control in the Department of Health Services to assist communities in developing local noise control programs and to work with the Office of Planning and Research to provide guidance for the preparation of the required noise elements in city and county general plans, pursuant to California Government Code § 65302(f). In preparing the noise element, a city or county must identify local noise sources and analyze and quantify, to the extent practicable, current, and projected noise levels for various sources including highways and freeways; passenger and freight railroad operations; ground rapid transit systems; commercial, general, and military aviation and airport operations; and other ground stationary noise sources. Noise-level contours must be mapped for these sources using both CNEL and day-night average level and are to be used as a guide in land use decisions to minimize the exposure of community residents to excessive noise.

California Code of Regulations

The California Noise Insulation Standards found in Title 24 of the CCR and California Health and Safety Code § 17922.6 set requirements for new multi-family residential units, hotels, and motels that could be subject to relatively high levels of transportation-related noise. For exterior noise, the noise insulation standard is 45 dBA L_{dn} or CNEL in any habitable room and requires an acoustical analysis demonstrating how dwelling units have been designed to meet this interior standard where such units are proposed in areas subject to noise levels greater than 60 dBA L_{dn} or CNEL.

5.12.2.3 Local

County of San Bernardino Countywide Plan

The County adopted the Countywide Plan (CWP) in October 2020. The CWP Policy Plan addresses the physical, social, and economic issues facing the County's unincorporated portions. **Table 5.12-7: Countywide Plan Policy Plan – Relevant Noise and Vibration Goals and Policies** includes the noise-related goals and policies relevant to the Project. For applicability of the CWP goals and policies to the Project, see **Section 5.0: Environmental Analysis**.

Table 5.12-7: Countywide Plan Policy Plan – Relevant Noise and Vibration Goals and Policies	
Goal or Policy	
HAZARDS ELEMENT	
Goal HZ 2	Human Generated Hazards. People and the natural environment protected from exposure to hazardous materials, excessive noise, and other human-generated hazards.
Policy HZ-2.6	Coordination With Transportation Authorities.
Policy HZ-2.7	Truck Delivery Areas. We encourage truck delivery areas to be located away from residential properties and require associated noise impacts to be mitigated.
Policy HZ-2.8	Proximity to Noise Generating Uses. We limit or restrict new noise sensitive land uses in proximity to existing conforming noise generating uses and planned industrial areas.
Policy HZ-2.9	Control Sound at the Source. We prioritize noise mitigation measures that control sound at the source before buffers, soundwalls, and other perimeter measures.
Goal HZ 3	Environmental Justice. For unincorporated environmental justice focus areas, equitable levels of protection from environmental and health hazards; expanded opportunities for physical activity and meaningful civic engagement; and access to healthy food, public facilities, safe and sanitary housing.
Policy HZ-3.19	Community Education. We make educational materials available to the public in unincorporated environmental justice focus areas so that they clearly understand the potential for adverse pollution, noise, odor, vibration, and lighting and glare, and the effects of toxic materials to promote civil engagement. We require that such educational materials be developed in accordance with Plain Language Guidelines. We require that this information be made available in public spaces such as libraries and community centers, as well as on County websites and other appropriate means.
Source: County of San Bernardino. 2020. <i>Countywide Plan</i> . https://countywideplan.com/policy-plan .	

See **Section 5.12.4-Environmental Setting** for further discussion concerning existing noise and vibration conditions.

Codified Ordinances of the County of San Bernardino

The Codified Ordinances of the County of San Bernardino (County Code) regulations addressing noise and vibration are provided below.

County Code Title 2 Division 4 Chapter 7: Noise Abatement and Control. San Bernardino County Development Code (County Code) Title 2, Division 4, Chapter 7, *Noise Abatement and Control* was adopted to regulate noise in the County’s unincorporated area to promote the public health, comfort, and convenience of its inhabitants and visitors. However, as stated in the County Code, this chapter is not intended to establish thresholds of significance for the purpose of any analysis required by CEQA. This chapter further specifies that no person shall create any sound, or allow the creation of any sound, on any property that causes the sound level on any other occupied property to exceed the sound level limits set forth in County Code § 83.01.080.

County Code Title 8 Division 3 Chapter 1: Vibration. This section (§ 83.01.090) establishes standards for acceptable vibration levels. County Code § 83.01.090 states that no ground vibration shall be allowed that can be felt without the aid of instruments at or beyond the lot line, nor shall any vibration be allowed which produces a particle velocity greater than or equal to 0.20 in/sec measured at or beyond the lot line.

Temporary construction, maintenance, repair, or demolition activities between 7:00 AM and 7:00 PM are exempt from this vibration limit, except on Sundays and federal holidays, when construction is prohibited.

County Code Title 8, Division 3, Chapter 83.01. This division sets development standards within the County. Specifically, County Code § 83.01.080 sets exterior noise standards for stationary sources and interior and exterior noise standards for mobile sources by receiving land use type. Exterior noise standards for stationary noise sources are summarized in **Table 5.12-8: San Bernardino County Exterior Noise Standards for Stationary Noise Sources**. As shown, the noise standard for residential properties is 55 dBA L_{eq} from 7:00 AM to 10:00 PM and 45 dBA L_{eq} from 10:00 PM to 7:00 AM. For industrial properties, the noise standard from stationary noise sources is 70 dBA at any time of the day or night. Areas exposed to noise levels exceeding these standards are considered noise-affected areas. The County Code exempts construction noise if construction is limited to the hours between 7:00 AM and 7:00 PM, except on Sundays or federal holidays, when construction is not allowed. The County's standards for mobile sources are shown in **Table 5.12-9: San Bernardino County Noise Standards for Mobile Noise Sources**. Additionally, County Code § 83.01.090 establishes standards for acceptable vibration levels. County Code § 83.01.090 states that no ground vibration shall be allowed that can be felt without the aid of instruments at or beyond the lot line, nor shall any vibration be allowed which produces a particle velocity greater than or equal to 0.20 in/sec measured at or beyond the lot line. Temporary construction, maintenance, repair, or demolition activities between 7:00 AM and 7:00 PM are exempt from this vibration limit, except on Sundays and federal holidays, when construction is prohibited.

Table 5.12-8: San Bernardino County Exterior Noise Standards for Stationary Noise Sources		
Affected Land Uses (Receiving Noise)	7:00 AM – 10:00 PM L_{eq}	10:00 PM – 7:00 AM L_{eq}
Residential	55 dBA	45 dBA
Professional services	55 dBA	55 dBA
Other commercial	60 dBA	60 dBA
Industrial	70 dBA	70 dBA
Notes: L_{eq} = (Equivalent Energy Level). The sound level corresponding to a steady-state sound level containing the same total energy as a time-varying signal over a given sample period, typically 1, 8, or 24 hours. dBA = (A-weighted decibels). The sound pressure level, in decibels, as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound, placing greater emphasis on those frequencies within the sensitivity range of the human ear.		
Source: County of San Bernardino. 2014. <i>San Bernardino County Development Code</i> .		

Table 5.12-9: San Bernardino County Noise Standards for Mobile Noise Sources			
Receiving Land Uses		L _{dn} (or CNEL) dBA	
Categories	Uses	Interior	Exterior
Residential	Single and multi-family, duplex, mobile homes	45	60
Commercial	Hotel, motel, transient housing	45	60
	Commercial retail, bank, restaurant	50	N/A
	Office building, research and development, professional offices	45	65
	Amphitheater, concert hall, auditorium, movie theater	45	N/A
Institutional/ Public	Hospital, nursing home, school classroom, religious institution, library	45	65
Open Space	Park	N/A	65
Notes: - The indoor environment shall exclude bathrooms, kitchens, toilets, closets, and corridors. - The outdoor environment shall be limited to: - Hospital/office building patios - Hotel and motel recreation areas - Mobile home parks - Multi-family private patios or balconies - Park picnic areas - Private yard of single-family dwellings - School playgrounds - An exterior noise level of up to 65 dB(A) (or CNEL) shall be allowed provided exterior noise levels have been substantially mitigated through a reasonable application of the best available noise reduction technology, and interior noise exposure does not exceed 45 dBA (or CNEL) with windows and doors closed. Requiring that windows and doors remain closed to achieve an acceptable interior noise level shall necessitate the use of air conditioning or mechanical ventilation. - CNEL = Community Noise Equivalent Level (The average equivalent A-weighted sound level during a 24-hour day, obtained after addition of approximately five decibels to sound levels in the evening from 7 PM to 10 AM and 10 decibels to sound levels in the night before 7 AM and after 10 PM) - dBA = A-weighted decibels, L_{dn} = day-night sound level, dBA Sources: County of San Bernardino. 2014. <i>San Bernardino County Development Code</i>.			

For applicability of the above County Code regulations to the Project, see **Section 5.0**.

City of Barstow 2015-2020 General Plan

The City adopted the City of Barstow 2015-2020 General Plan (2015 General Plan) in February 2015. The 2015 General Plan is the overarching guide for implementation of the Development Code, which defines development regulations and establishes zoning districts throughout the City.

Table 5.12-10: 2015 General Plan Relevant Goals and Policies – Noise and Vibration includes the noise and vibration-related goals and policies relevant to the Project. For applicability of the 2015 General Plan goals and policies to the Project, see **Section 5.0**.

Table 5.12-10: 2015 General Plan Relevant Goals and Policies – Noise and Vibration	
Number	Goal or Policy¹
NOISE ELEMENT	
Goal 1	Provide an environment free of potentially hazardous sounds and noise
Policy 1.A	The City shall adhere to the State of California interior and exterior standards for desirable sound levels in various land use categories as shown in Table N-1 (refer to Table 5.12-11: City of Barstow Interior and Exterior Noise Standards , below).
Strategy 1.A.1	For projects that are expected to generate potentially harmful noise levels, conduct noise analyses and prepare projections and incorporate mitigation measures to ensure that exterior noise levels at property lines of sensitive noise receptors (e.g., residential, institutional and open space) do not exceed 65 dBA.
Strategy 1.A.2	Endeavor to locate noise-sensitive land uses outside of the 60-65 dBA noise contours illustrated on Exhibit N-1.
Policy 1.B	Minimize the exposure of residents and visitors to temporary noise levels that are potentially harmful.
Strategy 1.B.1	Consider noise impacts and require noise mitigation mechanisms in approving public events that are likely to generate high levels of noise. Responsible Parties: City Council, City Manager, or designee.
Strategy 1.B.2	Limit the hours of operation of activities that are likely to generate high noise levels.
Goal 2	Minimize adverse noise impacts of development anticipated under the General Plan.
Policy 2.A	Proposals for development as well as changes proposed to the Land Use Map shall include consideration of the potential noise impacts associated with such activities.
Strategy 2.A.1	Residential projects proposed adjacent to any street where the build out noise level at 50 feet from centerline is expected to exceed 65 dBA, as well as commercial and industrial projects proposed adjacent to sensitive receptors, or lands designated for sensitive receptors, including residential, school or hospital sites, shall be required to submit a noise analysis in conjunction with entitlement applications.
Strategy 2.A.2	Minimum requirements for noise analyses for proposed development projects shall be developed and distributed to applicants early in the development review process.
Policy 2.B	Minimize noise and ground vibration associated with project construction.
Strategy 2.B.1	Exempt construction activities from the operational noise standards set forth in Table N-1 between the hours of 7:00 a.m. and 7:00 PM and enforce the standards outside of these hours.
Strategy 2.B.2	Pursuant to San Bernardino County Ordinance 87.0910 vibration levels shall be limited to 0.2 inches per second at the property line (or nearest sensitive receptor).
Source: City of Barstow. 2015. <i>City of Barstow 2015-2020 General Plan</i> . https://www.barstowca.org/home/showpublisheddocument/5359/636607004808630000	

In addition, the City has adopted the State of California’s interior and exterior noise standards in the 2015 General Plan, which are shown below in **Table 5.12-11: City of Barstow Interior and Exterior Noise Standards**. These are the standards incorporated directly into the existing 2015 General Plan. For applicability of the above 2015 General Plan goals and policies to the Project, see **Section 5.0**.

Table 5.12-11: City of Barstow Interior and Exterior Noise Standards			
Categories	Uses	CNEL (dBA)	
		Interior	Exterior
Residential	Single-family, duplex, multi-family	45 ³	65
	Mobile homes	--	65 ⁴
Commercial Industrial	Hotel, motel, transient lodge	45	65 ⁵
	Commercial retail, bank, restaurants	55	--
	Office building, R&D, professional & government offices	50	--
	Amphitheater, concert hall, auditorium, meeting hall	45	--
	Gymnasium (multipurpose)	50	--
	Sports club	55	--
	Manufacturing, warehousing, wholesale, utilities	65	--
	Movie theaters	45	--
Institutional	Hospitals, schools, classrooms	45	65
	Church, library	45	--
Open Space	Parks and outdoor active and passive recreational facilities	--	65
Notes: 1. Indoor environment excluding: bathrooms, toilets, closets, and corridors. 2. Outdoor environment limited to: Private yard of single-family residential dwellings. Multi-family private patio or balcony which is served by a means of exit from inside. Mobile home park. Hospital patio. Park's picnic area. School's playground. Hotel and motel recreation area. 3. Noise level requirements with closed windows. Mechanical ventilation or other means of natural ventilation shall be provided as per Uniform Building Code Chapter 12, § 1205. 4. Exterior noise level should be such that interior noise level would not exceed 45 dBA CNEL. Except those areas affected by aircraft noise. 5. CNEL = (Community Noise Equivalent Level), dBA = A-weighted decibels			
Source: City of Barstow. 2015. 2015-2020 General Plan.			

Code of the City of Barstow

The Code of the City of Barstow (Barstow Code) regulations addressing noise are provided below.

City of Barstow Municipal Code § 19.18.170. The following regulation for land uses in the Industrial District includes:

(2) Uses in the industrial district shall be planned, developed, conducted, and operated so that noise and vibration do not impact adjacent properties pursuant to section 19.18.060(h) and the noise element of the Barstow General Plan. Noise levels shall be no more than 65 dBA when measured at the property line when adjacent to residential or other sensitive uses, or as approved by the city for other uses.

5.12.3 METHODOLOGY FOR EVALUATING IMPACTS

This section defines the study area (i.e., affected environment) and summarizes the methodology used to analyze potential impacts concerning noise and vibration.

5.12.3.1 Definition of Study Area

The study area is the geographic boundary in which the environmental investigations were conducted specific to each resource topic.

Proposed General Plan

The study area for the proposed General Plan is the City of Barstow and its unincorporated Sphere of Influence (SOI) (proposed General Plan area).

Barstow International Gateway

The study area for impacts concerning noise and vibration includes BIG footprint and nearby sensitive receptors.

5.12.3.2 Terminology and Concepts

Acoustic Fundamentals

Sound is mechanical energy transmitted by pressure waves through a medium such as air or water; the manner in which sound travels through this medium is influenced by the medium's physical properties (such as temperature, density, and humidity). Noise is often defined as unwanted sound. Of the various noise descriptors used to characterize the loudness of a sound, the sound pressure level has become the most common.

To appropriately characterize the community noise environment and evaluate noise impacts, noise exposure must be measured over a period of time. This time-varying nature of environmental noise is characterized by using statistical noise descriptors. The following definitions are used in this evaluation:

- **dB.** The decibel (dB) scale is used to quantify sound intensity, with 0 dB corresponding roughly to the threshold of human hearing, and 120 to 140 dB corresponding to the threshold of pain.
- **dBA.** A-weighted decibels (dBA) are measured using a filter that de-emphasizes the frequencies below 1,000 hertz (Hz) and above 5,000 Hz in a manner corresponding to the human ear's decreased sensitivity to low and extremely high frequencies. The dBA is the standard tool used for environmental noise assessment.
- **Sound Pressure Level.** Sound pressure is the sound force per unit area and is usually expressed in micropascals (μPa), or 20 micronewtons per square meter, where 1 pascal is the pressure resulting from a force of 1 newton exerted over an area of 1 square meter. The sound pressure level is expressed in dB as 20 times the logarithm to the base 10 of the ratio between the pressures exerted by the sound to a reference sound pressure (e.g., 20 μPa). Sound pressure level is the quantity that is directly measured by a sound level meter.
- **L_{eq} .** The energy-equivalent sound level (L_{eq}) provides for the average noise measured over a specified period of time.
- **L_{max} .** The instantaneous maximum noise level (L_{max}) measured during the measurement period.
- **L_{dn} .** The day-night average sound level (L_{dn}) is the average of the A-weighted sound levels occurring during a 24-hour period and accounts for the greater sensitivity of most people to noise at night. L_{dn} "penalizes" noise occurring between 10:00 PM and 7:00 AM by adding 10 dBA to nighttime noise levels.

- **CNEL.** Similar to L_{dn} , the community noise equivalent level (CNEL) is a 24-hour average L_{eq} , which adds a 4.77 dB “penalty” for noise events occurring between 7:00 PM and 10:00 PM and adds a 10 dB penalty to noise events occurring between 10:00 PM and 7:00 AM to account for noise sensitivity in the evening and nighttime, respectively.
- **Frequency.** The number of complete pressure fluctuations per second above and below atmospheric pressure, usually expressed in Hz. Normal human hearing is between 20 Hz and 20,000 Hz. Infrasonic sounds are below 20 Hz, and ultrasonic sounds are above 20,000 Hz.
- **Ambient Noise Level.** The composite of noise from all sources near and far. The normal or existing environmental noise level at a given location. Ambient noise represents the existing (baseline) condition.

Measuring sound directly in terms of pressure would require a large range of numbers. To avoid this, the logarithmic dB scale was devised. The dB scale uses the hearing threshold of $20 \mu\text{Pa}$ as a point of reference, defined as 0 dB. Other sound pressures are then compared to this reference pressure, and the logarithm is taken to keep the numbers in a practical range. The dB scale allows a million-fold increase in pressure to be expressed as 120 dB, and changes in levels correspond closely to human perception of relative loudness. **Table 5.12-12: Typical Noise Levels** provides typical noise levels.

A-Weighted Decibels

The perceived loudness of sounds is dependent on many factors, including sound pressure level and frequency content. However, within the usual range of environmental noise levels, perception of loudness is relatively predictable and can be approximated by dBA values. There is a strong correlation between dBA and the way the human ear perceives sound. For this reason, the dBA has become the standard tool used for environmental noise assessment. All noise levels reported in this section are in terms of dBA, but are expressed as dB, unless otherwise noted.

Addition of Decibels

The dB scale is logarithmic, not linear, and therefore sound levels cannot be added or subtracted through ordinary arithmetic. Two sound levels 10 dB apart differ in acoustic energy by a factor of 10. When the standard logarithmic dB is A-weighted, an increase of 10 dBA is generally perceived as a doubling in loudness. For example, a 70 dBA sound is half as loud as an 80 dBA sound and twice as loud as a 60 dBA sound. When two identical sources are each producing sound of the same loudness, the resulting sound level at a given distance would be 3 dBA higher than one source under the same conditions. Under the dB scale, three sources of equal loudness together would produce an increase of 5 dBA.

Table 5.12-12: Typical Noise Levels		
Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	– 110 –	Rock Band
Jet fly-over at 1,000 feet		
	– 100 –	
Gas lawnmower at 3 feet		
	– 90 –	
Diesel truck at 50 feet at 50 mph		Food blender at 3 feet
	– 80 –	Garbage disposal at 3 feet
Noisy urban area, daytime		
Gas lawnmower, 100 feet	– 70 –	Vacuum cleaner at 10 feet
Commercial area		Normal Speech at 3 feet
Heavy traffic at 300 feet	– 60 –	
		Large business office
Quiet urban daytime	– 50 –	Dishwasher in next room
Quiet urban nighttime	– 40 –	Theater, large conference room (background)
Quiet suburban nighttime		
	– 30 –	Library
Quiet rural nighttime		Bedroom at night, concert hall (background)
	– 20 –	
		Broadcast and/or recording studio
	– 10 –	
Lowest threshold of human hearing	– 0 –	Lowest threshold of human hearing
Note: 1 dBA = A-weighted decibels, mph = miles per hour		
Source: Caltrans. 2013. Technical Noise Supplement to the Traffic Noise Analysis Protocol.		

Sound Propagation and Attenuation

Sound spreads (propagates uniformly outward in a spherical pattern), and the sound level decreases (attenuates) at a rate of approximately 6 dB for each doubling of distance from a stationary or point source. Sound from a line source, such as a highway, propagates outward in a cylindrical pattern. Sound levels attenuate at a rate of approximately 3 dB for each doubling of distance from a line source, such as a roadway, depending on ground surface characteristics. No excess attenuation is assumed for hard surfaces like a parking lot or a body of water. Soft surfaces, such as soft dirt or grass, can absorb sound, so an excess ground-attenuation value of 1.5 dB per doubling of distance is normally assumed. For line sources, an overall attenuation rate of 3 dB per doubling of distance is assumed.

Noise levels could also be reduced by intervening structures; generally, a single row of buildings between the receptor and the noise source reduces the noise level by about 5 dBA, while a solid wall or berm reduces noise levels by 5 to 10 dBA. The manner in which older homes in California were constructed generally provides a reduction of exterior-to-interior noise levels of about 20 to 25 dBA with closed windows. The exterior-to-interior reduction of newer residential units is generally 30 dBA or more.

Human Response to Noise

The effects of noise on people can be placed into three categories: the subjective effects of annoyance, nuisance, and dissatisfaction; interference with activities such as speech, sleep, and learning; and physiological effects such as hearing loss or sudden startling. Environmental noise typically produces effects in the first two categories. Workers at industrial plants often experience noise in the third category. A wide variation exists in the individual thresholds of annoyance, and different tolerances to noise tend to develop based on an individual's past experiences with noise. Therefore, an important method of predicting human reactions to a new noise environment is to compare the new noise level to the existing noise level to which one has adapted (i.e., the existing ambient noise level). In general, the more a new noise level exceeds the former ambient noise level, the less acceptable the new noise environment would be judged. The Caltrans *Technical Noise Supplement to the Traffic Noise Analysis Protocol* reports the following human responses to changes in noise levels:

- Except in carefully controlled laboratory experiments, a change of 1 dBA cannot be perceived.
- Outside of the laboratory, a 3 dBA increase is considered a "barely perceptible" difference (i.e., the change in noise is perceived but does not cause a human response).
- An increase of at least 5 dBA is required before any noticeable change in human response is expected.
- A 10 dBA increase is subjectively heard as an approximate doubling in loudness.

Effects of Noise on People

Noise is known to have several adverse effects on humans. From these known adverse effects of noise, criteria have been established to protect public health and safety and prevent disruption of activities. These criteria are based on effects of noise on people, such as hearing loss, annoyance, sleep disturbance, and speech interference as described below.

Hearing Loss. Hearing loss occurs mainly due to chronic exposure to excessive noise but may be due to a single event such as an explosion. Natural hearing loss associated with aging may also be accelerated from chronic exposure to loud noise. OSHA has a noise exposure standard that is set at the noise threshold where hearing loss may occur from long-term exposures. In places subject to OSHA regulation, the maximum allowable level is 90 dBA averaged over 8 hours. If the noise is above 90 dBA, the allowable exposure time is correspondingly shorter.

Annoyance. Attitude surveys are used for measuring the annoyance felt in a community for noises intruding into homes or affecting outdoor activity areas. In these surveys, it was determined that causes for annoyance include interference with speech, radio and television, house vibrations, and interference with sleep and rest. The L_{dn} as a measure of noise has been found to provide a valid correlation of noise

level and the percentage of people annoyed. People have been asked to judge the annoyance caused by aircraft noise and ground transportation noise. There continues to be disagreement about the relative annoyance of these different sources. A noise level of about 55 dBA L_{dn} is the threshold at which a substantial percentage of people begin to report annoyance.

Sleep Disturbance. The effect of noise on sleep is a recognized concern when addressing the impacts of noise on people. Historical studies of sleep disturbance were focused mainly in laboratories, using various indicators of response (electroencephalographic recordings, verbal response, button push, etc.). Field studies were also conducted, in which subjects were exposed to noise in their own homes, using real or simulated transportation noise.

Based on a 1989 literature review by Pearsons for the U.S. Air Force, no specific adverse health effects have been clearly associated with sleep disturbance, characterized either by awakening or by sleep-state changes. Nevertheless, sleep disturbance is deemed undesirable, and may be considered an impact caused by noise exposure.

The Federal Interagency Committee on Noise (FICON) was formed in 1990 to review Federal policies that govern the assessment of airport noise impacts. In 1992, FICON created an interim dose-response curve to predict the population expected to be awakened by a single event noise level. Due to their findings, FICON recommended that a standing federal interagency committee should be established to continue to research community reaction to aircraft noise including sleep disturbance, speech interference, and non-auditory health effects of noise. Therefore, the Federal Interagency Committee on Aviation Noise (FICAN) was formed in 1993. Since the adoption of FICON's interim curve and the establishment of FICAN, substantial research around sleep disturbance has been completed.

In 1997, FICAN utilized results from three studies, conducted in the United Kingdom, near Castle Air Force Base adjacent to Los Angeles International Airport, and communities near the Denver International Airport, in 1992, 1992 and 1995, respectively, in order to create a sleep disturbance curve. This curve illustrates the maximum percent of a residential population to be behaviorally awakened when exposed to varying indoor noise levels, "Sound Exposure Levels (SEL)," measured in dB. The FICAN 1997 sleep disturbance curve is shown in **Figure 5.12-1: FICAN 1997 Sleep Disturbance Curve** and should be interpreted as predicting the "maximum percent of the exposed population expected to be behaviorally awakened", or the "maximum percent awakened" for a given residential population at a given noise level.

Speech Interference. Another negative impact of sustained noise is through speech interference, in which people find it more difficult to maintain intelligible spoken communication as ambient noise levels increase. **Figure 5.12-2: Distance for Satisfactory Conversations** presents the distance that must be obtained between talker and listener for satisfactory conversations, defined as 95 percent intelligibility or higher in the presence of different steady A-weighted background noise levels. For example, as shown below, in environments with high ambient noise levels, the distance needed to achieve intelligible speech can be a foot or less.

Figure 5.12-1: FICAN 1997 Sleep Disturbance Curve

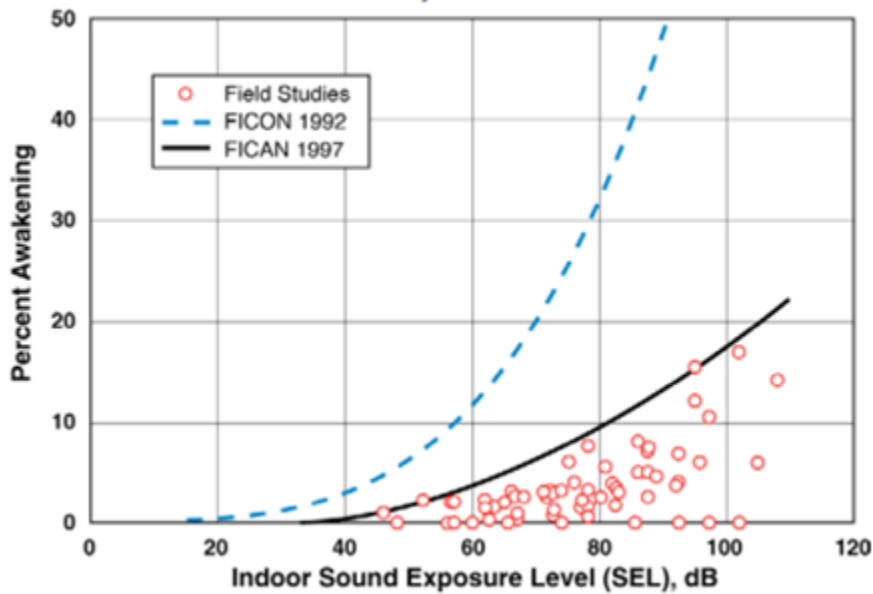
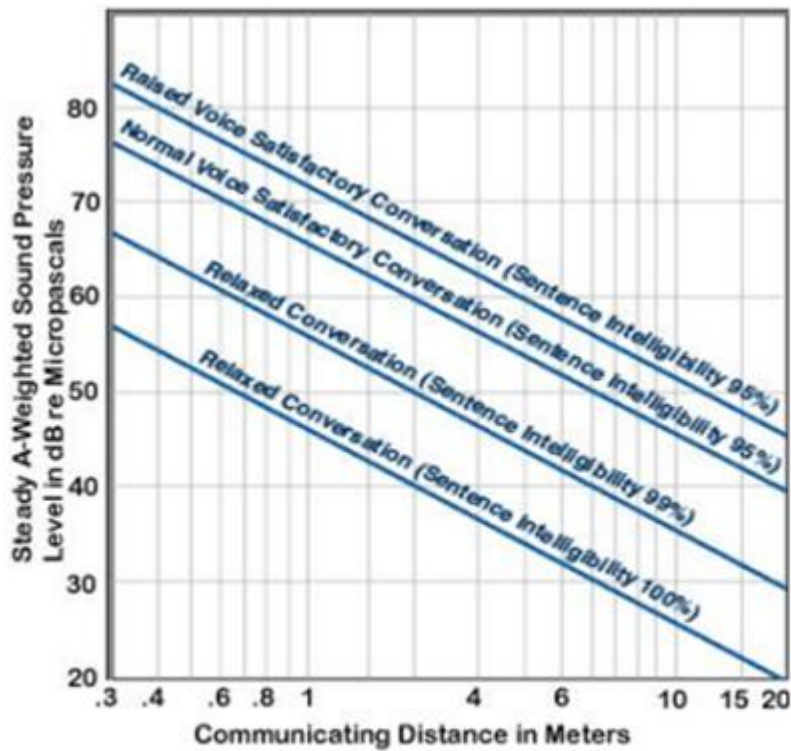


Figure 5.12-2: Distance for Satisfactory Conversations



Source: US EPA, *Information on Levels of Noise Requisite to Protect the Public Health and Welfare with an Adequate Margin of Safety*, March 1974.

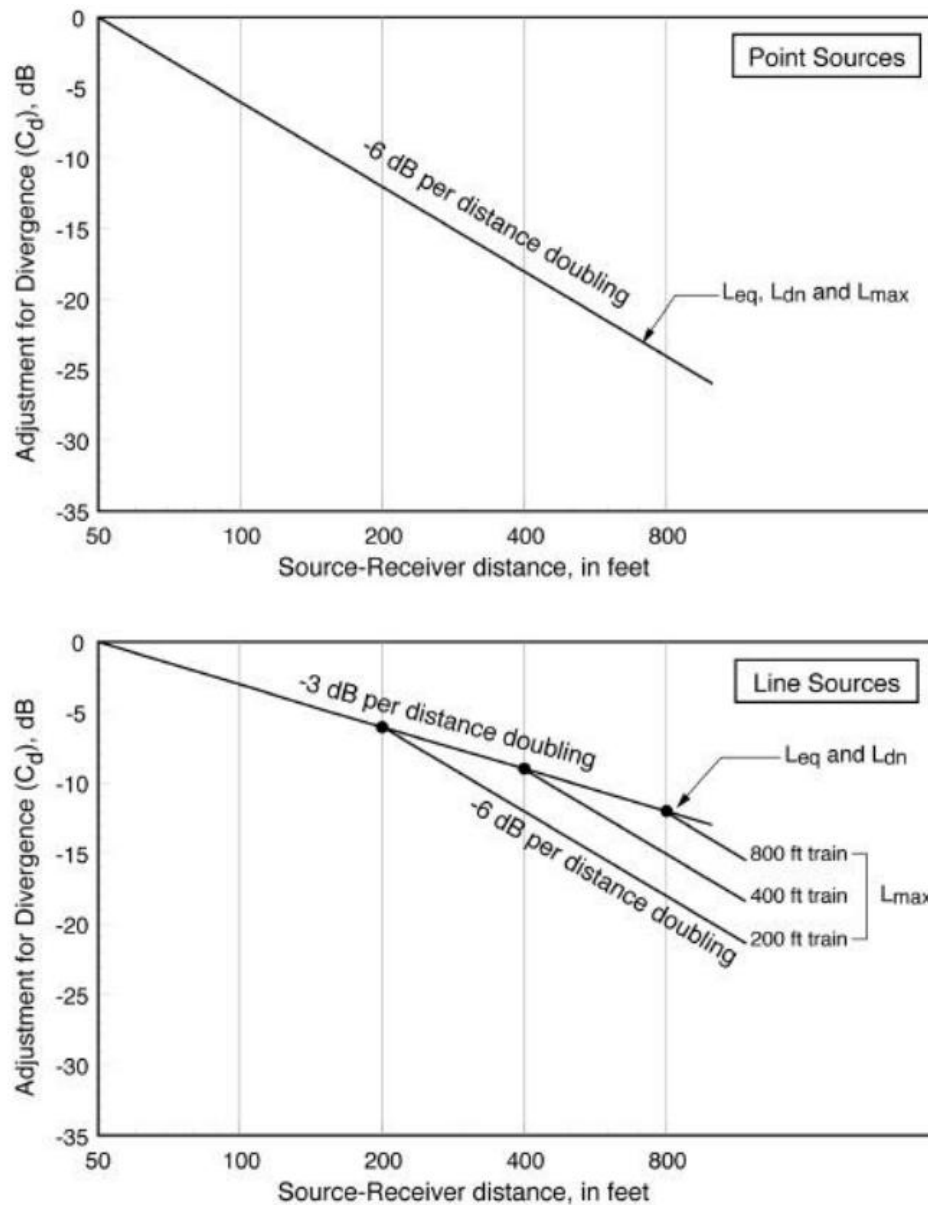
Propagation of Noise to Receptors

Attenuation Due to Distance (Divergence)

Sound levels naturally attenuate with distance. Such attenuation, sometimes called “divergence,” depends upon source configuration and noise generation characteristics. **Figure 5.12-3: Attenuation due to Distance (Divergence)** shows divergence graphically for point sources and line sources separately in terms of how they attenuate with distance. As shown below, the sound level attenuates with increasing distance due to the geometric spreading of sound energy. For sources grouped closely together (called point sources), attenuation with distance is high: 6 dB per doubling of distance. Most individual noise sources on a moving train radiate sound as point sources. When many point sources are arrayed in a line, all radiating sound at the same time so any one source is not distinguishable, the arrangement is called a line source. For line sources, divergence with distance is less: 3 decibels per doubling of distance for L_{eq} and L_{dn} , and 3 to 6 decibels per doubling of distance for L_{max} . A train, such as is proposed by BIG, passing a stationary receptor along a track can be considered a line source. **Figure 5.12-3** shows the line source curve separates into three separate lines for L_{max} , with the point of departure depending on the line source’s length. For example, close to a short train, it behaves like a line source; far away, it behaves like a point source.

Some sound sources, such as warning bells, radiate sound energy nearly uniformly in all directions. These are called nondirectional, or monopole, sources. Train noise, however, including the rolling noise from wheel-rail interactions, as well as some types of aerodynamic noise caused by the train moving at high speeds, is complicated because the sources do not radiate sound equally in all directions. This unequal radiation is known as source directivity, which is a measure of the variation in a source’s radiation with direction. Studies have shown that wheel-rail noise can be modeled by representing the source as a line source (or continuous row of point sources) with dipole directivity. A dipole radiation pattern has also been observed in the turbulent boundary layer near the sides of a train. Typically, a dipole source radiates a directivity pattern such that the sound pressure is proportional to the cosine of the angle between the source orientation and the receptor. Consequently, wheel-rail noise is propagated more efficiently to either side of a moving train than in front, above, or behind it.

Figure 5.12-3: Attenuation due to Distance (Divergence)

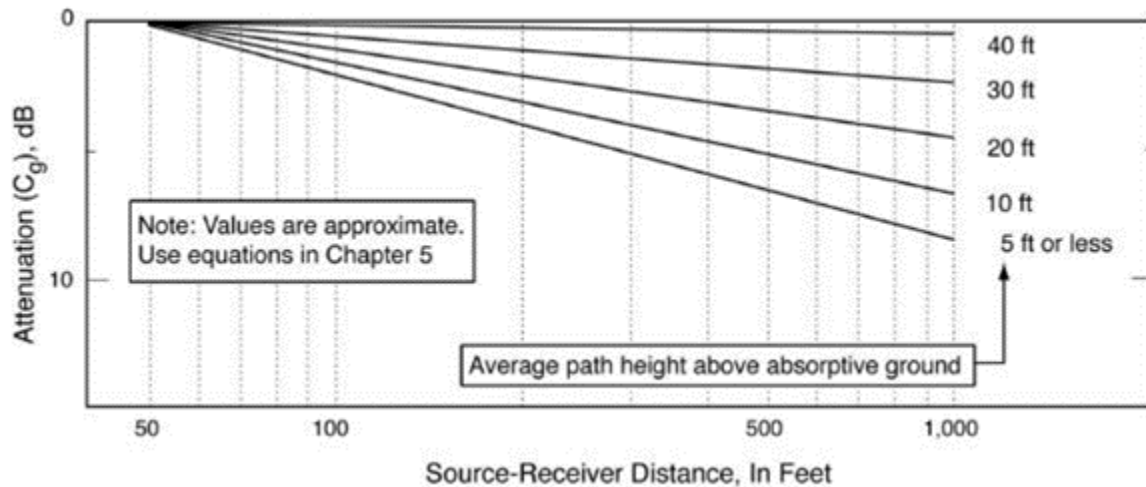


Source: FRA, *High-Speed Ground Transportation Noise and Vibration Impact Assessment Manual*, 2012

Attenuation Due to Absorption and Diffusion

In addition to the attenuation from geometric spreading of the sound energy, sound levels are further attenuated when sound paths lie close to absorptive or "soft" ground, such as freshly plowed or vegetation-covered areas. This additional attenuation, which can be 5 dB or more within a few hundred feet, is shown graphically on **Figure 5.12-4: Absorption and Diffusion**. At very large distances, wind and temperature gradients can alter ground attenuation; such variable atmospheric effects generally influence noise levels well beyond the range of typical railway noise impact and are not included in the FTA guidelines.

Figure 5.12-4: Absorption and Diffusion



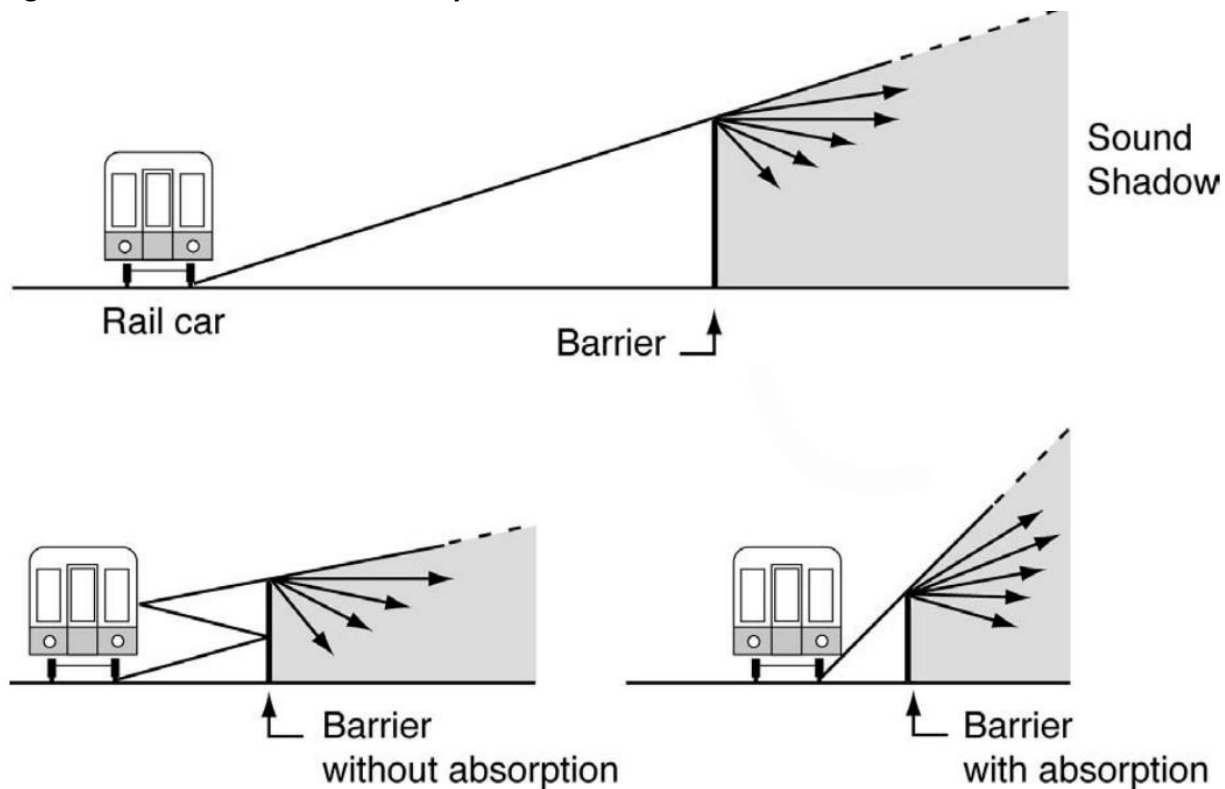
Attenuation Due to Shielding

Sound paths are sometimes interrupted by noise barriers, terrain, rows of buildings, or vegetation. Noise barriers, usually the most effective means of mitigating noise in sensitive areas, are the most important of these sound path interruptions. A noise barrier reduces sound levels at a receptor by breaking the direct path between the source and receptor with a solid wall; vegetation/hedges, in contrast, blocks the line of sight with the source but does not reduce sound levels significantly. **Figure 5.12-5: Noise Barrier Geometry** depicts sound barrier geometry (i.e., absorption and diffusion) which is expected to occur with the proposed trains. Sound energy reaches the receptor only by bending (diffracting) over the top of the barrier, as shown on **Figure 5.12-5**. This diffraction reduces the sound level at the receptor.

Noise barriers for transportation systems typically attenuate noise at the receptor by 5 to 15 dBA depending upon receptor and source height, barrier height, length, and distance from both source and receptor. A barrier's noise attenuation is also frequency (Hz) dependent (i.e., all other factors being the same, the higher the noise frequency, the greater the barrier attenuation). The peak frequencies and source heights of train noise vary according to the dominant noise source in a particular speed regime. In general, aerodynamic noise has lower peak frequencies than does wheel-rail noise, which means that a barrier is less effective at attenuating aerodynamic noise. In addition, aerodynamic noise sources tend to be located higher up on the train than wheel-rail noise sources. As a result, a noise barrier high enough to shield aerodynamic noise would be relatively expensive compared to a noise barrier for shielding wheel-rail noise, since it must extend 15 feet or more above the top of rail. For operating speeds up to about 160 miles per hour (mph), a barrier high enough to shield wheel-rail and other lower car body sound sources would normally provide sufficient sound attenuation.

Barriers on a structure very close to the source provide less attenuation than predicted using standard barrier attenuation formulae, due to reverberation (multiple reflections) between the barrier and the train's body. This reverberation can be offset by increased barrier height, and/or the use of acoustically absorptive material on the source side of the barrier. These concepts are illustrated on **Figure 5.12-5**.

Figure 5.12-5: Noise Barrier Geometry



Sound Measurements

Sound pressure is measured through the A-weighted measure to correct for the relative frequency response of the human ear. That is, an A-weighted noise level de-emphasizes low and very high frequencies of sound similar to the human ear's de-emphasis of these frequencies.

Unlike linear units such as inches or pounds, decibels are measured on a logarithmic scale, representing points on a sharply rising curve. On a logarithmic scale, an increase of 10 dBA is 10 times more intense than 1 dBA, 20 dBA is 100 times more intense, and 30 dBA is 1,000 times more intense. A sound as soft as human breathing is about 10 times greater than 0 dBA. The decibel system of measuring sound gives a rough connection between the physical intensity of sound and its perceived loudness to the human ear. Ambient sounds generally range from 30 dBA (very quiet) to 100 dBA (very loud).

Sound levels are generated from a source and their decibel level decreases as the distance from that source increases. Sound dissipates exponentially with distance from the noise source. This phenomenon is known as "spreading loss." For a single point source, sound levels decrease by approximately 6 dBA for each doubling of distance from the source. This drop-off rate is appropriate for noise generated by on-site operations from stationary equipment or activity at a project site. If noise is produced by a line source, such as highway traffic, the sound decreases by 3 dBA for each doubling of distance in a hard-site environment. Line source noise in a relatively flat environment with absorptive vegetation decreases by 4.5 dBA for each doubling of distance.

Time variation in noise exposure is typically expressed in terms of a steady-state energy level equal to the energy content of the time varying period (called L_{eq}), or alternately, as a statistical description of the sound level that is exceeded over some fraction of a given observation period. These “ L_n ” values are typically used to demonstrate compliance for stationary noise sources with a city or county noise ordinance, as discussed below. Other values typically noted during a noise survey are the L_{min} and L_{max} . These values represent the minimum and maximum root-mean-square noise levels obtained over the measurement period.

Because community receptors are more sensitive to unwanted noise intrusion during the evening and at night, State law requires that, for planning purposes, an artificial dB increment be added to quiet time noise levels in a 24-hour noise descriptor called the CNEL or Day-Night Noise Level (L_{dn}). The CNEL descriptor requires that an artificial increment of 5 dBA be added to the actual noise level for the hours from 7:00 PM to 10:00 PM and 10 dBA for the hours from 10:00 PM to 7:00 AM. The L_{dn} descriptor uses the same methodology but only adds a 10 dBA increment between 10:00 PM and 7:00 AM. Both descriptors give roughly the same 24-hour level, with the CNEL being only slightly more restrictive (i.e., higher).

Vibratory Motion

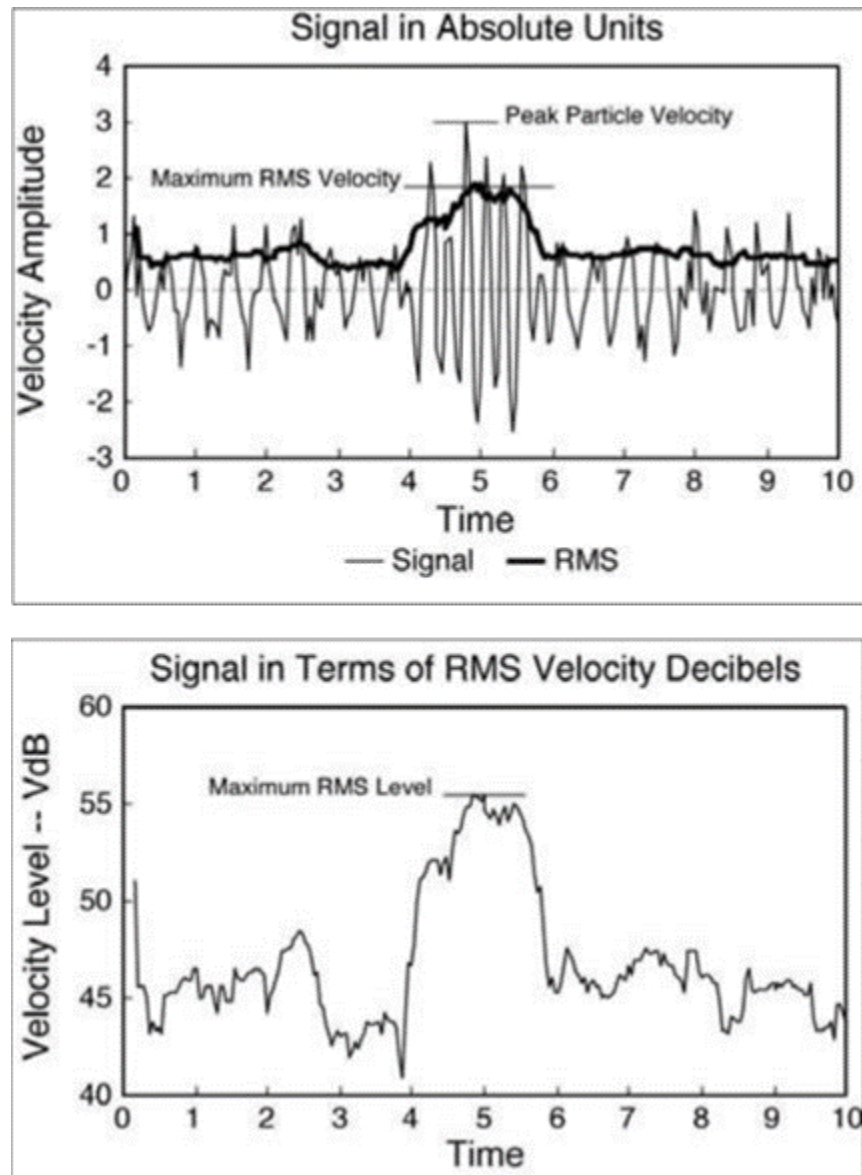
Vibration is an oscillatory motion through a solid medium. In contrast to airborne noise, ground-borne vibration is not a common environmental problem. It is unusual for individuals to perceive vibration from sources such as buses and heavy-duty trucks, even in locations near major roads. However, some common vibration sources produce ground-borne vibration that can be felt (e.g., construction activities such as blasting, pile-driving, and operating heavy equipment). There are several methods employed to quantify vibration. The measurement used in this analysis – PPV – is defined as the vibration signal’s maximum instantaneous positive or negative peak. PPV is used to describe vibration impacts on buildings and structures and is expressed in in/sec. Typically, ground-borne vibration generated by human activity attenuates rapidly with distance from the vibration’s source. Sensitive receptors for vibration include structures (especially older masonry structures); people (residents, especially the elderly and sick); and locales with vibration-sensitive equipment such as hospitals, research labs, and production facilities for computer-chip manufacturing.

The responses of human receptors and structures to vibration are influenced by a combination of factors including soil and rock type, distance from the source, duration, and the number of perceived events. Energy transmitted through the ground as vibration can reach levels that cause structural damage; however, humans are very sensitive, and the vibration amplitudes that can be perceived by humans are well below the levels that cause architectural or structural damage. The FTA has published standard vibration velocities for construction equipment operations. In general, the FTA architectural damage criterion for continuous vibrations (0.2 in/sec) is conservative as discussed in **Appendix 5.12 BIG-1**. The Caltrans *Transportation and Construction Vibration Guidance Manual* characterizes the annoyance potential of vibration as follows: 0.01 in/sec PPV is “barely perceptible,” 0.04 in/sec PPV is “distinctly perceptible,” 0.1 in/sec PPV is “strongly perceptible,” and 0.4 in/sec PPV is “severe” for continuous or frequent intermittent sources.

Amplitude Descriptors

The various methods used to quantify vibration amplitude are shown in **Figure 5.12-6: Different Methods of Describing a Vibration Signal**. The raw signal is the lighter weight curve in the top graph of this figure. This is the instantaneous vibration velocity, which fluctuates near the zero point. As noted above, PPV is defined as the vibration signal's maximum instantaneous positive or negative peak. PPV often is used in monitoring blasting vibration because it is related to the stresses that are experienced by building.

Figure 5.12-6: Different Methods of Describing a Vibration Signal



Although PPV is appropriate for evaluating the potential of building damage, it is not suitable for evaluating human response. It takes some time for the human body to respond to vibration signals. In a sense, the human body responds to average vibration amplitude. Because the net average of a vibration signal is zero, the RMS amplitude is used to describe the "smoothed" vibration amplitude. The RMS of a

signal is the average of the squared amplitude of the signal. The average is typically calculated over a 1-second period. **Figure 5.12-6** shows the RMS amplitude superimposed on the vibration signal. The RMS amplitude is always less than the PPV and is always positive. The ratio of PPV to maximum RMS amplitude is defined as the crest factor for the signal. The crest factor is always greater than 1.71, although a crest factor of 8 or more is not unusual for impulsive signals. For ground-borne vibration from trains, the crest factor is usually 4 to 5.

The PPV and RMS velocities are normally described in in/sec within the U.S. Although it is not universally accepted, decibel notation commonly used for vibration. Decibel notation serves to compress the range of numbers required to describe vibration. The bottom graph in **Figure 5.12-6** shows the top graph's RMS curve expressed in decibels. Vibration velocity level in decibels is defined as:

$$L_v = 20 \times \text{Log}_{10} (v/v_{\text{ref}})$$

Where: L_v = velocity level in decibels

v = RMS velocity amplitude

v_{ref} = reference velocity amplitude

A reference always must be specified whenever a quantity is expressed in terms of decibels. The accepted reference quantity for vibration velocity level in the nation is 1×10^{-6} in/sec; however, it is important to clearly state the reference quantity being used whenever velocity levels are specified. All vibration levels in this report are referenced to 1×10^{-6} in/sec. Although not a universally accepted notation, the abbreviation VdB (RMS vibration velocity level, decibels) is used in this document for vibration decibels to reduce the potential for confusion with sound decibels.

Ground-borne Noise

The rumbling sound caused by the vibration of room surfaces is called ground-borne noise. The annoyance potential of ground-borne noise is usually characterized using the A-weighted sound level (i.e., dBA). Although the A-weighted level is typically the only descriptor used for community noise, there are potential problems with characterizing low-frequency noise using A-weighting. This is because of the non-linearity of human hearing, which causes sounds dominated by low frequency components to seem louder than broadband sounds that have the same A-weighted level. The result is that a ground-borne noise level of 40 dBA sounds louder than 40 dBA broadband airborne noise. This anomaly is accounted for by setting the limits for ground-borne noise lower than would be the case for broadband noise.

Ground-borne noise is generally only an issue for trains operating underground. For systems where the train is operating either at or above grade, the airborne noise level is generally noticeably louder than the ground-borne noise, so that the ground-borne noise is masked by the airborne noise. This would be the case for BIG, as there are no tracks proposed underground—all proposed tracks would be either at or above grade. Ground-borne noise is typically not generated by construction equipment and the FTA Guidelines do not establish methodologies or thresholds for construction ground-borne noise analyses. Therefore, this analysis does not include a ground-borne noise analysis for BIG construction activities.

5.12.3.3 Methodology

Proposed General Plan

This is a program-level analysis that considers the potential impacts from adoption of the proposed General Plan by assessing its proposed policies and the development and activities that may occur under it. Impacts relative to noise and vibration are evaluated using the City's criteria discussed above and based on information in the proposed General Plan and existing and future traffic volumes provided by Fehr and Peers (2025).

The proposed General Plan does not propose specific development projects but, for the purposes of environmental review, establishes the potential buildout of the proposed General Plan. This represents the maximum feasible development that the SOI has projected can reasonably be expected throughout the proposed General Plan horizon. To capture the potential impact of future development under the proposed General Plan, this analysis utilizes the baseline existing conditions described below and analyzes the impacts of development through the projection period of 2050.

The construction noise analysis uses the FHWA Roadway Construction Noise Model (RCNM) based on an anticipated equipment mix for individual construction activities that could be associated with future projects. Construction noise emissions vary considerably, depending on the specific construction activity performed at any given moment. Noise attenuation due to distance, the number and type of equipment, and the load and power requirements to accomplish tasks at each construction phase would result in different noise levels from construction activities at a given receptor. Noise from construction equipment is intermittent and diminishes at a rate of at least 6 dBA per doubling of distance (conservatively ignoring other attenuation effects from air absorption, ground effects, and shielding effects), the average noise levels at noise-sensitive receptors could vary considerably, because mobile construction equipment would move around the Project site with different loads and power requirements. The noise produced during each construction phase is determined by combining the L_{eq} contributions of the simultaneous use of the top three loudest pieces of equipment for each construction activity, which is then modeled from the acoustical center of the construction site to the nearest sensitive receptor property line. The FTA construction noise criteria is used in this analysis to assess the significance of construction noise impacts at sensitive receptors (**Table 5.12-2**). Groundborne vibration and vibration noise is determined using FTA methodology and reference vibration levels for typical construction equipment (FTA, 2018). Vibration levels are modeled from the nearest disturbance area of the construction site to the nearest sensitive receptor building facade. The FTA construction vibration criteria are used in this analysis to assess the significance of construction vibration impacts at sensitive receptors (**Table 5.12-6**).

Future roadside noise levels were calculated for the same roadways analyzed under existing conditions. The street segments selected for analysis are those forecast to experience the greatest percentage increase in traffic generated by future development under the proposed General Plan and are therefore expected to be most directly impacted. Transportation source noise levels have been calculated using the FHWA Highway Noise Prediction Model (FHWA-RD-77-108) with traffic counts provided by Fehr and Peers (2025). The model calculates the average noise level at specific locations based on traffic volumes, average speeds, roadway geometry, and site environmental conditions. The average vehicle noise rates (energy

rates) used in the FHWA model have been modified to reflect average vehicle noise rates identified for California by Caltrans. Future traffic noise level increases are conservatively evaluated using the noise increase threshold of 1.5 dBA in ambient noise environments of 65 dBA CNEL and higher, 3 dBA in ambient noise environments of 60 to 64 dBA CNEL, and 5 dBA in ambient noise environments of less than 60 dBA CNEL in accordance with the FAA noise methodologies.

Impacts of the Environment on a Project

Buildout of the proposed Land Use Plan under the proposed General Plan could result in siting sensitive uses (e.g., residential) near major sources of noise and vibration (e.g., freeways, industrial uses, etc.). Developing new sensitive land uses near significant noise sources could expose persons that inhabit these sensitive land uses to potential noise levels that exceed the City's noise level standards (**Table 5.12-6**) or the FTA vibration standards. However, the purpose of this environmental evaluation is to identify the significant effects of the proposed General Plan on the environment, not the significant effects of the environment on the proposed General Plan.

As a result of the California Supreme Court decision regarding the assessment of the environment's impacts on projects (*California Building Industry Association v. Bay Area Air Quality Management District*, 62 Cal. 4th 369 (No. S 213478) issued December 17, 2015), it is generally no longer the purview of the CEQA process to evaluate the impact of existing environmental conditions on a proposed project. Therefore, CEQA does not require an analysis of the potential environmental effects from siting sensitive receptors near existing sources. However, the proposed General Plan includes policies (Land Use Element Policy 6.1) that would require design features to minimize noise and vibration impacts and to comply with the City's interior and exterior noise level standards.

Barstow International Gateway

BIG construction and operational noise and vibration levels were calculated based on BIG-specific activities and further detail can be found in **Appendix 5.12 BIG-1**. The following procedures and methodologies are utilized to evaluate BIG's construction and operational noise and vibration impact.

Construction Noise

Construction noise was evaluated consistent with FTA guidelines and using the RCNM, RCNM User's Guide, and SoundPLAN 3D modeling software. RCNM is a program that enables the prediction of construction noise levels for a variety of construction operations based on a compilation of empirical data and the application of acoustical propagation formulas. The RCNM User's Guide provides input data and references, adjustment factors, noise calculation formulas, and other pertinent information for the RCNM model. SoundPLAN is a complex state-of-the-art noise modeling software used for simulating noise environments, and creates noise contour maps using reference noise levels, topography, point and area noise sources, mobile noise sources, and intervening walls and structures. Inputs to the SoundPLAN model include ground topography and ground type, intervening walls and structures, noise source locations and heights, receptor locations, and sound power level data. Construction equipment reference noise levels were obtained from the FTA guidelines and were input into RCNM for each construction phase and area and then modeled in SoundPLAN to predict construction noise levels at the nearest noise-sensitive

receptors surrounding the BIG footprint. The modeled receptor location represents the area of frequent human use for each noise-sensitive use evaluated for construction and operational noise impacts in this report. Construction equipment was modeled in SoundPLAN as area sources for eight distinct construction areas: block swap yard, intermodal facility, transload warehouse center, east and west lead tracks, solar farm, 33 kV line, and Lenwood Channel improvements. In addition, pile driving and concrete batch plants required for BIG construction were modeled in SoundPLAN as point sources to capture construction noise from all equipment sources. Ancillary construction activities, including bridge demolition and Sweeten Lane paving were also modeled in SoundPLAN as areas sources.

Construction noise levels were based on typical noise levels generated by construction equipment published by the FTA and FHWA, as provided in **Table 5.12-13: Typical Construction Equipment Noise Levels**. Operating cycles for these types of construction equipment could involve one or two minutes of full power operation followed by three to four minutes at lower power settings. Other primary sources of noise impacts would be due to random incidents, which would last less than one minute (such as dropping large pieces of equipment or the hydraulic movement of machinery lifts). Ground-borne noise and other types of construction-related noise impacts would typically occur during grading phase excavation activities, which have the potential to create the highest noise levels. Other construction activities with the potential to generate high noise levels include pile-driving during bridge construction and railroad track laydown during track construction. Neither the County nor the City have construction noise standards. As such, construction noise is evaluated against the FTA's day and night construction noise assessment criteria of 80 dBA (8-hour L_{eq}) and 70 dBA (8-hour L_{eq}), respectively, for residential uses (see **Table 5.12-1**). Per FTA guidelines Section 7.1, L_{eq} is the appropriate unit for evaluation because can be used to describe noise level from operation of each piece of equipment separately, and levels can be combined to represent the noise level from all equipment operating during a given period.

BIG construction activities would primarily occur between 7:00 AM and 7:00 PM consistent with the County Code (County Code Title 8, Division 3, Chapter 83.01). However, nighttime construction would be required throughout the BIG footprint during certain phases or periods to accommodate key activities required to maintain progress on BIG construction and rail operations (e.g., concrete foundation pouring for the transload warehouse center, east and west lead track work adjacent to the mainline tracks where the lead tracks would tie into the mainline tracks, etc.). Therefore, nighttime construction was analyzed to occur at each phase of BIG construction, and nighttime noise levels were evaluated against the FTA's nighttime construction noise assessment criteria as shown in **Table 5.12-1**.

BIG construction would last for approximately 34 months, intermittently increasing the ambient noise level at various noise-sensitive receptors due to the various types of construction equipment required, and the various locations and times at which such equipment would be used. Increased noise levels would be experienced at the nearest noise-sensitive receptors. Because the magnitude of the effect depends on the type of construction activity, the number of units of construction equipment, and the sound level generated by various units of equipment, noise-sensitive receptors nearest to the active construction area would experience the highest levels of BIG-related noise.

Table 5.12-13: Typical Construction Equipment Noise Levels		
Equipment	Typical Noise Level (dBA) at 50 feet from Source	Typical Noise Level (dBA) at 100 feet from Source¹
Air compressor	80	74
Backhoe	80	74
Compactor	82	76
Concrete mixer	85	79
Concrete pump	82	76
Concrete vibrator	76	70
Crane, derrick	88	82
Crane, mobile	83	77
Dozer	85	79
Generator	82	76
Grader	85	79
Impact wrench	85	79
Jack hammer	88	82
Loader	80	74
Paver	85	79
Pile-driver (impact)	101	95
Pile-driver (sonic)	95	89
Pneumatic tool	85	79
Pump	77	71
Roller	85	79
Saw	76	70
Scraper	85	79
Shovel	82	76
Truck	84	78
Notes: 1. Calculated using the inverse square law formula for sound attenuation: $dBA2 = dBA1 + 20\log(d1/d2)$ 2. dBA2 = estimated noise level at receptor, dBA1 = reference noise level, d1 = reference distance, d2 = receptor location distance, dBA = A-weighted decibels Source: FTA. 2018. <i>Transit Noise and Vibration Impact Assessment Manual</i> , Table 7-1.		

BIG has nine distinct construction phases: demolition, site preparation and mobilization; mass grading; fine grading; bridges, box culverts, sub-ballast, drainage, and utilities; buildings; paving; tracks and signals; solar farm, and 33 kV transmission line. Each construction phase involves a different mix of construction equipment.

Details regarding construction equipment for each construction phase were provided by BNSF. BIG includes construction at the eight construction areas listed above (block swap yard, intermodal facility, transload warehouse center, east and west lead tracks, solar farm, 33 kV line, and Lenwood Channel improvements). The construction equipment was proportionally distributed to each of the eight construction areas based on their relative size for the BIG footprint. All eight construction areas and

associated equipment were analyzed as individual noise sources and conservatively assumed to operate simultaneously. The two loudest construction phases within each construction area were modeled in SoundPLAN and assumed to occur simultaneously as a worst-case scenario to account for potential overlapping construction activities in accordance with FTA methodologies. The construction activities and noise levels for each construction area are discussed in more detail below.

Maximum or peak day BIG construction trips are compared to existing average daily traffic (ADT) for BIG construction routes and are conservatively evaluated using the barely perceptible noise increase threshold of 3 dBA in accordance with FHWA traffic noise methodologies.

Construction Noise Levels

Table 5.12-13 presents typical construction noise levels for various pieces of construction equipment at a standard reference level distance of 50 feet. The sound levels would be attenuated with distance from the source by a variety of mechanisms, but the most effective of these mechanisms is the diversion of sound waves with distance from the source (i.e., attenuation by divergence). In general, there would be a 6 dB decrease in the sound level with every doubling of distance from the construction equipment. Therefore, at a distance of 100 feet, the noise levels would be about 6 dB lower than at the 50-foot reference distance. Similarly, at a distance of 200 feet, the noise levels would be approximately 12 dB lower than at the 50-foot reference distance.

In order to provide a conservative estimate of BIG construction noise levels, the following assumptions were used to conduct a detailed assessment of the noise effects of each construction phase:

- **Noise source level** – Sound generation levels for construction equipment items were obtained from **Table 5.12-13**. Usage factors for each piece of construction equipment were determined based on FHWA's RCNM to calculate L_{eq} for each construction phase.
- **Noise propagation** – For construction assessment, ground was considered hard and $G = 0$.
- **Location** – All pieces of equipment are conservatively assumed to operate in the same location within the proposed construction activity areas.

Construction Year 2026 Condition – South Mainlines

During 2026, BIG construction, the south mainlines would be used to divert train traffic from the existing north mainlines while they are being upgraded, which would divert 100 percent of trains along the new south mainlines. Once BIG construction is finished, half of the trains which would bypass BIG would use the north mainlines and half would use the south mainlines to balance train counts between the mainlines. This condition (Construction Year 2026) was modeled in SoundPLAN to evaluate potential impacts as a result of diverting 100 percent of trains along the new south mainlines.

Appendix 5.12 BIG-1 describes, in detail, the methodology for determining construction noise impacts for each construction activity within BIG footprint including: the Block Swap Yard, Intermodal Facility, Transload Warehouse Center, East and West Lead Track Alignment, Hinkley Road Bridge Replacement, Solar Farm, 33kV Transmission Line, Lenwood Channel Improvements, Pile-Driving, Concrete Batch Plants, and Construction Year 2026 Conditions.

Operations

The FTA guidelines recommend evaluating operational rail noise impacts by quantifying and evaluating project-generated noise levels against FTA's sliding scale noise standards that are based on measured existing ambient noise levels at nearby sensitive receptors. However, this methodology does not account for a potential change in future baseline noise levels at sensitive receptors. Train activity along the existing mainlines in the vicinity of BIG is anticipated to increase approximately 1.0 to 2.5 percent annually without BIG (ENSAFE, 2025), and thus, future baseline train noise levels at sensitive receptors would also increase. Specifically, future daily train volumes along the rail corridor would increase by the following percentages when compared to existing conditions:

- Year 2028 No BIG: 7.43 percent increase in daily train trips (which equates to an approximate 2.62 percent increase annually);
- Interim Year 2033 No BIG: 15.75 percent increase in daily train trips (which equates to an approximate 1.43 percent increase annually); and
- Horizon Year 2048 No BIG: 47.27 percent increase in daily train trips (which equates to an approximate 1.89 percent increase annually).

According to State CEQA Guidelines § 15125, where existing conditions change or fluctuate over time, and where it is necessary to provide the most accurate picture of a project's impacts, a Lead Agency may define existing conditions by referencing historic conditions, conditions expected when the project becomes operational, or both, supported with substantial evidence. Therefore, operational train noise modeling was completed for future years without BIG (2028, 2033, and 2048) to establish future baseline train noise conditions and analyze incremental noise increase impacts directly attributable to BIG at nearby sensitive receptors. Based on that data, use of existing conditions alone would be misleading and without informative value to decision-makers and the public (see State CEQA Guideline § 15125(a)(2)).

To model predicted noise levels at noise-sensitive receptors as a result of BIG during Opening Year 2028 (2028 Plus BIG), Interim Year 2033 Plus BIG (2033 Plus BIG), and Horizon Year 2048 (2048 Plus BIG) conditions, noise source reference levels, operating conditions, propagation paths (i.e., the manner in which sound travels, which is affected by many factors which include spreading, absorption, terrain, and obstacles), and distances, in conjunction with existing ambient noise were considered.

Train Noise Sources

The No Project and Plus BIG train noise levels were quantified using SoundPLAN and are based on the proposed track alignment, daily train volumes, speed, number of locomotives and rail cars, rail car length, and train noise acoustical factors published by the FTA.

Train noise from BIG was modeled in SoundPLAN as 18 railway sources representing the north and south mainlines, east and west lead tracks, and rail spurs/tracks associated with the intermodal facility and block swap yard. Based on information provided by BNSF, a maximum speed of 20 mph was utilized for trains traveling within the rail yard (i.e., the intermodal facility and block swap yard) and 40 mph for trains traveling on the lead tracks and 70 mph for trains traveling on the mainline.

Train horn noise was incorporated into the SoundPLAN model as a line source for trains passing through any at-grade crossings, and an area source at the block swap yard to represent the potential locations train horns would be used during train assembly activities (i.e., a train stopping/stopped and/or backing up from a stopped position).

Non-Train Noise Sources

Noise levels from the non-train sources established below were calculated at the nearest noise-sensitive receptors based on reference noise levels and the inverse square law of sound propagation in SoundPLAN.

Block Swap Yard. The predominant noise sources from the block swap yard operations would include transferring train car blocks between trains, and railcar coupling.

Intermodal Facility. The predominant noise sources from intermodal facility operations would include loading and unloading containers from heavy-duty trucks onto trains and from trains onto heavy-duty trucks. In addition, intermodal facility operations would include stationary noise sources from electric and diesel equipment.

Transload Warehouse Center. The transload warehouse center is proposed at BIG footprint's northern extent. The predominant noise sources from transload warehouse center operations would include container parking/storage areas, employee parking, loading dock activities, and taking containers to and from the intermodal facility via electric hostler vehicles on a proposed private road. Transload warehouse center operations would also include stationary noise sources from diesel equipment (emergency generators) and mechanical equipment (heating, ventilation, and air conditioning [HVAC]).

Solar Farm. The proposed solar farm at BIG's southwest corner would produce long-term, continuous, operational noise from the battery electric storage system (BESS) and solar inverter equipment. The BESS equipment would be located at the northwestern corner of the solar farm site adjacent to Main Street, and the solar inverter equipment would be positioned at various locations throughout the solar farm.

Combined Operational Noise Levels

Operational noise levels associated with the rail yard, rail corridor/trains, transload warehouse center, mechanical equipment, and solar farm were modeled with the SoundPLAN software. Inputs to the SoundPLAN model included ground topography and ground type, intervening walls, and structures (including the stacked containers at the intermodal facility), noise source locations and heights, receptor locations, and sound power level data. The SoundPLAN run for BIG's operations conservatively assumes the simultaneous operation of all BIG noise sources.

Utilizing the input data described above, SoundPLAN was used to calculate noise levels at the nearest off-site properties and sensitive receptors surrounding BIG footprint. It should be noted that predicted noise levels are conservative estimates since it was assumed that all BIG equipment and operational activity would occur in a simultaneous manner during the daytime and nighttime. SoundPLAN was utilized to model 2028, 2033, and 2048 Plus BIG operations. It is also noted that SoundPLAN utilizes FTA/FRA rail calculation factors and methodologies consistent with the FTA guidance manual to quantify train noise levels. It is also noted that SoundPLAN utilizes FTA rail calculation factors and methodologies consistent with the FTA guidance manual to quantify train noise levels.

The BIG operational impact analysis incorporates the following structure to present and evaluate modeling data, identify impacted receptor locations, and analyze potential noise abatement measures to potentially reduce BIG operational noise impacts for Opening Year 2028, Interim Year 2033, and Horizon Year 2048 conditions:

1. Only receptors that would either exceed the incremental increase noise standard or the absolute noise standard (City or County) are presented. Modeling data and screening analyses for all other receptors can be found in **Appendix 5.12 BIG-1**.
2. Noise barriers were modeled in SoundPLAN at various heights and locations to evaluate potential noise reductions and determine if BIG operational noise levels can be reduced below the incremental increase noise standard or absolute noise standard at the impacted receptor(s). See **Appendix 5.12 BIG-1** for noise barrier feasibility analysis.
3. Noise impacts are determined based on whether noise barriers can acoustically reduce BIG operational noise levels below standards.
4. The financial feasibility and reasonability to construct the noise barriers evaluated in the impact analysis is provided in **Appendix 5.12 BIG-1: Noise Barrier Financial Feasibility Analysis – On-Site BIG Facility Noise**. Only noise barriers that meet the maximum cost allowance per benefited receptor are considered financially feasible and reasonable and are recommended as mitigation to reduce BIG operational noise impacts. The mitigated noise levels presented in the analysis below only account for the noise barriers deemed financially feasible and reasonable.

Emergency Generators

To provide backup power in the event of electrical service interruptions, diesel emergency generators are proposed at various locations across the rail yard and transload warehouse center. The rail yard would include 10 emergency generators at the southeastern portion of the intermodal facility, while the transload warehouse center would include 29 emergency generators dispersed throughout. The combined 39 emergency generators would undergo regular testing up to 50 hours per year per generator (a maximum of one generator would be tested for up to one hour in any single day), for a total of approximately 1,950 hours of generator testing per year. However, to provide a worst-case analysis of potential noise impacts from emergency generators, the proposed 39 emergency generators were modeled in SoundPLAN assuming all emergency generators would operate simultaneously during an emergency situation at their specific/identified locations in BIG's site plans.

Roadway Traffic Noise

Roadway traffic noise levels were calculated for the roadway segments in the vicinity of BIG. This task was accomplished using the FHWA-RD-77-108 and traffic data within BIG's transportation analysis (see **Appendix 5.15-1: CEQA Assessment – Transportation Analysis**). The noise prediction model calculates the average noise level at given distances (contours) from the roadway centerline based on traffic volumes, average speeds, roadway geometry, and site environmental conditions. For this analysis, roadway noise levels are given in dB at 100 feet from roadway centerline. The average vehicle noise rates (also referred to as energy rates) used in the FHWA model have been modified to reflect average vehicle noise rates identified for California by Caltrans.

Federal Interagency Committee on Noise Incremental Noise Impact Guidance

FICON developed guidance to analyze incremental noise level increases that include contributing factors from ambient noise levels. Although the FICON guidance and recommendations were specifically developed to evaluate aircraft noise impacts, these recommendations are often used in environmental noise impact assessments. FICON identifies a readily perceptible 5 dBA or greater project-related noise level increase is considered a significant impact when the noise criteria for a given land use is exceeded. According to FICON, in areas where the “without project” noise levels range from 60 to 65 dBA, a 3 dBA barely perceptible noise level increase appears to be appropriate for most people. When the “without project” noise levels already exceed 65 dBA, any increase in community noise louder than 1.5 dBA or greater is considered a significant impact if the noise criteria for a given land use is exceeded, since it likely contributes to an existing noise exposure exceedance.

Noise Barrier Feasibility Analysis

State CEQA Guidelines § 21002 requires mitigation measures (including noise barriers) to be feasible. Per FTA guidelines Section 2.3 (Mitigation Policy Considerations), “...cost is an important consideration in reaching feasibility decisions about noise mitigation measures. One guideline for gauging the reasonableness of the cost of mitigation is the State DOT’s procedures on the subject” (FTA, 2018). Therefore, this analysis utilizes the Caltrans Noise Analysis Protocol methodology for financial feasibility, which establishes a maximum allowable cost per benefited receptor to assess whether a noise barrier is reasonable or feasible for implementation. The noise barrier feasibility analysis can be found in **Appendix 5.12 BIG-1**.

Interior Noise Analysis

Interior noise levels were calculated to evaluate the potential for sleep disturbance under two conditions: “windows closed” and “windows open.” With windows closed, a 28 dBA noise reduction was applied to exterior noise levels at receptors to estimate their respective interior noise levels. A conservative noise reduction of 10 dB for exterior to interior noise with windows open was also utilized.

Sleep Disturbance and Speech Interference

Calculated interior noise levels were analyzed in combination with the FICAN Sleep Disturbance Curve (**Figure 5.12-1**) to predict the likelihood of sleep awakenings during BIG operations. As BIG operations would potentially affect nearby schools, speech interference is included in this analysis. For speech interference, a separation distance between a projector (speaker) and receptor (audience) was assumed to be nominally 20 feet (to model a classroom scenario) and noise levels were evaluated against a speech intelligibility of 95 percent to determine impacts from BIG operations.

Appendix 5.12 BIG-1 describes, in detail, the methodology for determining operational noise impacts from BIG.

Vibration

Construction

Ground-borne vibration levels associated with construction-related activities for BIG were evaluated utilizing typical ground-borne vibration levels associated with construction equipment, obtained from FTA published data for construction equipment. Potential ground-borne vibration impacts related to building/structure damage and interference with sensitive existing operations were evaluated, considering the distance from construction activities to nearby land uses and typically applied criteria.

For a structure built traditionally, without assistance from qualified engineers, the FTA guidelines show that a vibration level of up to 0.20 in/sec is considered safe and would not result in any vibration damage. FTA guidelines show that modern engineered buildings built with reinforced-concrete, steel or timber can withstand vibration levels up to 0.50 in/sec and not experience vibration damage; **Table 5.12-5**. The Caltrans *2020 Transportation and Construction Vibration Guidance Manual* identifies the vibration threshold for human annoyance, a vibration level of 0.1 in/sec PPV is the level at which human annoyance starts and levels of 0.2 in/sec PPV is used for building damage. Construction vibration impacts would be significant if BIG construction vibration levels exceed any of the aforementioned vibration standards established by FTA or Caltrans.

BIG construction vibration levels were quantified using reference levels and calculation equations from the FTA guidelines. **Table 5.12-14: Typical Construction Equipment Vibration Levels** lists vibration levels at 50 feet for typical construction equipment. BIG construction equipment was conservatively assumed to operate at BIG's boundary line nearest to off-site receptors.

Table 5.12-14: Typical Construction Equipment Vibration Levels		
Equipment	PPV at 50 Feet (inches/second) ¹	Approximate Velocity Level at 50 Feet (VdB) ²
Large bulldozer	0.032	78
Caisson drilling	0.032	78
Loaded trucks	0.027	77
Vibratory roller	0.074	85
Jackhammer	0.012	70
Small bulldozer/tractors	0.001	49
Pile Driver (Impact)	0.537	103
Notes: ¹ Calculated using the following formula: $PPV_{equip} = PPV_{ref} \times (25/D)^{1.5}$, where: PPV_{equip} = the peak particle velocity in in/sec of the equipment adjusted for the distance; PPV_{ref} = the reference vibration level in in/sec from Table 7-4 of the FTA Transit Noise and Vibration Impact Assessment Manual, September 2018; D = the distance from the equipment to the receptor. ² Calculated using the following formula: $L_v(D) = L_{v,ref} - 30 \log(D/25 \text{ feet})$, where: $L_v(D)$ = the RMS velocity level adjusted for distance; $L_{v,ref}$ = the source reference vibration level at 25 feet (VdB); and D = distance from the equipment to the receptor (feet) from Equation 7-3 of the FTA, Transit Noise and Vibration Impact Assessment Manual, September 2018. VdB = vibration velocity level, decibels		
Source: FTA. 2018. Transit Noise and Vibration Impact Assessment Manual.		

Operations

Vibration levels at sensitive receptors are determined by estimating the overall vibration velocity level and A-weighted ground-borne noise levels as a function of distance from the track and applying adjustments to account for factors such as track support systems, vehicle speed, type of building, and track and wheel conditions.

A General Vibration Assessment was prepared for BIG operations in accordance with Section 6.4 of the FTA guidelines. The General Vibration Assessment is used to examine potential impacts on vibration-sensitive land use areas identified in the screening step more closely. It uses generalized information available at an early stage in the project development process. BIG operations would result in significant impacts if vibration levels are substantial enough to damage nearby structures or buildings or result in vibration levels that are commonly accepted as an annoyance to sensitive land uses per FTA guidelines Table 6-3 and 6-4 (as shown as **Table 5.12-3** and **Table 5.12-4**). Long-term vibration impacts from BIG would occur if operational vibration levels are expected to exceed the vibration criteria for building damage and/or human annoyance in **Table 5.12-3** and **Table 5.12-5**, respectively.

Sensitive receptors in BIG's vicinity (e.g., residential dwellings, churches) fall under Land Use Categories 2 or 3 described in **Appendix 5.12 BIG-1**. The FTA criteria for "infrequent events" are used for BIG in Year 2028 and Year 2048 because BIG train operations would result in a maximum of approximately 24 daily freight train pass-bys in Year 2028 and 35 pass-bys in Year 2048 at the nearest receptors. The FTA vibration standards for infrequent events are provided in **Table 5.12-3**.

Ground-Borne Noise

Construction and Operations

The FTA Detailed Vibration Analysis procedure provides vibration propagation characteristics inside a building. In addition to vibration that can be felt, the vibration of room surfaces radiates low-frequency sound that may be audible. The sound level is affected by the amount of acoustical absorption in the receptor room. Ground-borne noise is determined in dBA. Ground-borne noise impacts are assessed based on criteria for human annoyance and activity interference.

5.12.4 ENVIRONMENTAL SETTING

Proposed General Plan

Existing Ambient Noise Environment

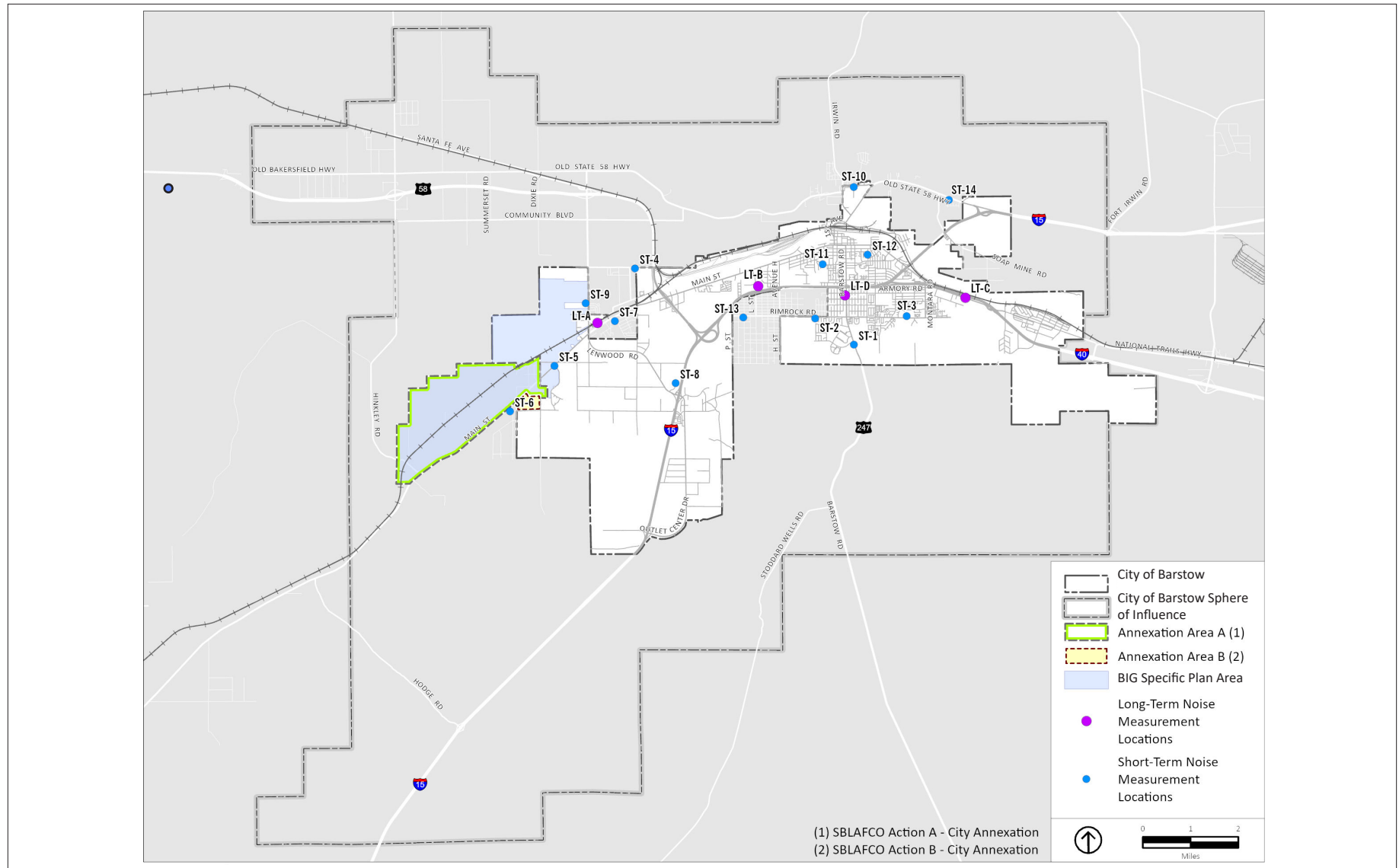
Ambient noise monitoring was conducted within the proposed General Plan area on Wednesday, February 5 through Thursday, February 6, 2025, to document ambient noise levels at different types of noise environments, such as residential, school, parks, and major transportation corridors. Measurements were made during weekday periods when the proposed General Plan area is expected to be most active. Long-term (24-hour) noise measurements were conducted at four locations within the proposed General Plan area, and short-term (15 minute) noise measurements were conducted at 14 locations in the proposed General Plan area.

Monitoring for the short-term noise measurements was performed using a Larson-Davis Model LxT sound level meter, which satisfies the American National Standards Institute (ANSI) standard for Type I instrumentation. Piccolo II meters were used for long-term noise measurements, which satisfy the ANSI standard for Type II instrumentation. All meters were calibrated prior to and after each monitoring period. All noise measurements were at least five feet above the ground and away from reflective surfaces. Meteorological conditions during the measurement periods were favorable for outdoor noise measurements and were noted to be representative of the typical conditions for the season. All sound level meters were equipped with a windscreen during measurements.

Long-Term Noise Measurements

The long-term noise measurement results are addressed below and summarized in **Appendix 5.12 GP-1**. The locations of the long-term measurements are shown in Figure **5.12-7: Ambient Noise Monitoring Locations – Proposed General Plan**. Long-Term Location A (LT-A) monitoring was conducted at the end of the cul-de-sac on Townsend Street, at the southwest corner of the property at 34351 Townsend Street. The measurement location was approximately 110 feet southeast of the rail line and approximately 400 feet northwest of the Highway 66/Main Street southbound centerline. The 24-hour noise measurement was conducted from Wednesday, February 5 through Thursday, February 6, 2025. The noise environment is characterized primarily by train noise from the BNSF railway. Average hourly daytime noise levels were 71.0 dBA L_{eq} at LT-A. Results are summarized in **Table 5.12-15: Long-Term Location A Ambient Long-Term Noise Measurements – 78.2 dBA CNEL**. It should be noted that there was tampering of the meter during 10:00 PM that resulted in the highest measured L_{max} during the measurement period and has been disregarded.

Table 5.12-15: Long-Term Location A Ambient Long-Term Noise Measurements – 78.2 dBA CNEL									
Time	L_{eq} (dBA)	L_{max} (dBA)	L_{50} (dBA)	L_{90} (dBA)	Time	L_{eq} (dBA)	L_{max} (dBA)	L_{50} (dBA)	L_{90} (dBA)
9:00 AM	71.6	90.5	53.5	46.0	9:00 PM	73.5	94.0	51.5	46.1
10:00 AM	71.4	93.8	50.7	44.6	10:00 PM	74.4	99.8	48.1	44.7
11:00 AM	69.9	91.8	52.9	46.3	11:00 PM	73.5	90.8	49.0	43.5
12:00 PM	67.7	85.0	51.5	46.5	12:00 AM	66.5	88.2	44.6	41.0
1:00 PM	69.6	91.5	50.4	45.4	1:00 AM	73.1	92.3	47.4	41.8
2:00 PM	71.9	93.0	49.4	44.5	2:00 AM	69.6	86.2	47.3	42.5
3:00 PM	71.7	91.3	51.8	46.7	3:00 AM	65.3	88.2	45.5	41.2
4:00 PM	72.7	90.9	52.8	48.4	4:00 AM	71.8	89.0	50.9	44.8
5:00 PM	69.6	92.1	53.2	49.1	5:00 AM	73.5	93.2	53.8	48.3
6:00 PM	73.8	91.6	53.1	48.6	6:00 AM	67.8	95.3	54.3	49.6
7:00 PM	71.2	91.5	52.0	48.0	7:00 AM	69.2	89.9	52.2	47.2
8:00 PM	67.1	87.0	50.0	46.1	8:00 AM	67.8	85.9	49.4	44.9
February 5 - 6, 2025. See Appendix 5.12 GP-1: Noise Monitoring and Modeling .									



Source:
City of Barstow, 2025

Figure 5.12-7
Ambient Noise Monitoring Locations - Proposed General Plan

Long-Term Location B (LT-B) monitoring was conducted on the northeast corner of the L Street Parking Lot. The L Street Parking Lot is located on the northbound side of L Street and the measurement location was approximately 340 feet west of the L Street centerline. The measurement location was also approximately 330 feet north of the nearest entrance/exit lane of I-15. The 24-hour noise measurement was conducted from Wednesday, February 5th through Thursday, February 6th, 2025. The noise environment is characterized by freeway vehicle noise from I-15 and vehicles passing on L Street. Average hourly daytime noise levels were 65.8 dBA L_{eq} at LT-B. Results are summarized in **Table 5.12-16: Long-Term Location B Ambient Long-Term Noise Measurements – 71.6 dBA CNEL**.

Table 5.12-16: Long-Term Location B Ambient Long-Term Noise Measurements – 71.6 dBA CNEL									
Time	L_{eq} (dBA)	L_{max} (dBA)	L_{50} (dBA)	L_{90} (dBA)	Time	L_{eq} (dBA)	L_{max} (dBA)	L_{50} (dBA)	L_{90} (dBA)
9:00 AM	63.9	82.5	62.5	59.9	9:00 PM	64.5	78.0	63.8	61.2
10:00 AM	63.9	82.3	62.7	60.4	10:00 PM	65.1	79.1	64.5	61.8
11:00 AM	66.7	80.5	65.8	63.5	11:00 PM	63.5	74.5	63.1	59.9
12:00 PM	66.3	78.1	65.3	62.9	12:00 AM	63.8	71.8	63.3	59.7
1:00 PM	65.1	73.6	64.3	62.0	1:00 AM	63.7	72.3	63.2	59.5
2:00 PM	65.8	79.5	64.9	62.7	2:00 AM	64.7	77.4	63.8	59.5
3:00 PM	65.8	73.4	65.5	63.6	3:00 AM	65.1	73.0	64.6	61.3
4:00 PM	65.9	75.7	65.7	63.6	4:00 AM	64.4	74.6	64.0	60.2
5:00 PM	67.1	81.3	66.8	64.7	5:00 AM	65.0	75.9	64.6	62.0
6:00 PM	67.9	81.2	67.3	65.3	6:00 AM	66.6	76.1	66.0	63.5
7:00 PM	66.5	74	66.0	63.3	7:00 AM	65.6	79.2	65.0	62.6
8:00 PM	65.3	82.3	64.3	61.3	8:00 AM	64.0	72.8	63.6	61.2
February 5 – 6, 2025. See Appendix 5.12 GP-1: Noise Monitoring and Modeling .									

Long-Term Location C (LT-C) monitoring was conducted at the northeastern corner of the property on 2450 East Main Street. The measurement location was approximately 40 feet southwest of the East Main Street centerline. The 24-hour noise measurement was taken from Wednesday, February 5th through Thursday, February 6th, 2025. The noise environment is characterized primarily by traffic noise on East Main Street and barking from dogs at the nearby Human Society property. Average hourly daytime noise levels were 70.9 dBA L_{eq} at LT-C. Results are summarized in **Table 5.12-17: LT-C Ambient Long-Term Noise Measurements – 74.1 dBA CNEL**.

Table 5.12-17: LT-C Ambient Long-Term Noise Measurements – 74.1 dBA CNEL

Time	L _{eq} (dBA)	L _{max} (dBA)	L ₅₀ (dBA)	L ₉₀ (dBA)	Time	L _{eq} (dBA)	L _{max} (dBA)	L ₅₀ (dBA)	L ₉₀ (dBA)
8:00 AM	70.8	83.0	68.8	63.3	8:00 PM	68.2	82.6	64.8	58.5
9:00 AM	70.7	85.0	69.0	64.1	9:00 PM	66.3	83.7	64.8	59.3
10:00 AM	72.9	84.8	69.9	64.4	10:00 PM	65.8	80.3	63.6	56.6
11:00 AM	74.8	88.2	71.2	65.0	11:00 AM	65.7	77.3	63.6	56.8
12:00 PM	70.1	88.3	67.4	62.0	12:00 AM	65.6	81.4	62.0	55.8
1:00 PM	72.4	85.5	69.9	64.9	1:00 AM	67.4	79.0	64.9	57.3
2:00 PM	69.2	78.8	67.9	63.8	2:00 AM	65.8	78.6	62.8	55.3
3:00 PM	70.2	82.9	68.4	63.5	3:00 AM	66	83.4	63.1	56.8
4:00 PM	67.7	79.0	66.4	61.0	4:00 AM	68.2	82.9	65.9	60.9
5:00 PM	66.5	77.5	64.8	59.4	5:00 AM	68.1	81.5	66.0	61.1
6:00 PM	66.3	77.9	64.4	58.5	6:00 AM	67	80.9	64.4	58.2
7:00 PM	67.6	80.0	65.7	60.4	7:00 AM	64.4	76.2	62.6	56.2

February 5 – 6, 2025.

See **Appendix 5.12 GP-1: Noise Monitoring and Modeling**.

Long-Term Location D (LT-D) monitoring was conducted at 490 Armory Road which is constructed with a new gas station. The measurement was located 39 feet west of the Armory Road centerline and mounted on a fence 12 feet above the grade of the street. The 24-hour noise measurement was taken from Wednesday, February 5th through Thursday, February 6th, 2025. The noise environment was primarily characterized by roadway traffic at the intersection of Barstow Road and Armory Road. Average hourly daytime noise levels were 72.5 dBA L_{eq} at LT-D. Results are summarized in **Table 5.12-18: Long-Term Location D Ambient Long-Term Noise Measurements – 77.5 dBA CNEL**.

Table 5.12-18: Long-Term Location D Ambient Long-Term Noise Measurements – 77.5 dBA CNEL

Time	L _{eq} (dBA)	L _{max} (dBA)	L ₅₀ (dBA)	L ₉₀ (dBA)	Time	L _{eq} (dBA)	L _{max} (dBA)	L ₅₀ (dBA)	L ₉₀ (dBA)
9:00 AM	72.3	99.8	64.0	56.4	9:00 PM	69.7	95.1	60.6	54.5
10:00 AM	71.2	95.2	64.3	56.3	10:00 PM	67.2	89.8	57.3	53.5
11:00 AM	70.9	89.7	64.4	57	11:00 PM	68.2	91.7	55.7	51.8
12:00 PM	72.2	92.1	65.7	58.1	12:00 AM	74.7	104.7	54.6	50.7
1:00 PM	72.5	96.5	65.3	56.7	1:00 AM	65.0	91.7	54.1	50.5
2:00 PM	74.7	97.2	65.0	57.7	2:00 AM	75.5	105.7	53.0	49.1
3:00 PM	71.6	91.8	65.5	58.5	3:00 AM	64.1	85.4	54.1	50.5
4:00 PM	73.2	98.7	67.2	59.8	4:00 AM	64.5	87.5	55.0	51.0
5:00 PM	74.2	96.8	66.3	58.5	5:00 AM	67.1	85.4	59.6	53.6
6:00 PM	72.4	98.4	65.3	58.1	6:00 AM	71.6	92.1	63.9	57.0
7:00 PM	69.7	87.5	63.2	56.1	7:00 AM	71.4	91.3	64.9	57.6
8:00 PM	70.1	92.5	62.4	56.1	8:00 AM	70.8	93.9	64.2	56.8

February 5 – 6, 2025.

See **Appendix 5.12 GP-1: Noise Monitoring and Modeling**.

Short-Term Measurements

The short-term measurement results are detailed below and summarized in **Table 5.12-19: Ambient Short-Term Noise Measurement Summary**. The locations of the short-term measurements are shown in Figure 5.12-7.

Table 5.12-19: Ambient Short-Term Noise Measurement Summary							
Location	L _{eq}	L _{max}	L _{min}	L50	L25	L8	L2
ST-1: Barstow Road, west of Baptist Trinity Church	66.2	83.4	40.9	50.9	63.5	71.9	75.9
ST-2: North of residence on 2000 Lovato Road	70.5	84.6	41.2	60.5	69.7	76.0	79.5
ST-3: East of Donald A Stringham Park at 1655 Rimrock Road	52.1	64.7	44.2	49.8	52.4	55.4	58.4
ST-4: Agate Road, north of Ingels County Education Center	44.8	57.9	39.1	41.9	43.8	48.4	52.3
ST-5: Intersection of Country Club Drive and West Main Street	64.1	79.8	35.6	49.3	60.1	70.3	74.1
ST-6: North of 23589 Ganza Street	52.1	84.4	36.8	45.1	50.7	55.1	61.3
ST-7A: Ash Road, north of Lenwood Elementary School	64.2	82.3	40.9	54.9	64.3	68.3	72.5
ST-7B: Ash Road, north of Lenwood Elementary School	52.1	63.1	49.5	51.7	52.4	53.4	55.4
ST-8: North of the Motel 6 on 2551 Commerce Road	62.5	74.0	42.8	54.5	62.3	69.3	71.2
ST-9: Intersection of Lenwood Road and Camino Del Sol	66.8	81.5	36.5	48.4	59.5	71.0	77.0
ST-10: 500 feet south of Old Hwy 58, east of 1650 Silver Spur Drive	47.4	63.3	42.0	44.9	46.0	48.2	56.5
ST-11: Northwest of Barstow STEM Academy at Bus Yard	54.5	66.5	46.1	49.9	52.7	59.8	63.3
ST-12: Lillian Park on 901 Bigger Street	50.7	68.4	43.6	48.1	49.8	52.7	58.7
ST-13: Rimrock Convalescent Home at 27555 Rimrock Road	52.5	69.5	47.3	50.4	51.7	53.6	59.2
ST-14: Intersection of Bayan Street and Hawthorne Drive	55.9	72.4	43.5	47.0	50.8	60.5	66.2
February 5-6, 2025. See Appendix 5.12 GP-1: Noise Monitoring and Modeling .							

- Short-Term Location 1 (ST-1) monitoring was conducted 180 feet north of Baptist Trinity Church, 52 feet west of the Barstow Road centerline. The 15-minute noise measurement began at 9:51 AM on Wednesday, February 5, 2024. The noise environment of this site is characterized by passing traffic on Barstow Road. Noise levels measured 66.2 dBA L_{eq} and 83.4 dBA L_{max} during the measurement period at ST-1.
- Short-Term Location 2 (ST-2) monitoring was conducted 7 feet north of the backyard of the residence on 2000 Lovato Avenue and 35 feet south of the Rimrock Road centerline. An 8-foot sound wall separated the residence from the road. The 15-minute noise measurement began at

9:30 AM on Wednesday, February 5, 2024. The noise environment of this site is characterized primarily by local traffic passing on Rimrock Road. Noise levels measured 70.5 dBA L_{eq} and 84.6 dBA L_{max} during the measurement period at ST-2.

- Short-Term Location 3 (ST-3) was at the empty field adjacent to and east of the Donald A Stringham Park. The measurement location was approximately 20 feet from the park's eastern fence-line and approximately 185 feet north of the Rimrock Road centerline. A 15-minute noise measurement began at 10:03 AM on Thursday, February 6, 2025. The noise environment of this site is characterized primarily by the occasional vehicular traffic, a large portion of which was composed of smaller vehicles. Occasional chatter from the park was observed from the direction of park patrons. Noise levels measured 52.1 dBA L_{eq} and 64.7 dBA L_{max} during the measurement period at ST-3.
- Short-Term Location 4 (ST-4) monitoring was conducted on the southeast corner of Western Road and Agate Road, approximately 315 feet north of the Ingels County Education Center, and approximately 50 feet from the centerline of both Western Road and Agate Road. The 15-minute noise measurement began at 10:56 AM on Wednesday, February 5, 2025. The noise environment of this site is characterized primarily by rural residential property uses and open fields. No airplanes were observed during the measurement period. Minor power tool whirring was observed, as well as occasional animal noises (dog barking, rooster cawing, birds chirping). Noise levels measured 44.8 dBA L_{eq} and 57.9 dBA L_{max} during the measurement period at ST-4.
- Short-Term Location 5 (ST-5) monitoring was conducted on the corner of Country Club Drive and West Main Street, approximately 50 feet west and south, respectively from their centerlines. The 15-minute noise measurement began at 9:23 AM on Wednesday, February 5, 2025. The primary noise source at this site is the frequent flow of vehicles along SR-66. Noise levels measured 64.1 dBA L_{eq} and 79.8 dBA L_{max} during the measurement period at ST-5.
- Short-Term Location 6 (ST-6) monitoring was conducted across the street from 23589 Ganza Street, in the Lenwood Community, west of Barstow. Surrounding uses were primarily single-family residential properties and a flat, empty field to the north. The 15-minute noise measurement began at 8:55 AM on Wednesday, February 5, 2025. The location was primarily quiet, with a few occasional small vehicles, and one large truck passing by. Occasional noise was observed coming from vehicle traffic along SR-66, north of the monitoring site, approximately 400 feet away. Noise levels measured 52.1 dBA L_{eq} and 84.4 dBA L_{max} during the measurement period at ST-6.
- Short-Term Location 7A (ST-7) monitoring was conducted at the northern exterior of Lenwood Elementary School. General noise sources at the measurement site included student-associated shouting and playing in the school yard. A 15-minute noise measurement began at 10:21 AM on February 5, 2025. During the monitoring period, an event occurred at the school, which called for the arrival of two emergency vehicles to report to the school site between 10:27 AM and 10:34 AM. Multiple school announcements were made over the loudspeaker during the measurement as well. Additional noise sources observed at this location included nearby train activities, and the

occasional pedestrian walking by. Noise levels measured 64.2 dBA L_{eq} and 82.3 dBA L_{max} during the measurement period at ST-7.

- Short-Term Location 7B (ST-7) an additional 15-minute noise measurement was conducted the following day, on Thursday February 6, 2025, at the same location. The noise environment consisted of occasional passing of larger vehicles and the occasional passing of a train at the railway located approximately 846 feet north of the measurement location. Noise levels measured 52.1 dBA L_{eq} and 63.1 dBA L_{max} during the measurement period at ST-7.
- Short-Term Location 8 (ST-8) monitoring was conducted approximately 120 feet north of the Motel 6 at 2551 Commerce Road. The 15-minute noise measurement began at 11:31 AM on Wednesday, February 5, 2025. The noise environment of this site is characterized primarily by distant high-volume traffic along I-15, which is located approximately 570 feet to the east of the measurement location. Noise levels measured 62.5 dBA L_{eq} and 74.0 dBA L_{max} during the measurement period at ST-8.
- Short-Term Location 9 (ST-9) monitoring was conducted at the corner of Lenwood Road and Camino Del Sol on the northern side of the neighborhood community entrance. The 15-minute noise measurement began at 9:47 AM on Wednesday, February 5, 2025. The noise environment of this site is characterized primarily by the occasional Large-Vehicle travel route traffic. The neighborhood is lined by a 71.5-inch tall masonry wall along Lenwood Road. Noise levels measured 66.8 dBA L_{eq} and 81.5 dBA L_{max} during the measurement period at ST-9.
- Short-Term Location 10 (ST-10) monitoring was conducted 138 feet east of 1650 Silver Spur Drive. The measurement was located 330 feet south of the Old Highway 158 centerline. The 15-minute noise measurement began at 9:25 AM on Thursday, February 6, 2025. The noise environment of this site is characterized primarily by residential activity including dogs barking and vehicles at nearby residences driving along the gravel road. Secondary noise sources included distant traffic noise from I-15. Noise levels measured 47.4 L_{eq} and 63.3 dBA L_{max} during the measurement period at ST-10.
- Short-Term Location 11 (ST-11) monitoring was conducted in the employee transportation parking lot, 126 feet southeast of a school bus yard and 24 feet northwest of the Barstow STEM Academy on 501 Silver Lane. The 15-minute noise measurement began at 10:16 AM on Wednesday, February 5, 2025. The noise environment at this site is characterized by traffic on Mountain View Street and bus noise (beeping, exhaust, acceleration) at the bus yard. During the measurement period, an electric saw was operating at buildings on the Barstow High School property across the street from the measurement location. Noise levels measured 54.5 dBA L_{eq} and 66.5 dBA L_{max} during the measurement period at ST-11.
- Short-Term Location 12 (ST-12) was conducted at Lillian Park on 901 Bigger Street, 123 feet south of the intersection of Lillian Drive and Bigger Street. The 15-minute noise measurement began at 10:42 AM on Wednesday, February 5, 2025. The noise environment at the site was characterized by residential noise including talking from residents at a home 136 feet southwest of the measurement location, in addition to dogs barking and crows cawing at various locations around

the park. Noise levels measured 50.7 dBA L_{eq} and 68.4 dBA L_{max} during the measurement period at ST-12.

- Short-Term Location 13 (ST-13) monitoring was conducted at the Rimrock Convalescent Hospital near the intersection of Rimrock Road and N Street. The measurement location was 63 feet from the Rimrock Road centerline. The 15-minute noise measurement began at 9:07 AM on Wednesday, February 5, 2025. The noise environment of the site is characterized primarily by vehicles passing on Rimrock Road and distant vehicle noise from I-15. During the measurement, a train horn from the BNSF railway, 1.1 miles northwest of the site, sounded for 30 seconds. Noise levels measured 52.5 dBA L_{eq} and 69.5 dBA L_{max} during the measurement period at ST-13.
- Short-Term Location 14 (ST-14) monitoring was conducted at the southwest corner of the intersection of Banyan Street and Hawthorne Road, 113 feet south of Old Highway 58. The measurement was located 119 feet north of the property on 36450 Hawthorne Road. The 15-minute noise measurement began at 9:05 AM, on Thursday, February 6, 2025. The noise environment of this site is characterized primarily by fast-moving vehicles on Old Highway 58, including several heavy-duty vehicles. Vehicles from the residential development south of the measurement location also passed by the meter on Hawthorne Road. Noise levels measured 55.9 dBA L_{eq} and 72.4 dBA L_{max} during the measurement period at ST-14.

Sensitive Receptors

Certain land uses, such as residences, schools, and hospitals, are particularly sensitive to noise and vibration. Land uses considered as sensitive receptors include residences, schools, places of worship, and hospitals. These uses are regarded as sensitive because they are where citizens most frequently engage in activities that are likely to be disturbed by noise, such as reading, studying, sleeping, resting, or engaging in quiet or passive recreation. Commercial and industrial uses are not particularly sensitive to noise or vibration.

Traffic Noise

On-road vehicles represent the most prominent source of noise in the City. Traffic noise levels depend primarily on the speed of the traffic and the volume of trucks. The primary source of noise from automobiles is high-frequency tire noise, which increases with speed. Freeways and highways that traverse Barstow include I-15 through the central portion of the City, I-40 through the eastern portion of the City, and State Route 58 (SR-58) through the western portion of the City. In addition to these highways, major roadways in Barstow include Main Street, Armory Road, Rimrock Road, Lenwood Road, and Barstow Road (SR-247). Existing traffic noise conditions were modeled using the FHWA's traffic noise prediction model (FHWA RD-77-108). Fehr and Peers provided various data (i.e., ADT volumes, vehicle mix (auto, medium-duty truck, heavy-duty truck), speeds, time of day split (day, evening, night), speeds, and number of lanes) for highway and roadway segments throughout the City. **Table 5.12-20: Existing Traffic Noise Conditions**, lists the calculated existing noise levels on roadways at a distance of 50 feet from the nearest travel lane centerline.

Train Noise

The BNSF Railroad runs roughly parallel with Main Street and SR-58 through the City. Existing train noise levels at sensitive receptors within the City range from approximately 50.0 dBA CNEL to 83.7 dBA CNEL. See **Appendix 5.12 BIG-1** for train noise calculations.

Stationary Noise

Stationary sources of noise occur from all types of land uses. Residential uses generate noise from landscaping, maintenance activities, and air conditioning systems. Commercial uses generate noise from HVAC systems; loading docks; and other sources. Industrial uses generate noise from HVAC systems, loading docks, and outdoor machinery. Noise generated by residential or commercial uses is generally short and intermittent. Industrial uses generate noise on a more continual basis. Nightclubs, outdoor dining areas, gas stations, car washes, fire stations, drive-throughs, swimming pool pumps, school playgrounds, athletic and music events, and public parks are other common stationary noise sources.

Construction Noise

Construction activity also contributes to the noise environment; however, such activities are typically temporary, occurring in any one location and only for a relatively limited period of time. Larger or multiphase construction projects, however, may contribute to the noise environment of a particular location for a more extended period of time. Public infrastructure that requires open-ended maintenance may also result in ongoing noise impacts, though usually not at a constant location. For example, different sections of road may be repaved at different times, meaning that noise impacts from associated construction activities would, at any given time, only occur along and near the section of roadway undergoing such maintenance.

Public Facility Noise

Outdoor activities that occur on school campuses and in parks throughout the City generate noticeable levels of noise. Noise generated on both the weekdays (from physical education classes and sports programs) and weekends (from use of the fields and stadiums) can elevate community noise levels somewhat during the timeframe of each particular usage.

Train Vibration

Passing trains create vibration events that last approximately two minutes at a receptor's location, though it is extremely rare for vibration from train operations to cause substantial or even minor cosmetic building damage. Older, historic buildings are often considered fragile and are the predominant source of concern from rail-related vibration (FTA, 2018). According to the FTA, groundborne vibration from "locomotive-powered passenger and freight rail" is readily perceptible at distances of less than 50 feet between the track and building foundations (85 VdB), while vibration from "rapid transit/light rail" is barely perceptible at that distance (75 VdB) (FTA, 2018). While each building would have different characteristics relative to structure-borne vibration, in general, the heavier the building, the lower the levels of vibration. Additionally, community (human) response to vibration correlates with the frequency of events, and more-frequent low-vibration events may evoke the same response as fewer high-vibration events. **Table 5.12-21: Representative Train Vibration Levels** identifies train vibration levels at several distances within 200 feet, as determined by the FTA.

Table 5.12-20: Existing Traffic Noise Conditions

Roadway	Segment			dBA CNEL			
	From	To	Average Daily Traffic Volumes	CNEL (dBA at 50 ft)	60 (dBA CNEL)	65 (dBA CNEL)	70 (dBA CNEL)
Riverside Drive	1st Ave	Yucca Ave	1,600	57.0	32	15	7
Main Street	Western City Boundary	Lenwood Road	4,100	68.2	177	82	38
	Lenwood Road	SR-58	9,900	71.6	296	137	64
	SR-58	L Street	7,800	71.0	272	126	59
	L Street	1st Ave	14,500	74.2	443	206	96
	1st Ave	Barstow Road	13,800	73.0	366	170	79
	Barstow Road	I-15	11,100	71.0	271	126	58
	I-15	I-40	9,000	71.5	292	136	63
Mountain View Street	Ave A	Barstow Road	3,100	64.2	95	44	20
	Barstow Road	Main Street	5,900	66.3	131	61	28
Armory Road	Barstow Road	Muriel Drive	7,900	69.7	221	103	48
	Muriel Drive	Montara Road	7,700	69.2	206	96	44
Rimrock Road	H Street	Barstow Road	7,300	71.6	295	137	64
	Barstow Road	Muriel Drive	7,900	70.4	248	115	53
	Muriel Drive	Montara Road	3,700	66.3	133	62	29
Lenwood Road	Agate Road	Main Street	7,300	72.6	348	161	75
	Main Street	High Desert Road	4,500	69.7	223	104	48
	High Desert Road	I-15	15,300	75.0	501	232	108
	I-15	Mercantile Way	11,700	73.4	391	181	84
L Street	Main Street	I-15	10,000	74.0	428	199	92
	I-15	Southern City Boundary	5,400	70.0	231	107	50
H Street	Main Street	I-15	3,700	67.3	153	71	33
Irwin Road	Old Hwy 58	1st Avenue	5,100	71.9	312	145	67
1 st Avenue	Old Hwy 58	Irwin Road	3,900	69.2	206	96	44
	Irwin Road	Main Street	7,500	70.2	240	111	52

Table 5.12-20: Existing Traffic Noise Conditions

Roadway	Segment			dBA CNEL			
	From	To	Average Daily Traffic Volumes	CNEL (dBA at 50 ft)	60 (dBA CNEL)	65 (dBA CNEL)	70 (dBA CNEL)
Barstow Road	Main Street	Mountain View Street	9,600	69.5	214	99	46
	Mountain View Street	I-15	12,100	70.7	257	119	55
	I-15	Rimrock Road	12,200	72.9	361	167	78
	Rimrock Road	Southern City Boundary	3,600	70.2	239	111	51
Muriel Drive	Main Street	Mountain View Street	2,900	60.3	52	24	11
	Mountain View Street	Armory Road	9,400	67.5	158	73	34
	Armory Road	Rimrock Road	5,600	65.8	121	56	26
Yucca Avenue	Riverside Drive	Main Street	2,700	62.0	68	32	15
Montera Road	I-40	Rimrock Road	12,500	71.6	299	139	64
SR-58	I-15	Lenwood Road	17,000	80.8	1212	562	261
	Lenwood Road	City Boundary - North	15,200	81.0	1258	584	271
I-15	City Boundary - West	SR-58	64,000	84.8	2241	1040	483
	SR-58	SR-247 Junction	72,000	85.6	2547	1182	549
	SR-247 Junction	I-40 Junction	85,000	86.3	2845	1321	613
	I-40 Junction	City Boundary - East	80,000	86.2	2787	1294	600
I-40	Montara Avenue	I-15	27,000	82.8	1655	768	357
	Main Street	Montara Avenue	23,000	81.9	1434	666	309
	Nebo Street	Main Street	20,500	81.5	1348	626	290

Source: Calculated using the FHWA RD-77-108 model based on traffic data provided by Fehr and Peers. See **Appendix 5.12 GP-1: Noise Monitoring and Modeling**.

Table 5.12-21: Representative Train Vibration Levels				
Distance to Source (Feet)	Locomotive-Powered Trains		Rapid Transit/Light Rail	
	VdB	PPV	VdB	PPV
10	95	0.22	82	0.05
25	90	0.13	78	0.03
50	85	0.07	74	0.02
75	82	0.05	70	0.01
100	79	0.04	68	0.01
125	78	0.03	66	0.01
150	78	0.03	64	0.01
175	73	0.02	62	0.01
200	71	0.01	60	0.00
Source: FTA 2018.				

Aircraft Noise

The Barstow-Daggett Airport is approximately 8 miles east of the City. The 65 dBA CNEL noise contour just exceed outside of the Airport's property and limited to east of Hidden Springs Road. The airport noise contours do not extend into the proposed General Plan area. While aircraft that utilize these airports could fly over the City and generate noise levels that may be momentarily audible or noticeable, these aircraft operations are not expected to significantly contribute to Barstow's noise environment.

Barstow International Gateway

The existing noise environment at any particular location is a function of the types of nearby noise sources, the relative distance to the sources, and the intervening topography and structures. Baseline noise and vibration levels in the BIG footprint, as well as in the surrounding areas that border transportation corridors to and from BIG, are attributed to vehicular traffic on local arterials, vehicular traffic on SR-58 and Main Street, railroad activity, industrial operations, and community and wildlife activity.

The City's primary mobile noise sources are vehicular traffic traveling on the roadway network and BNSF railway traffic. Roadway traffic noise is a function of the traffic volume and vehicle speed on the roadways. Main Street, which parallels the existing BNSF main line tracks to the south, is the City's primary source of roadway traffic noise. Other nearby residential streets, local roadways, and State Route 58 also contribute to roadway traffic noise in the area. Existing BNSF trains that traverse Barstow daily are the primary source of railway traffic noise and generate noise levels ranging from approximately 50.0 dBA CNEL to 83.7 dBA CNEL at sensitive receptors along the rail corridor; see **Appendix 5.12 BIG-1**.

The area surrounding BIG is developed with a mix of residential, commercial, institutional, industrial, and recreational uses served by a grid system of arterial and collector streets. The primary stationary noise sources in the area consist of urban-related activities (e.g., mechanical equipment, parking areas, and residential areas). The noise associated with these stationary sources could represent a single-event noise occurrence, short-term, long-term, or continuous noise.

Noise-Sensitive Receptors

Human response to noise varies widely depending on the type of noise, time of day, and the receptor's sensitivity. The effects of noise on humans can range from temporary or permanent hearing loss to mild stress and annoyance due to such things as speech interference and sleep deprivation. Prolonged stress, regardless of the cause, is known to contribute to a variety of health disorders. Noise, or the lack thereof, is a factor in the aesthetic perception of some settings, particularly those with religious or cultural significance. Certain land uses are particularly sensitive to noise, including schools, hospitals, rest homes, long-term medical and mental care facilities, and parks and recreation areas. Residential uses are also considered noise sensitive, especially during nighttime hours. Sensitive land uses nearest to BIG are shown in **Figure 5.12-8: Sensitive Receptor Locations** and **Table 5.12-22: Sensitive Receptors – BIG**.

Table 5.12-22: Sensitive Receptors – BIG			
Receptor ID	Receptor Description	Location	Distance and Direction from BIG ¹
RESIDENTIAL RECEPTORS – WEST LEAD RECEPTOR AREA			
W1	Single-Family Residences	North of Indian Trail	715 feet north
W2	Single-family Residences	North of Link Road	690 feet north
W3	Single-family Residences	South of Main Street	120 feet south
W4	Single-family Residences	North of Main Street	250 feet south
W5	Single-family Residences	South of Main Street	200 feet south
RESIDENTIAL RECEPTORS – BLOCK SWAP/INTERMODAL RECEPTOR AREA			
R1	Single-family Residences	Along Hinkley Road	1,500 feet north
R2	Single-family Residences	South of Main Street	300 feet south
R3	Single-family Residences	South of Main Street	130 feet south
RESIDENTIAL RECEPTORS – EAST LEAD RECEPTOR AREA			
E1	High Desert Estates, Single-family Residences	Northeast corner of Lenwood Road and Jasper Road	570 feet north
E2	Single-family Residences	Along the south side of Jasper Road, approximately 380 feet west of Birch Road	250 feet north
E3	Single-family Residences	South of Main Street	400 feet south
E4	Single-family Residences	1,200 feet southeast of the Main Street and Osborne Street intersection	3,200 feet southeast
E5	Single-family Residences	South of I-15 and L Street Ramps	9,000 feet southeast
E6	Single-family Residences	Southeast of Main Street and Avenue H	13,000 feet east
SCHOOLS			
1	Lenwood Elementary School	34374 Ash Road, Barstow	520 feet southeast
PLACES OF WORSHIP			
2	Landmark Missionary Baptist Church	34836 Cedar Road, Barstow	1,080 northeast
3	St. Philip Neri Catholic Church	25333 3 rd Street, Barstow	1,670 feet southeast

Table 5.12-22: Sensitive Receptors – BIG

Receptor ID	Receptor Description	Location	Distance and Direction from BIG ¹
PARKS			
4	Jasper Park	25473 Jasper Road, Barstow	Adjacent to the northeast
5	Lenwood Park	Ash Road, Barstow	960 feet to the southeast
Note:			
¹ Distances are measured from the closest sensitive receptor to the closest point of BIG.			
Source: Google Inc. 2024. <i>Google Earth Pro</i> .			

Noise Measurements

To determine existing ambient noise levels in the noise and vibration study area, three one-hour noise measurements were taken between 2:00 PM and 4:45 PM on October 25, 2022, and six long-term measurements were taken between 12:45 PM on October 25, 2022, and 6:45 PM on October 26, 2022. Long-term measurement instruments continuously monitored the measurement sites for at least 24 hours to record the L_{dn} . Short-term measurements were one-hour long and the hourly L_{eq} was recorded.

Figure 5.12-9: Noise Measurement Locations (Southern Portion) and **Figure 5.12-10: Noise Measurement Locations (Lenwood)** show the locations of the noise measurements and **Table 5.12-23: Noise Measurement Results** provides the noise measurement results. In accordance with the methodologies for noise determining existing noise exposure from the FTA guidance manual, short-term (1-hour) measurements were taken for assessment of impacts to non-residential receptors, whereas long-term (24-hour) measurements were taken for assessment of impacts to residential receptors.

Table 5.12-23: Noise Measurement Results

Measurement Location	Duration	Time of day	L_{min} (dBA)	L_{max} (dBA)	L_{eq} (dBA)	L_{dn} (dBA) ⁴
Short-Term Measurements¹						
ST-1	60 mins	2:11 PM	32.9	84.4	58.8	-
ST-2	60 mins	3:30 PM	34.8	72.7	54.9	-
ST-3	60 mins	3:35 PM	32.6	59.3	43.8	-
Long-Term Measurements²						
LT-1	24 hours	12:44 PM	26.1	87.3	53.7	61.2
LT-2	24 hours	12:18 PM	16.1	106.0	69.9	77.2
LT-3	24 hours	2:08 PM	34.5	100.3	60.8	66.5
LT-4	24 hours	5:31 PM	29.7	97.7	61.6	66.1
LT-5	24 hours	3:07 PM	21.5	84.4	52.6	58.1
LT-6	24 hours	5:01 PM	29.6	93.8	64.8	69.2

Notes:

¹ Short-term (one-hour) noise measurements were taken to obtain existing ambient noise levels at non-residential uses in BIG's vicinity.

² Long-term 24-hour noise measurements were taken to obtain representative long-term (24-hour) noise levels at residential receptors, consistent with the FTA guidelines.

³ dBA = A-weighted decibels, L_{min} = instantaneous minimum noise level, L_{max} = instantaneous maximum noise level, L_{eq} = energy-equivalent noise level, L_{dn} = day/night noise level

⁴ As explained in **Section 5.12.3**, L_{dn} is the average A weighted sound level over a 24-hour period. It includes a 10 dBA penalty for noise levels between 10:00 PM and 7:00 AM. Since the short-term measurements were taken for only one hour during the daytime, there is no L_{dn} noise level.

Source: Noise measurements taken by Kimley-Horn on October 25-26, 2022.

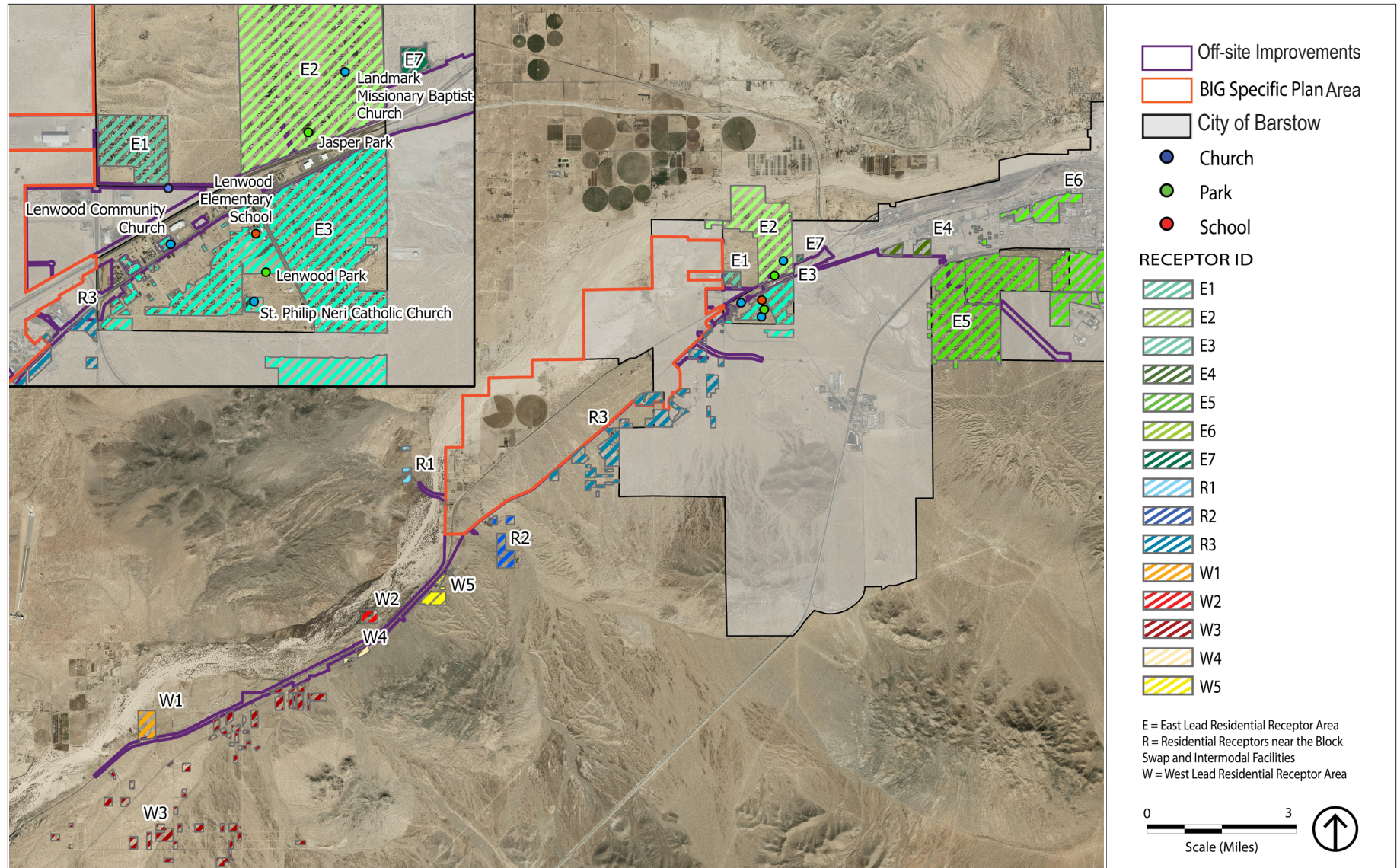
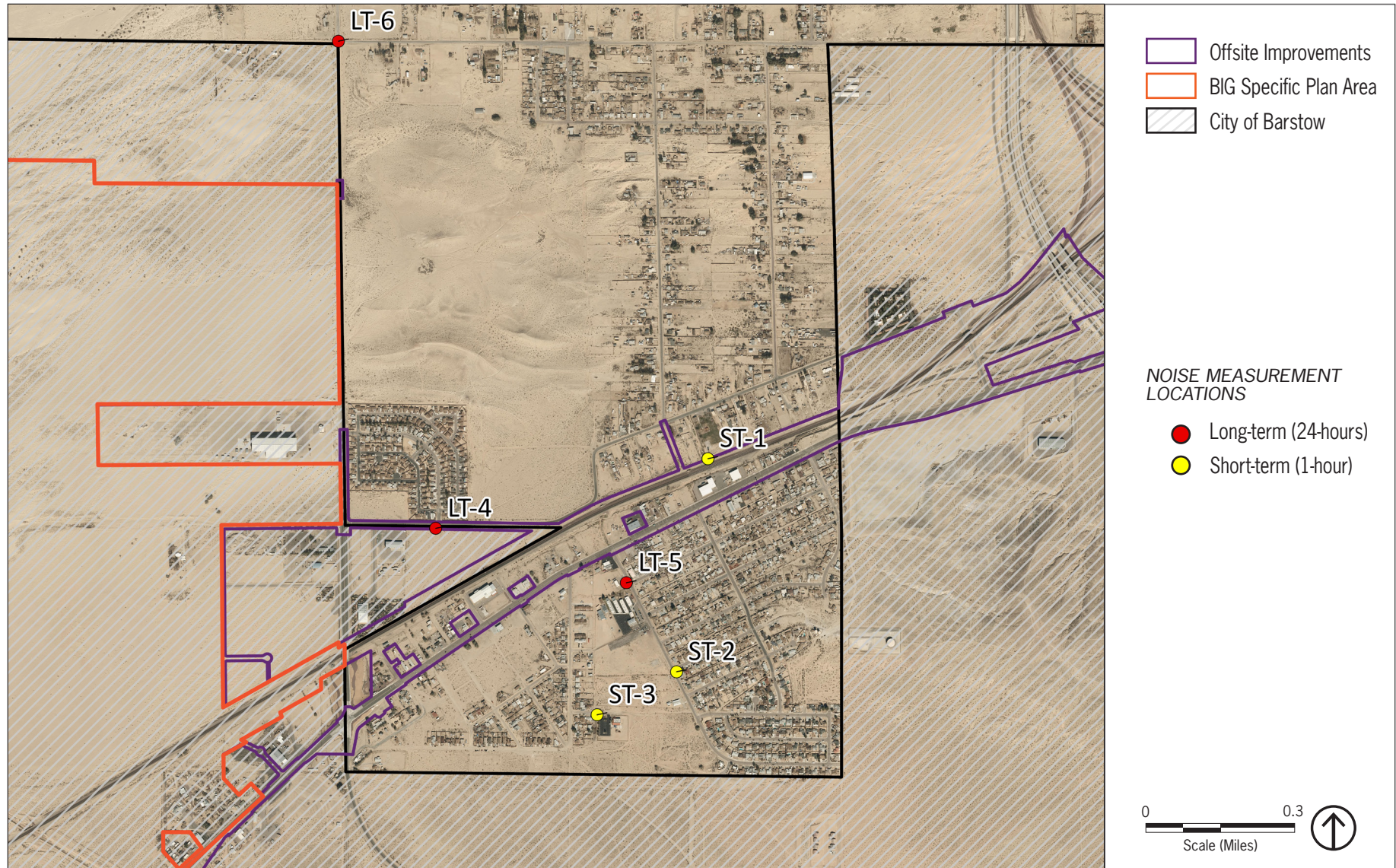


Figure 5.12-8
Sensitive Receptor Locations



Sources:
County of San Bernardino, Y2023_PUA_Cache [aerial imagery], 2023. Kimley-Horn and Associates,
Noise Measurement Locations, 2022.

Figure 5.12-9
Noise Measurement Locations (Southern Portion)



Sources:
County of San Bernardino, Y2023_PUA_Cache [aerial imagery], 2023. Kimley-Horn and Associates,
Noise Measurement Locations, 2022.

Figure 5.12-10
Noise Measurement Locations (Lenwood)

Noise measurements ST-1 through 3, and LT-1 through LT-6 were taken at the following locations in accordance with FTA guidance manual methodologies:

- ST-1 was taken to obtain existing ambient noise levels for recreational receptors at Jasper Park.
- ST-2 was taken to obtain existing ambient noise levels for recreational receptors at Lenwood Park.
- ST-3 was taken to obtain existing ambient noise levels for recreational receptors at St Philip Neri Catholic Church.
- LT-1 was taken to obtain existing ambient noise levels at the nearest residential receptors to the southwestern portion of the Intermodal Facility.
- LT-2 was taken to obtain existing ambient noise levels at the nearest residential receptors to the west lead tracks.
- LT-3 was taken to obtain existing ambient noise levels at the nearest residential receptors to the northeastern portion of the Intermodal Facility.
- LT-4 was taken to obtain existing ambient noise levels at the residential receptors north of the east lead tracks.
- LT-5 was taken to obtain existing ambient noise levels at the residential receptors and Lenwood Elementary School south of the east lead tracks.
- LT-6 was taken to obtain existing ambient noise levels at Ingels School and Grandview Baptist Church north of the east lead tracks.

Existing Roadway Traffic Noise Conditions

Existing noise levels from roadway traffic were calculated for the roadway segments in the vehicular noise study area using the FHWA-RD-77-108 and existing traffic volumes; see **Appendix 5.12 BIG-1** for traffic noise modeling assumptions and results. The noise prediction model calculates the average noise level at specific locations based on traffic volumes, average speeds, roadway geometry, and site environmental conditions. The average vehicle noise rates (also referred to as energy rates) used in the FHWA model have been modified to reflect average vehicle noise rates identified for California by Caltrans. Caltrans data indicates that California automobile noise is 0.8 to 1.0 dBA higher than national levels and that medium and heavy truck noise is 0.3 to 3.0 dBA lower than national levels. ADT noise levels along vehicular noise study area roadway segments are included in **Table 5.12-24: Existing BIG Conditions Roadway Traffic Noise Levels**.

Roadway traffic noise in the vicinity of BIG is primarily generated along Main Street. SR-58 and local roadways are also sources of roadway traffic noise. According to the 2015 General Plan Noise Element, uses along Main Street are within the 60-65 dBA CNEL roadway noise contours. Some uses close to the existing BNSF main tracks and Main Street are exposed to noise levels up to 65-70 dBA CNEL. **Table 5.12-24** shows that the existing ADT noise levels on study area roadways range from 47.5 to 66.2 dBA CNEL at 100 feet from the centerline.

Table 5.12-24: Existing BIG Conditions Roadway Traffic Noise Levels

Roadway	Segment	Existing ADT	dBA CNEL at 100 feet from Roadway Centerline ²	Distance to CNEL Contours (feet)		
				60 dBA CNEL	65 dBA CNEL	70 dBA CNEL
Main Street	Hinkley Road to Country Club Drive	3,610	57.7	70	32	-
	Country Club Drive to Lenwood Road	3,610	57.7	70	32	-
	Lenwood Road to County/City Boundary	9,650	61.6	127	59	-
	County/City Boundary to SR-58 Eastbound Ramps	9,650	62.6	149	69	-
	SR-58 Eastbound Off-Ramps to SR-58 Westbound Ramps	8,320	62.8	154	71	-
	SR-58 Westbound Ramps to L Street	6,990	61.3	123	57	-
	L Street to Avenue A	12,800	61.4	123	57	-
	Avenue A to Barstow Road	12,190	60.6	110	51	-
Barstow Road	Main Street to I-15 Southbound Ramps	11,070	63.4	169	79	-
	I-15 Southbound Ramps to I-15 Northbound Ramps	11,100	63.9	182	84	-
	I-15 Northbound ramps to Rimrock Road	11,140	64.3	194	90	-
Lenwood Road	SR-58 Westbound Ramps to Community Boulevard	1,290	59.7	96	44	-
	Community Boulevard to Agate Road	1,290	58.3	77	36	-
	Agate Road to Jasper Road	3,830	61.2	121	56	-
	Jasper Road to Main Street	6,370	63.0	158	73	34
	Main Street to High Desert Road	3,610	60.0	100	47	-
	High Desert Road to I-15 SB Off-Ramp	10,590	66.2	260	121	56
	I-15 SB Off-Ramp to I-15 NB Off-Ramp	8,980	62.2	139	65	-
Hinkley Road	SR-58 Westbound Ramp to BIG Driveway	360	47.5	-	-	-
	BIG Driveway to Main Street ²	360	47.5	-	-	-
Notes: 1. ADT = average daily traffic; dBA = A-weighted decibels; CNEL = community noise equivalent level; EB = eastbound; SB = southbound; WB = westbound; “-” = this noise level contour does not exist along this roadway segment. 2. Mobile source noise level is given in a 100-foot contour from the respective roadway’s centerline.						
Sources: Based on traffic data derived from the Traffic Impact Analysis (Kimley-Horn, 2025). Refer to Appendix 5.12 BIG-1: Noise and Vibration Technical Report - Appendix A for traffic noise modeling.						

Existing Vibration Environment

Based on the existing land use types, business operations, and empirical observations of typical vibration sources (as outlined in the FTA guidance manual) in BIG footprint, the primary source of existing ground vibration within the vibration study area is freight train vibration along the existing BNSF rail alignment. The vibration study area's vibration-sensitive receptors are the same as the noise-sensitive receptors identified in **Table 5.12-22**, except limited to the buildings/structures located at these sensitive receptor properties.

5.12.5 IMPACT THRESHOLDS AND SIGNIFICANCE CRITERIA

State CEQA Guidelines **Appendix G: Environmental Checklist Form** includes questions concerning noise. The issues presented in the Environmental Checklist Form have been used to formulate thresholds of significance in this section. Accordingly, the Project would have a significant effect concerning noise if it would:

- **Impact 5.12-1:** Result in generation of a substantial temporary or permanent increase in ambient noise levels (i.e., compared to levels without the Project) in vicinity of the Project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.
- **Impact 5.12-2:** Result in generation of excessive groundborne vibration or groundborne noise levels
- **Impact 5.12-3:** Expose people residing or working the Project area to excessive noise levels for a project located within the vicinity of a private airstrip or an airport land use plan, or where such a plan has not been adopted, within two miles of a public airport or public use airport.

Construction Noise and Vibration Thresholds

The City does not have specific limits or thresholds for construction noise. Therefore, the FTA construction noise criteria is used in this analysis to assess the significance of construction noise impacts at sensitive receptors.

Stationary Noise Thresholds

The City applies exterior and interior noise standards for operational stationary noise sources shown in **Table 5.12-6: State of California Interior and Exterior Noise Standards**. For the purposes of this analysis, these standards are used to determine significant stationary noise impacts to stationary noise.

Transportation Noise Thresholds

A project will normally have a significant effect on the environment related to noise if it will substantially increase the ambient noise levels for adjoining areas. Most people can detect changes in sound levels of approximately 3 dBA under normal, quiet conditions, and changes of 1 to 3 dBA are detectable under quiet, controlled conditions. Changes of less than 1 dBA are usually indiscernible. A change of 5 dBA is readily discernible to most people in an exterior environment. Based on this, the following thresholds of significance, similar to those recommended by the FAA, are used to assess traffic noise impacts at sensitive receptor locations. A significant impact would occur if the traffic noise increase would exceed:

- 1.5 dBA in ambient noise environments of 65 dBA CNEL and higher
- 3 dBA in ambient noise environments of 60 to 64 dBA CNEL
- 5 dBA in ambient noise environments of less than 60 dBA CNEL

Vibration Thresholds

As mentioned above, the City does not have specific limits or thresholds for construction vibration. Therefore, the recommended criteria by the FTA for vibration damage are used in this analysis to assess the significance of vibration impacts.

These impact thresholds are discussed further below for BIG.

BIG Noise

BIG Construction Noise

A construction noise impact would occur if construction noise levels exceed any of the following construction noise exterior standards established in the FTA guidelines:

- 80 dBA $L_{eq}(8\text{-hour})$ during the daytime (7:00 AM to 10:00 PM) at any residential use; or
- 70 dBA $L_{eq}(8\text{-hour})$ during the nighttime (10:00 PM to 7:00 AM) at any residential use.

BIG Operations – On-Site BIG Facility Noise

An operational noise impact from BIG facility operations would occur if BIG operational noise levels exceed the following thresholds:

Exterior Noise

- (1) Do Opening Year 2028/Interim Year 2033/Horizon Year 2048 with BIG noise levels exceed any of the following City or County noise standards as applicable?
 - The City's residential exterior noise standard of 65 dBA (for receptors located within the City's jurisdiction only, see **Table 5.12-11**);
 - The County's residential exterior daytime noise standard of 55 dBA (7:00 AM to 10:00 PM) or nighttime noise standard of 45 dBA (10:00 PM to 7:00 AM) for stationary sources (for receptors located within the County's jurisdiction only, see **Table 5.12-8**); or
 - The County's residential exterior noise standard of 60 dBA (for receptors located within the County's jurisdiction only, see **Table 5.12-9**).

If operational noise levels without BIG already exceed the applicable noise standard, noise impacts are assessed based on BIG's contribution to the noise level exceedance using the incremental increase criteria below.

OR

- (2) Do Opening Year 2028/Interim Year 2033/Horizon Year 2048 with BIG noise level increases exceed any of the following FICON incremental noise increase standards when compared to No BIG noise levels?:

- 5.0 dBA or greater when measured ambient noise levels are less than 60 dBA;
- 3.0 dBA or greater when measured ambient noise levels range from 60 to 65 dBA; or
- 1.5 dBA or greater when measured ambient noise levels exceed 65 dBA.

If BIG operational noise exceeds either of these thresholds, a potentially significant noise impact would occur and mitigation is required.

Interior Noise

Similar to the criteria above, interior noise impacts from BIG facility operations are evaluated using the following incremental increase and absolute noise thresholds:

- (1) Do Opening Year 2028/Interim Year 2033/Horizon Year 2048 with BIG noise levels exceed any of the following City or County noise standards as applicable?
 - The City's residential interior noise standard of 45 dBA (for receptors located within the City's jurisdiction only, see **Table 5.12-11**);
 - The County's residential interior noise standard of 45 dBA (for receptors located within the County's jurisdiction only, see **Table 5.12-9**).

OR

- (2) Do Opening Year 2028/Interim Year 2033/Horizon Year 2048 with BIG noise level increases exceed any of the following FICON incremental noise increase standards when compared to No BIG noise levels?:
 - 5.0 dBA or greater when measured ambient noise levels are less than 60 dBA;
 - 3.0 dBA or greater when measured ambient noise levels range from 60 to 65 dBA; or
 - 1.5 dBA or greater when measured ambient noise levels exceed 65 dBA.

If BIG operational noise exceeds either of these impact thresholds, a potentially significant noise impact would occur, and mitigation is required.

Roadway Traffic Noise Sources (Construction and Operational)

Project Level Analysis

Exterior Roadway Traffic Noise. Exterior roadway traffic noise impacts are evaluated using the following incremental increase and absolute thresholds:

- (1) The modeled noise level is compared to the applicable City or County exterior noise standards depending on the roadway segment and receptor location.
 - a. **City of Barstow.** If the roadway traffic noise level results in an exterior noise level exceeding the City's land use noise standards (see **Table 5.12-11**) at any impacted property, the noise impact is considered significant and mitigation is required.

- b. **San Bernardino County.** If the roadway traffic noise level results in an exterior noise level exceeding the County's noise standards for mobile sources (See **Table 5.12-9**) at any impacted property, the noise impact is considered significant and mitigation is required.

If roadway traffic noise levels without BIG already exceed the applicable noise standard, noise impacts are assessed based on BIG's contribution to the noise level exceedance using the incremental increase criteria below.

OR

- (2) Does BIG construction, or Opening Year 2028/Interim Year 2033/Horizon Year 2048 with BIG traffic noise level increases exceed any of the following FICON incremental noise increase standards?

- 5.0 dBA or greater when No BIG traffic noise levels are less than 60 dBA;
- 3.0 dBA or greater when No BIG traffic noise levels range from 60 to 65 dBA; or
- 1.5 dBA or greater when No BIG traffic noise levels exceed 65 dBA.

If BIG roadway traffic noise exceeds either of these impact thresholds, a potentially significant noise impact would occur, and mitigation is required.

Interior Roadway Traffic Noise. Similar to the exterior roadway traffic noise criteria above, interior traffic noise impacts are evaluated against the following incremental and absolute noise thresholds:

- (1) The modeled noise level is compared to the applicable City or County exterior noise standards depending on the roadway segment and receptor location.

- a. **City of Barstow.** If the roadway traffic noise level exceeds the City's interior noise standard of 45 dBA (see **Table 5.12-11**) at any impacted property, the noise impact is considered significant, and mitigation is required.
- b. **San Bernardino County.** If the roadway traffic noise level exceeds the County's interior noise standard of 45 dBA (see **Table 5.12-9**) at any impacted property, the noise impact is considered significant, and mitigation is required.

OR

- (2) Does BIG construction, or Opening Year 2028/Interim Year 2033/Horizon Year 2048 with BIG traffic noise level increases exceed any of the following FICON incremental noise increase standards?

- 5.0 dBA or greater when No BIG traffic noise levels are less than 60 dBA;
- 3.0 dBA or greater when No BIG traffic noise levels range from 60 to 65 dBA; or
- 1.5 dBA or greater when No BIG traffic noise levels exceed 65 dBA.

If BIG roadway traffic noise exceeds either of these impact thresholds, a potentially significant noise impact would occur, and mitigation is required.

Cumulative Roadway Traffic Noise Analysis

Cumulative roadway traffic noise impacts are evaluated using the following incremental increase and absolute noise impact thresholds:

- (1) Do Opening Year 2028/Interim Year 2033/Horizon Year 2048 with BIG roadway traffic noise level increases, when compared to existing roadway traffic noise levels, exceed the following FICON incremental noise increase standards?:
 - 5.0 dBA or greater when no BIG traffic noise levels are less than 60 dBA;
 - 3.0 dBA or greater when no BIG traffic noise levels range from 60 to 65 dBA; or
 - 1.5 dBA or greater when no BIG traffic noise levels exceed 65 dBA.OR
- (2) Do Opening Year 2028/Interim Year 2033/Horizon Year 2048 with BIG noise levels exceed City or County noise standards?
 - a. **City of Barstow.** If the roadway traffic noise level exceeds the City's interior noise standard of 45 dBA (see **Table 5.12-11**) at any impacted property, the noise impact is considered significant, and mitigation is required.
 - b. **San Bernardino County.** If the roadway traffic noise level exceeds the County's interior noise standard of 45 dBA (see **Table 5.12-9**) at any impacted property, the noise impact is considered significant, and mitigation is required.

If BIG roadway traffic noise exceeds either of these impact thresholds, a potentially significant cumulative noise impact would occur, and mitigation is required.

Sleep Disturbance and Speech Intelligibility

Sleep disturbance impacts from BIG were evaluated using the FICAN Sleep Disturbance Curve (see **Figure 5.12-1**) to predict the likelihood of single event awakenings. Frequency of sleep awakening above 10 percent are considered significant and would require mitigation. BIG noise was also analyzed against the U.S. EPA curve for speech intelligibility (see **Figure 5.12-2**); speech intelligibility less than 95 percent is considered an impact.

BIG Vibration

BIG Construction Vibration

The City does not have specific limits or thresholds for construction noise. Therefore, a construction vibration and ground-borne-noise impact would occur if BIG construction vibration levels exceeds any of the following construction vibration standards established by the FTA and Caltrans at any affected property:

Building Damage Criterion (FTA):

- 0.50 in/sec PPV for reinforced-concrete, steel, or timber (no plaster) buildings;
- 0.30 in/sec PPV for engineered concrete and masonry (no plaster) buildings;

- 0.20 in/sec PPV for non-engineered timber and masonry buildings; and
- 0.12 in/sec PPV for buildings extremely susceptible to vibration damage.

Human Annoyance (Caltrans):

- 0.1 in/sec PPV

BIG Operations

An operational vibration and/or ground-borne noise impact would occur if BIG operational vibration or ground-borne noise levels exceed any of the following standards for sensitive receptors established by the FTA as compared to No Project conditions at any affected property:

Vibration Criterion:

- 75 VdB for residential buildings; and
- 78 VdB for institutional (school) uses with primarily daytime use.

Ground-borne Noise:

- 38 dBA for residential buildings; and
- 43 dBA for institutional (school) uses with primarily daytime use.

Human annoyance from operational vibration and/or ground-borne noise would occur at the same thresholds per FTA Guidelines.

Airport Noise

Airport noise impacts are analyzed based on the distance from the BIG footprint to the nearest airport consistent with the CEQA Appendix G Guidelines; see **Impact 5.12-3** above.

5.12.6 PROJECT IMPACTS AND MITIGATION MEASURES

Applicable Proposed General Plan Policies

The proposed General Plan goals and policies relevant to noise and vibration are listed below.

Safety Element

- **Goal S-4. Protect public health and welfare by eliminating existing noise problems and preventing significant degradation of the acoustic environment.**
- **Policy S-4.1 Land use compatibility.** Approve development in a manner that ensures existing and future land use compatibility, requiring measures as necessary and feasible to minimize persistent, periodic, and impulsive noise and vibration impacts of business operations. (See Table N-1, of the proposed General Plan Safety Element below)
- **Policy S-4.2 New residential.** When new residential development is proposed adjacent to land designated for industrial or commercial uses, require the developer to assess the potential noise impacts and fund feasible noise-related mitigation measures.
- **Policy S-4.3 New nonresidential.** When new nonresidential development is proposed adjacent to land designated for residential uses, require the developer to assess the potential noise impacts and fund feasible noise-related mitigation measures.

- **Policy S-4.4 Control sound at the source.** Prioritize noise mitigation measures that control sound and vibration at the source before buffers, soundwalls, and other perimeter measures.
- **Policy S-4.5 Transportation noise.** Minimize potential transportation noise through proper roadway design, coordination of commercial vehicle routing, and other traffic control or abatement measures.
- **Policy S-4.6 Industrial proximity.** Discourage new residential or other uses sensitive to noise and/or vibration within 200 feet of existing or proposed railroad, mining, and industrial processing operations. Require new development of vibration-sensitive uses in areas within 200 feet of railroad operations to evaluate for indoor vibration levels and mitigate any exceedances of the Federal Transit Administration vibration-annoyance criteria.
- **IMP-S-16 Noise and vibration standards.** Update the Barstow Code to incorporate the noise and vibration standards identified in Safety Element Tables N-1, N-2, and N-3, and as directed in Policy S-4.6.

Table N-1: Interior and Exterior Noise Standards

Categories	Uses	CNEL (dBA ¹)	
		Interior ²	Exterior ³
Residential	Low Density (single-family, duplex, mobile homes)	45 ⁴	65
	Medium / High Density (multi-family)	--	65 ⁵
Commercial Industrial	Lodging (hotels / motels)	45	65 ⁶
	Commercial (retail, restaurant)	50	70
	Professional / Office	50	70
	Amphitheater, Concert Hall, Auditorium	40	65
	Manufacturing, Warehousing, Wholesale, Utilities	--	75
	Mixed-Use / Infill Development	45	70
Institutional	Hospitals, Schools, Community Centers, Religious Institutions, Libraries	45	70
Open Space/ Recreation	Playgrounds, Neighborhood Parks	--	70
	Indoor/Outdoor Recreation	--	75
Construction	Construction activities associated with the above uses	Varies ⁷	Varies ⁷

Notes:

1. dBA stands for an A-weighted decibel and is the sound pressure that approximates the response of the human ear to sound. The CNEL is the community noise equivalent level and represents the average equivalent A-weighted sound level during a 24-hour day.

2. Indoor environment excluding: bathrooms, toilets, closets, and corridors.

3. As measured at the property line.

4. Noise level requirements with closed windows. Mechanical ventilation or other means of natural ventilation shall be provided as per Chapter 12, Section 1205 of the Uniform Building Code.

5. Exterior noise level should be such that interior noise level will not exceed 45 dBA CNEL.

6. Except those areas affected by aircraft noise.

7. Temporary construction, maintenance, repair, or demolition activities associated with these uses are exempt from these operational standards between the hours of 7:00 AM and 7:00 PM. Outside of these hours, the interior and exterior noise standards applicable to the associated use shall apply.

Impact 5.12-1 *Would the Project result in generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the Project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?*

Proposed General Plan

Construction Noise

As part of implementing the proposed General Plan, various individual future development and redevelopment projects would generate temporary noise level increases on and adjacent to construction sites in the SOI. Strategy 2.B-1 would exempt construction activities from the operational noise standards noted in **Table 5.12-25: Reference Construction Equipment Noise Levels** between the hours of 7:00 AM and 7:00 PM and enforce the standards outside of these hours. Construction activities are performed in distinct steps, each of which has its own mix of equipment, and, consequently, each step of construction has its own noise characteristics. The table lists typical construction equipment noise levels recommended for noise-impact assessments based on a distance of 50 feet between the equipment and noise receptor.

As identified in **Table 5.12-25**, construction equipment generates high levels of noise, with maximums ranging from 76 to 101 dBA at a distance of 50 feet. Construction of individual development projects associated with implementation of the proposed General Plan would temporarily increase the ambient noise environment and would have the potential to affect noise-sensitive land uses in the vicinity of an individual project.

Construction noise levels are highly variable and dependent upon the specific locations, site plans, construction details, phasing, and presence or absence of any natural or human-made barriers with potential acoustic dampening effects (e.g., the presence of vegetation, berms, walls, or buildings). Significant noise impacts may occur from operation of heavy earth-moving equipment and truck-haul operations that would occur with construction of future individual development projects, particularly if construction techniques, such as impact pile driving or vibratory pile driving, are proposed. The time of day that construction activity is conducted would also determine the significance of each project, particularly during the more sensitive evening/nighttime hours. However, construction would be localized and would occur intermittently for varying periods of time.

Table 5.12-25: Reference Construction Equipment Noise Levels			
Construction Equipment	Typical Max Noise Level at 50 feet (dBA L _{max}) ¹	Construction Equipment	Typical Max Noise Level at 50 feet (dBA L _{max}) ¹
Air Compressor	80	Pile-Driver (Impact)	101
Backhoe	80	Pile-Driver (Sonic)	95
Ballast Equalizer	82	Pneumatic Tool	85
Ballast Tamper	83	Pump	77
Compactor	82	Rail Saw	90
Concrete Mixer	85	Rock Drill	95
Concrete Pump	82	Roller	85
Concrete Vibrator	76	Saw	76
Crane, Derrick	88	Scarifier	83
Crane, Mobile	83	Scraper	85
Dozer	85	Shovel	82
Generator	82	Spike Driver	77
Grader	85	Tie Cutter	84
Impact Wrench	85	Tie Handler	80
Jack Hammer	88	Tie Inserter	85
Loader	80	Truck	84
Paver	85		

Source: FTA. 2018. Transit Noise and Vibration Impact Assessment Manual.

Because specific project-level information is not available at this time, it is not possible nor appropriate to quantify the construction noise impacts at specific sensitive receptors for most of the General Plan area. In most cases, construction of individual development projects associated with implementation of the proposed General Plan would temporarily increase the ambient noise environment in the vicinity of each individual project site, potentially affecting existing and future nearby sensitive uses. Proposed General Plan Policy S-4.2 and Policy S-4.3 would help to mitigate City impacts by requiring an assessment of potential noise impacts and implement feasible mitigation measures when new residential is proposed adjacent to land designated for industrial, commercial, or residential. In addition, Policy S-4.4 would help to mitigate City impacts by requiring future projects to minimize short-term noise impacts on sensitive receptors at the source. However, because construction activities associated with any individual development may occur near noise-sensitive receptors and depending on the project type, equipment list, time of day, phasing, and overall construction durations, noise disturbances may occur for prolonged periods of time or during the more sensitive evening/nighttime hours causing a substantial temporary increase in ambient noise levels, construction noise impacts associated with implementation of the Proposed General Plan are considered potentially significant.

Mitigation Measures: Construction Noise – Proposed General Plan

MM GP NOI-1 Construction Noise Measures. Construction contractors shall implement the following measures for construction activities conducted in the City of Barstow. Construction plans submitted to the City shall identify these measures on demolition, grading, and construction plans. The City of Barstow shall verify that grading, demolition, and/or

construction plans submitted to the City include these notations prior to issuance of demolition, grading, and/or building permits.

- Limit construction activities to the hours of 7:00 AM and 7:00 PM Monday through Sunday, unless an exception is approved by the Community Development Director, and enforce FTA nighttime construction noise standards outside of these hours.
- During active construction, project equipment and trucks shall use the best-available noise control techniques (e.g., improved mufflers, equipment redesign, use of intake silencers, ducts, engine enclosures, and acoustically attenuating shields or shrouds), wherever feasible. Proper mufflers and/or silencers can achieve a 4 to 5 dBA reduction, while engine enclosures can achieve 8 to 10 dBA reduction.
- Impact tools (e.g., jack hammers and hoe rams) shall be hydraulically or electrically powered wherever possible. Where pneumatic tools must be used, an exhaust muffler on the compressed air exhaust shall be used along with external noise jackets on the tools, when within 300 feet of sensitive receptors. Pneumatic tools typically measure at a noise level of 6 to 8 dBA lower than impact tools.
- Stationary equipment, such as generators and air compressors, shall be located as far as feasible from nearby noise-sensitive uses.
- Stockpiling shall be located as far as feasible from nearby noise-sensitive receptors.
- Construction traffic shall be limited, to the extent feasible, to approved haul routes established by the City Community Development Department.
- At least 10 days prior to the start of construction activities, a sign shall be posted at the entrance(s) to the job site, clearly visible to the public, that includes permitted construction days and hours, as well as the telephone numbers of the City's and contractor's authorized representatives that are assigned to respond in the event of a noise or vibration complaint. If the authorized contractor's representative receives a complaint, he/she shall investigate, take appropriate corrective action, and report the action to the City.
- During the entire active construction period and to the extent feasible, the use of noise-producing signals, including horns, whistles, alarms, and bells, shall be for safety warning purposes only.
- If construction is anticipated for prolonged periods adjacent to sensitive receptors, as required by the Community Development Director, erect temporary noise barriers (at least as high as the exhaust of equipment and breaking line-of-sight between noise sources and sensitive receptors), as necessary and feasible, to maintain construction noise levels at or below the performance standard of 80 dBA L_{eq} . Barriers shall be constructed with a solid material that has a density of at least 4 pounds per square foot with no gaps from the ground to the top of the barrier.

Stationary Noise

The proposed General Plan would result in an increase in residential, commercial, and industrial land uses, and overall development and growth in the proposed General Plan area. Primary stationary noise sources would be from landscaping maintenance activities, back-up diesel generators, parking lot activity, maintenance activities, HVAC (residential and non-residential) and loading and unloading activities at commercial and industrial uses. The proposed General Plan is not expected to result in new types of stationary noise sources. Furthermore, the proposed General Plan includes policies that address stationary noise source compliance including Policy S-4.2, which calls for ensuring compliance with standards and procedures for mitigating stationary noise, and Policy S-4.3, which requires future developments of stationary noise sources to comply with standards for regulating noise levels. Policy S-4.4 would help to mitigate City impacts by prioritizing mitigation at the source, such as sound enclosures. Future stationary noise sources associated with any individual development that may occur near noise-sensitive receptors would not cause a substantial permanent increase in ambient noise levels with implementation of the Proposed General Plan. Therefore, impacts would be less than significant.

Mitigation Measures: Construction Noise – Proposed General Plan. No mitigation is required.

On-Road Traffic Noise

Future development and activities under the proposed General Plan are expected to affect the community noise environment mainly by generating additional traffic. Transportation-source noise levels were calculated using the FHWA-RD-77-108 with traffic counts provided by Fehr and Peers (2025).

Table 5.12-26: Proposed General Plan Projected Traffic Noise Levels at Buildout (2050) shows the estimated traffic noise increase along study roadway segments. **Table 5.12-27: Future Traffic Noise Conditions** lists the calculated future noise levels on roadways at a distance of 50 feet from the nearest travel lane centerline. The traffic noise increase is the difference between the projected future traffic noise level without the Project and the projected future traffic noise level with the Project. Significant traffic noise increases (i.e., increases greater than 1.5, dBA in noise environments of 65 dBA CNEL and higher and 3 dBA in noise environments of 60 to 64 dBA CNEL) are estimated along several of the study roadway segments, including Rimrock Road, Lenwood Road, and Muriel Drive with implementation of the proposed General Plan (**Table 5.12-26**). Traffic noise impacts associated with buildout of the proposed General Plan are potentially significant.

Table 5.12-26: Proposed General Plan Projected Traffic Noise Levels at Buildout (2050)

Roadway	Segment		ADT Volumes		dBA CNEL at 100 feet		
	Cumulative Change	Cumulative Change	Cumulative Change	Cumulative Change	Cumulative Change	Cumulative Change	Cumulative Change
Riverside Drive	-2	-2	-2	-2	-2	-2	-2
Main Street	1	1	1	1	1	1	1
	0	0	0	0	0	0	0
	1	1	1	1	1	1	1
	0	0	0	0	0	0	0
	1	1	1	1	1	1	1
	0	0	0	0	0	0	0
	0	0	0	0	0	0	0
Mountain View Street	2	2	2	2	2	2	2
	0	0	0	0	0	0	0
Armory Road	0	0	0	0	0	0	0
	1	1	1	1	1	1	1
Rimrock Road	2	2	2	2	2	2	2
	2	2	2	2	2	2	2
	1	1	1	1	1	1	1
Lenwood Road	6	6	6	6	6	6	6
	2	2	2	2	2	2	2
	2	2	2	2	2	2	2
	3	3	3	3	3	3	3
L Street	1	1	1	1	1	1	1
	0	0	0	0	0	0	0
H Street	0	0	0	0	0	0	0
Irwin Road	0	0	0	0	0	0	0
1 st Avenue	-5	-5	-5	-5	-5	-5	-5
	-2	-2	-2	-2	-2	-2	-2

Table 5.12-26: Proposed General Plan Projected Traffic Noise Levels at Buildout (2050)

Roadway	Segment		ADT Volumes		dBA CNEL at 100 feet		
	Cumulative Change	Cumulative Change	Cumulative Change	Cumulative Change	Cumulative Change	Cumulative Change	Cumulative Change
Barstow Road	2	2	2	2	2	2	2
	1	1	1	1	1	1	1
	1	1	1	1	1	1	1
	-1	-1	-1	-1	-1	-1	-1
Muriel Drive	1	1	1	1	1	1	1
	1	1	1	1	1	1	1
	3	3	3	3	3	3	3
Yucca Avenue	-2	-2	-2	-2	-2	-2	-2
Montera Road	-1	-1	-1	-1	-1	-1	-1

Source: Calculated using the FHWA RD-77-108 model based on traffic data provided by Fehr and Peers. See **Appendix 5.12 GP-1: Noise Monitoring and Modeling**.
Bold = Significant noise increase.

Table 5.12-27: Future Traffic Noise Conditions

Roadway	Segment		CNEL dBA at 50 Feet	Distance to 70 dBA CNEL in Feet	Distance to 65 dBA CNEL in Feet	Distance to 60 dBA CNEL in Feet
	From	To				
Riverside Drive	1st Avenue	Yucca Avenue	58	8	17	36
Main Street	Western City Boundary	Lenwood Road	78	175	376	810
	Lenwood Road	SR-58	76	121	261	562
	SR-58	L Street	75	111	240	517
	L Street	1st Avenue	76	134	289	622
	1st Avenue	Barstow Road	74	86	186	400
	Barstow Road	I-15	73	76	163	352
	I-15	I-40	72	69	150	322
Mountain Valley Street	Avenue A	Barstow Road	66	27	59	127

Table 5.12-27: Future Traffic Noise Conditions

Roadway	Segment		CNEL dBA at 50 Feet	Distance to 70 dBA CNEL in Feet	Distance to 65 dBA CNEL in Feet	Distance to 60 dBA CNEL in Feet
	From	To				
	Barstow Road	Main Street	70	48	103	221
Armory Road	Barstow Road	Muriel Drive	72	69	148	318
	Muriel Drive	Montara Road	71	61	131	283
Rimrock Road	H Street	Barstow Road	77	142	306	660
	Barstow Road	Muriel Drive	76	120	258	555
	Muriel Drive	Montara Road	68	39	84	182
Lenwood Road	Agate Road	Main Street	83	380	818	1763
	Main Street	High Desert Road	81	282	608	1309
	High Desert Road	I-15	83	352	759	1635
	I-15	Mercantile Way	76	118	254	547
L Street	Main Street	I-15	78	178	383	826
	I-15	Southern City Boundary	75	107	229	494
H Street	Main Street	I-15	68	39	85	183
Irwin Road	Old Hwy 58	1st Avenue	74	93	201	433
1 st Avenue	Old Hwy 58	Irwin Road	70	52	112	241
	Irwin Road	Main Street	72	72	156	336
Barstow Road	Main Street	Mountain View Street	73	82	177	381
	Mountain View Street	I-15	75	101	218	469
	I-15	Rimrock Road	79	193	415	895
	Rimrock Road	Southern City Boundary	74	95	205	442
Muriel Drive	Main Street	Mountain View Street	65	25	53	114
	Mountain View Street	Armory Road	69	46	100	215
	Armory Road	Rimrock Road	70	47	101	217
Yucca Avenue	Riverside Drive	Main Street	64	20	44	94
Montera Road	I-40	Rimrock Road	73	83	179	385
SR-58	I-15	Lenwood Road	80	261	562	1212

Table 5.12-27: Future Traffic Noise Conditions

Roadway	Segment		CNEL dBA at 50 Feet	Distance to 70 dBA CNEL in Feet	Distance to 65 dBA CNEL in Feet	Distance to 60 dBA CNEL in Feet
	From	To				
	Lenwood Road	City Boundary - North	81	271	584	1258
I-15	City Boundary - West	SR-58	84	483	1040	2241
	SR-58	SR-247 Junction	85	549	1182	2547
	SR-247 Junction	I-40 Junction	86	613	1321	2845
	I-40 Junction	City Boundary - East	86	600	1294	2787
I-40	Montara Avenue	I-15	82	357	768	1655
	Main Stree	Montara Avenue	81	309	666	1434
	Nebo Street	Main Street	81	290	626	1348

Source: **Appendix 5.12 GP-1: Noise Monitoring and Modeling.**

Note: Calculated using the FHWA RD-77-108 model based on traffic data provided by Fehr and Peers.

Impact 5.12-1 GP: Level of Significance Before Mitigation: Potentially Significant Impact.

Mitigation Measures: On-Road Traffic Noise – Proposed General Plan

MM GP NOI-2 **Traffic Noise Measures.** No feasible mitigation measures have been identified that would substantially reduce impacts associated with a substantial increase in traffic noise levels for all roadways showing significant impacts. However, the following measures shall be considered for mitigating or avoiding traffic noise impacts.

Special Roadway Paving. Notable reductions in tire noise have been achieved via the implementation of special paving materials. For example, the California Department of Transportation (Caltrans) conducted a study of pavement noise along Interstate 80 in Davis and found an average improvement of 6 dBA to 7 dBA compared to conventional asphalt overlay (Caltrans, 2011).

Sound Barrier Walls. Review of aerial depictions of the impacted segments show most residences along the study segments have direct access (via driveways) to the associated roadways. Therefore, barrier walls would prevent access to/from individual properties and would be infeasible because to be effective the barrier needs to break the line of sight of the receptor (home) from the noise source (road) which would mean blocking the driveway. Further, these impacted homes are on private property outside of the control of future project developers, so there may be limited admittance onto these properties to construct such walls. Lastly, the costs versus benefits ratio in relation to the number of benefited households may not be feasible and reasonable in all cases.

Sound Insulation of Existing Residences and Sensitive Receptors. Exterior-to-interior noise reductions depend on the materials used, the design of the homes, and their conditions. To determine what upgrades would be needed, a noise study would be required for each house to measure exterior-to-interior noise reduction. Sound insulation may require upgraded windows, upgraded doors, and a means of mechanical ventilation to allow for a “windows closed” condition. There are no funding mechanisms and procedures that would guarantee that the implementation of sound insulation features at each affected home would offset the increase in traffic noise to interior areas and ensure that the State’s 45 dBA CNEL standard for multifamily residences would be achieved.

Impact 5.12-1 GP: Level of Significance After Mitigation: Significant and Unavoidable Impact.

Implementation of **MM GP NOI-2** could reduce future traffic noise levels; however, they may not be feasible or practical mitigation measures available to reduce project-generated traffic noise to less-than-significant levels for existing residences along the affected roadways. No individual measure and no set of feasible or practical mitigation measures are available to reduce project-generated traffic noise to less-than-significant levels in all cases. Thus, traffic noise would remain a significant and unavoidable impact in the proposed General Plan area. It should be noted that the identification of this program-level impact

does not preclude the finding of less-than-significant impacts for subsequent projects analyzed at the project level.

Barstow International Gateway

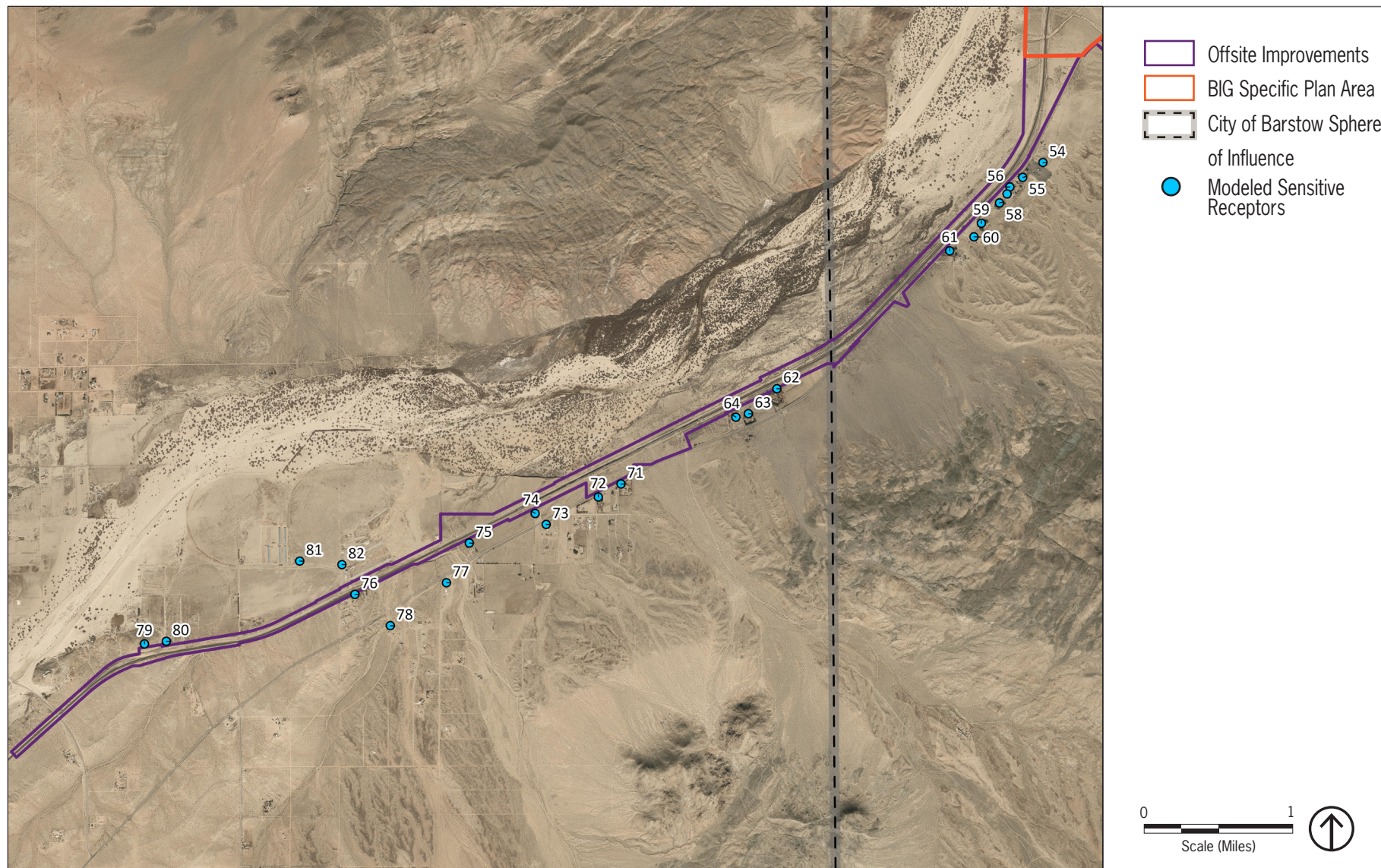
Construction Noise

The noise levels calculated in **Table 5.12-28: Maximum BIG Construction Noise Levels at Nearest Sensitive Receptors**, show BIG's highest estimated construction noise levels (by construction area) at the nearest sensitive receptors (residential uses). Modeled receptor locations for construction and operations are shown in **Figure 5.12-11: Modeled Sensitive Receptor Locations (West Lead Track)**, **Figure 5.12-12: Modeled Sensitive Receptor Locations (BIG Specific Plan Area)**, and **Figure 5.12-13: Model Sensitive Receptor Locations (Lenwood)**. Construction equipment reference noise levels were obtained from the FTA guidelines (see **Table 5.12-13**) and were input into SoundPLAN for each construction area. Construction equipment was modeled as an area source in SoundPLAN in acknowledgment that construction activities would occur throughout BIG footprint and would not be concentrated at the point closest to sensitive receptors or other off-site properties. The noise levels presented in **Table 5.12-28** represent the worst-case condition with the maximum amount of equipment in each construction area operating simultaneously.

Table 5.12-28: Maximum BIG Construction Noise Levels at Nearest Sensitive Receptors

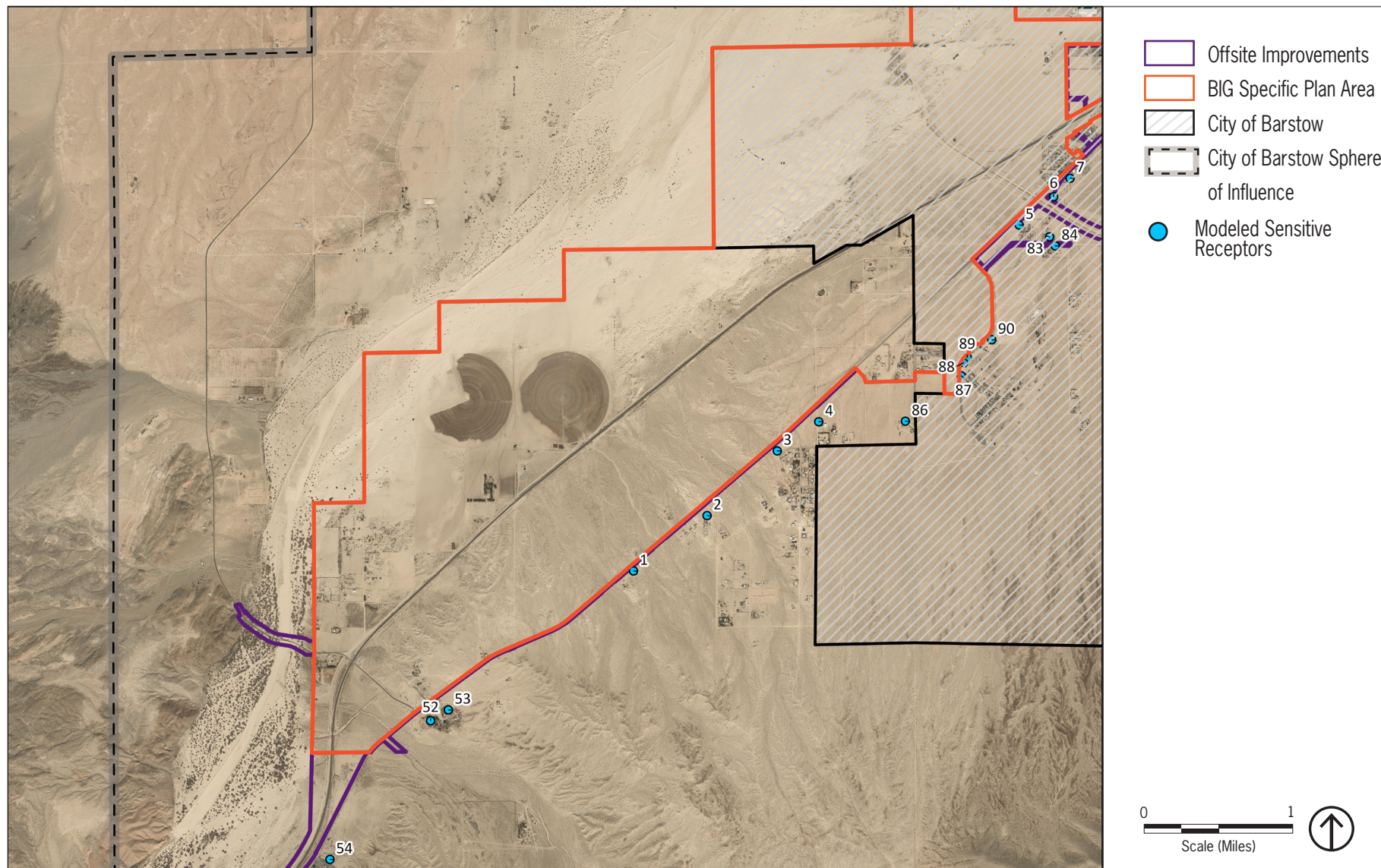
Construction Area/Activity	Impacted Receptor (Receptor ID) ¹	Receiving Land Use	Maximum Noise Level (dBA L _{eq(8-hr)}) ²	FTA Daytime Construction Noise Threshold, (dBA L _{eq(8-hr)})	Threshold Exceeded?	FTA Nighttime Construction Noise Threshold, (dBA L _{eq(8-hr)})	Threshold Exceeded?
Block Swap Yard	5	Residential	61.9	80	No	70	No
Intermodal Facility	1	Residential	63.6	80	No	70	No
Transload Warehouse Center	7	Residential	58.4	80	No	70	No
East Lead Tracks	15	Residential	73.3	80	No	70	Yes
West Lead Tracks	62	Residential	65.6	80	No	70	No
Solar Farm	87	Residential	75.7	80	No	70	Yes
Lenwood Channel Improvements	6	Residential	73.4	80	No	70	Yes
Concrete Batch Plant	53	Residential	30.5	80	No	70	No
Pile Driving	5	Residential	73.7	80	No	70	Yes
33 kV Line	13	Residential	84.2	80	Yes	70	Yes
Bridge Demolition	5	Residential	52.6	80	No	70	No
Sweeten Lane Paving	83	Residential	67.5	80	No	70	No
Combined (all sources)	6	Residential	84.4	80	Yes	70	Yes
Notes:							
¹ Modeled receptor locations are shown in Figure 5.12-11 , Figure 5.12-12 , and Figure 5.12-13 .							

Table 5.12-28: Maximum BIG Construction Noise Levels at Nearest Sensitive Receptors							
Construction Area/Activity	Impacted Receptor (Receptor ID) ¹	Receiving Land Use	Maximum Noise Level (dBA L _{eq(8-hr)}) ²	FTA Daytime Construction Noise Threshold, (dBA L _{eq(8-hr)})	Threshold Exceeded?	FTA Nighttime Construction Noise Threshold, (dBA L _{eq(8-hr)})	Threshold Exceeded?
² Noise levels calculated using the SoundPLAN Essential software. Modeling results are provided in Appendix 5.12 BIG-1- Appendix A .							
Source: Kimley-Horn, 2024; SoundPLAN Essential version 5.1. Refer to Appendix 5.12 BIG-1: Noise and Vibration Technical Report - Appendix A for noise modeling results and receptor locations.							



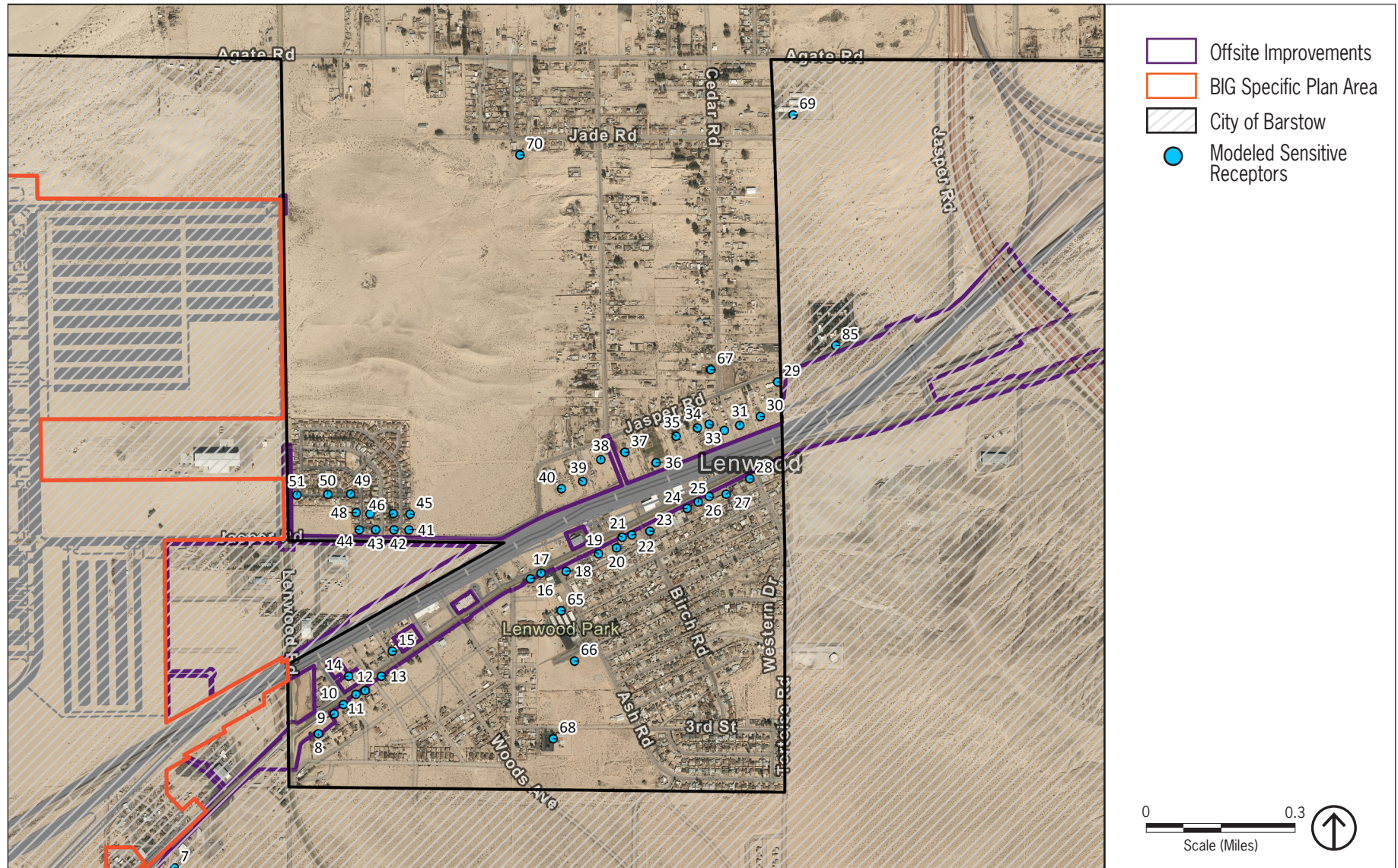
Sources:
County of San Bernardino, Y2023_PUA_Cache [aerial imagery], 2023; Kimley-Horn and Associates, Modeled Noise Receptors, 2024.

Figure 5.12-11
Modeled Sensitive Receptor Locations (West Lead Track)



Sources:
County of San Bernardino, Y2023_PUA_Cache [aerial imagery], 2023; Kimley-Horn and Associates, Modeled Noise Receptors, 2024.

Figure 5.12-12
Modeled Sensitive Receptor Locations (BIG Specific Plan Area)



Sources:
County of San Bernardino, Y2023_PUA_Cache [aerial imagery], 2023; Kimley-Horn and Associates, Modeled Noise Receptors, 2024.

Figure 5.12-13
Modeled Sensitive Receptor Locations (Lenwood)

Daytime Construction

BIG construction noise levels would reach a maximum of 84.2 dBA $L_{eq(8-hour)}$ during 33 kV Line construction and would exceed the FTA's 80 dBA $L_{eq(8-hour)}$ daytime construction noise standard for residential uses in only one construction area: the 33 kV line (see **Table 5.12-28**). Noise levels from all other construction areas/activities would not exceed the FTA's daytime standard. In addition, the combined noise level from simultaneous construction activities at all construction areas would reach a maximum of 84.4 dBA $L_{eq(8-hour)}$ and would exceed the FTA 80 dBA $L_{eq(8-hour)}$ daytime noise standard. However, as indicated the table and previously described, 33 kV line construction itself would exceed the FTA's daytime threshold and is the primary contributor to the combined construction noise level. Construction of the 33 kV line would occur over approximately four weeks and would move in a linear fashion along the 7.5-mile route from the SCE Tortilla Substation to the intermodal facility's western end. Due to the nature of 33 kV line construction activities, the only feasible mitigation to reduce construction noise levels would be to construct a temporary noise barrier to block the line of sight from the construction area to the nearest residences. However, to attenuate noise levels below 80 dBA at the impacted residences, the temporary noise barrier would have to constantly be moved, re-oriented, and properly positioned as construction activities move along the 7.5-mile 33 kV line route. In addition, a temporary noise barrier placed between the 33 kV line construction area, and the impacted residences could create vehicle/ pedestrian access issues at residential properties. As such, temporary noise barriers for construction of the 33 kV line would be considered infeasible mitigation, and a significant and unavoidable construction noise impact would occur.

Nighttime Construction

BIG would require approximately four weeks of nighttime construction for east and west lead track work adjacent to the mainline tracks where the lead tracks would tie into the mainline tracks. Additionally, nighttime construction may be required throughout the BIG footprint during certain phases or periods to accommodate key activities required to maintain progress on construction and rail operations (e.g., concrete foundation pouring for the transload warehouse center, etc.).

As shown in **Table 5.12-28**, nighttime construction noise levels associated with the east lead tracks, solar farm, Lenwood Channel improvements, and 33 kV line would exceed the FTA's 70 dBA $L_{eq(8-hour)}$ nighttime construction noise standard for residential uses. Noise levels from the other construction areas/activities would not exceed the FTA's nighttime standard. As previously noted, the combined noise level from simultaneous construction activities at all construction areas would reach a maximum of 84.4 dBA $L_{eq(8-hour)}$ and would exceed the FTA 70 dBA $L_{eq(8-hour)}$ nighttime noise standard. BIG would incorporate **MM BIG NOI-1**, which requires preparation of a Construction Noise Logistics Plan to reduce nighttime construction noise levels. While incorporation of **MM BIG NOI-1** would reduce nighttime construction noise levels to the extent feasible, the precise details regarding the proposed schedule, duration/hours, equipment type/quantity, and specific location of construction for nighttime construction activities are unknown at this time. Therefore, despite incorporation of noise reduction measures (to be included in the Construction Noise Logistics Plan), nighttime construction noise levels could still exceed the FTA's 70 dBA $L_{eq(8-hour)}$ for residential uses. Therefore, BIG nighttime construction noise could result in a significant and unavoidable impact despite incorporation of **MM BIG NOI-1**.

Pile-driving (Daytime and Nighttime)

Pile-driving would be required wherever there are railroad bridges, including at Bridge 6.5, located about 4,000 feet northeast of the Lenwood Road and Main Street intersection, and Bridge 10.9B, located approximately 920 feet west of the Main Street and Buckboard Road intersection. Based on the site plan and potential pile-driving locations at BIG footprint, the nearest sensitive receptor(s) would be located as close as 0.28 mile (1,500 feet) from pile-driving equipment.

An impact pile-driver generates a noise level of approximately 101 dBA at a distance of 50 feet (**Table 5.12-13**). Conservatively assuming six impact pile drivers would be used simultaneously during construction of Bridges 6.5 and Bridge 10.9B (i.e., one pile driver at Bridge 6.5B, one pile driver at Bridge 6.5C, two pile drivers at Bridge 6.5F, and two pile drivers at Bridge 10.9B), the highest expected noise level at the nearest sensitive receptor would be approximately 73.7 dBA,¹ which is below the FTA 80 dBA L_{eq} (8-hour) daytime standard for residential uses. However, as also shown in Table 13, pile driving activities during the nighttime would likely exceed the FTA's 70 dBA L_{eq} (8-hour) nighttime noise standard for residential. As discussed above, BIG would incorporate **MM NOI-1**, which requires preparation of a Construction Noise Logistics Plan to reduce nighttime construction noise levels. While incorporation of **MM NOI-1** would reduce nighttime pile-driving noise levels to the extent feasible, the precise details for nighttime construction activities are unknown at this time. Therefore, despite incorporation of **MM NOI-1**, nighttime pile-driving noise levels could still exceed the FTA's 70 dBA L_{eq} (8-hour) for residential uses. As such, nighttime noise from pile driving would result in a significant and unavoidable impact.

Construction Roadway Traffic Noise

Construction crews traveling to and from the BIG footprint and vendors transporting construction equipment and materials to construction sites would incrementally increase noise levels along travel routes. In addition, BIG construction activities would require temporary lane or roadway closures. Rerouted traffic could affect existing noise levels and nearby land uses.

According to **Appendix 5.15 BIG-1**, BIG is expected to generate a maximum of 3,265 daily trips (worker trips + heavy truck trips) during month 13 of construction. A doubling of traffic (or a 100 percent increase) is required to result in a barely perceptible 3 dBA noise increase. The primary local access roads that would carry BIG construction traffic are Main Street and Lenwood Road, which currently experience approximately 3,868 and 6,499 daily trips, respectively, along roadway segments with access to the BIG construction site. Based on a worst-case total traffic volume of 4,105 daily BIG construction trips split evenly along both Main Street and Lenwood Road (i.e., 50 percent of construction trips would occur along Main Street, and 50 percent would occur along Lenwood Road), BIG's construction-related trips would result in a maximum increase of 53 percent and 32 percent increase in traffic along Main Street and Lenwood Road, respectively. Therefore, BIG's construction trips would not double existing traffic volumes and would result in a less than perceptible 3 dBA roadway traffic noise increase, and a less than significant impact would occur.

¹ Pile driving noise modeled in SoundPLAN Essential 5.1 as six (6) point sources at Bridge 6.5 and Bridge 10.98 (i.e., one pile driver at Bridge 6.5B, one pile driver at Bridge 6.5C, two pile drivers at Bridge 6.5F, and two pile drivers at Bridge 10.9B). See **Appendix 5.12 BIG-1 - Appendix A** for SoundPLAN modeling results.

Construction Year 2026 Condition – South Mainlines

During 2026 BIG construction, the south mainlines would be used to divert train traffic from the existing north mainlines while they are being upgraded. This condition (Year 2026) was modeled in SoundPLAN to evaluate potential impacts as a result of diverting 100 percent of trains along the new south mainlines. Once BIG construction is finished, half of the trains which would bypass BIG would use the north mainlines and half would use the south mainlines to balance train counts between the mainlines. The unmitigated Year 2026 No BIG and Year 2026 With BIG noise levels and impact screening analysis can be found in **Appendix 5.12 BIG-1- Appendix A**.

As shown in **Appendix 5.12 BIG-1 -Appendix A**, the receptors surrounding BIG would generally experience a reduction in train noise levels under the Year 2026 With BIG condition compared to the Year 2026 No BIG condition, thus, would not result in any noise impacts. The modeled receptors would experience a maximum noise reduction in train noise levels up to approximately 9.1 dBA and maximum increase of 1.3 dBA. Based on the SoundPLAN modeling results, the improved noise condition from the Year 2026 With BIG scenario is a result of several factors, including a grade separation/change of up to approximately 30 feet in the southernmost extent of the BIG footprint along Main Street that breaks the line of sight between the rail yard and mainlines, and the removal of the Hinkley Road at-grade crossing (train horns would not be used at this location anymore). Therefore, no train noise impacts would occur from the Year 2026 With BIG condition.

Operations

Operations – On-Site BIG Facility Noise

Operational Exterior Noise Levels – Opening Year 2028

BIG operations would result in new noise sources that could affect nearby sensitive receptors. Specifically, BIG would generate an increase in rail corridor activity along the existing mainline and at the block swap yard and intermodal facility, construct a new south mainline track closer to residential uses, increase train switching and coupling activities at the block swap yard, include new sources such as intermodal facility operations, truck loading/unloading activity at the transload warehouse center, mechanical equipment, solar generation facility operations, increased truck/traffic volumes along local roadways, and emergency generator equipment. BIG's noise sources are discussed in more detail below.

The Opening Year 2028 operational noise levels are evaluated against the applicable City and County noise standards in **Table 5.12-29: Opening Year 2028 BIG Operational Noise Levels – City/County Noise Standards Impact Analysis** and the incremental noise analysis is provided in **Table 5.12-30: Opening Year 2028 BIG Operational Noise Levels – Noise Increase Impact Analysis**. Only receptors that would, under “with BIG” conditions, exceed either the absolute noise standard or the incremental noise increase thresholds described in **Section 5.12.5 (Impact Thresholds and Significance Criteria)** are provided. See **Appendix 5.12 BIG-1 - Appendix A** for SoundPLAN results and impact screening analyses for all receptors.

Table 5.12-29: Opening Year 2028 BIG Operational Noise Levels – City/County Noise Standards Impact Analysis											
Receptor No. ¹	Land Use	Jurisdiction	Daytime			Nighttime			24-hour		
			Modeled Noise Level (dBA)	Noise Standard (dBA) ²	Exceeds Standard?	Modeled Noise Level (dBA)	Noise Standard (dBA) ²	Exceeds Standard?	Modeled Noise Level	Noise Standard (dBA Ldn) ³	Exceeds Standard?
NO BIG											
1	Residential	County	59.5	55	Yes	58.1	45	Yes	64.7	60	Yes
2	Residential	County	58.4	55	Yes	57.0	45	Yes	63.7	60	Yes
4	Residential	City	57.0	65	No	55.6	65	No	62.3	65	No
5	Residential	City	58.7	65	No	57.4	65	No	64.0	65	No
6	Residential	City	53.1	65	No	51.7	65	No	58.3	65	No
83	Residential	City	47.3	65	No	45.9	65	No	52.6	65	No
84	Residential	City	46.2	65	No	44.9	65	No	51.5	65	No
88	Residential	City	45.5	65	No	44.2	65	No	50.8	65	No
89	Residential	City	45.6	65	No	44.2	65	No	50.9	65	No
90	Residential	City	45.1	65	No	43.8	65	No	50.4	65	No
WITH BIG											
1	Residential	County	61.5	55	Yes	60.9	45	Yes	67.4	60	Yes
2	Residential	County	59.2	55	Yes	58.9	45	Yes	65.3	60	Yes
4	Residential	City	59.2	65	No	58.7	65	No	65.2	65	Yes
5	Residential	City	63.9	65	No	63.8	65	No	70.2	65	Yes
6	Residential	City	59.7	65	No	59.5	65	No	66.0	65	Yes
83	Residential	City	59.8	65	No	59.7	65	No	66.1	65	Yes
84	Residential	City	59.8	65	No	59.8	65	No	66.2	65	Yes
88	Residential	City	59.3	65	No	59.1	65	No	65.5	65	Yes
89	Residential	City	59.8	65	No	59.7	65	No	66.1	65	Yes
90	Residential	City	61.6	65	No	61.5	65	No	67.9	65	Yes
Notes: 1. See Figure 5.12-11 through Figure 5.12-13 for receptor locations. 2. City and County noise standards obtained from Table 5.12-8 , and Table 5.12-11 . 3. City and County 24-hour average (dBA Ldn) noise standard obtained from Table 5.12-9 .											
Source: SoundPLAN Essential version 5.1. Please see Appendix 5.12 BIG -1: Noise and Vibration Technical Report - Appendix A for complete modeling results for all receptors.											

Table 5.12-30: Opening Year 2028 BIG Operational Noise Levels – Noise Increase Impact Analysis

Receptor No. ¹	Land Use	Jurisdiction	Daytime			Nighttime			24-Hour		
			Incremental Increase (dBA) (With BIG Condition Minus No BIG Condition)	Incremental Standard (dBA) ²	Exceeds Standard?	Incremental Increase (dBA) (With BIG Condition Minus No BIG Condition)	Incremental Standard (dBA) ²	Exceeds Standard?	Incremental Increase (dBA Ldn) (With BIG Condition Minus No BIG Condition)	Incremental Standard (dBA Ldn) ²	Exceeds Standard?
1	Residential	County	2.0	1.5	Yes	2.8	1.5	Yes	2.7	1.5	Yes
2	Residential	County	0.8	1.5	No	1.9	1.5	Yes	1.6	1.5	Yes
4	Residential	City	2.2	1.5	Yes	3.1	1.5	Yes	2.9	1.5	Yes
5	Residential	City	5.2	1.5	Yes	6.4	1.5	Yes	6.2	1.5	Yes
6	Residential	City	6.6	5.0	Yes	7.8	5.0	Yes	7.7	5.0	Yes
83	Residential	City	12.5	1.5	Yes	13.8	1.5	Yes	13.6	1.5	Yes
84	Residential	City	13.6	1.5	Yes	14.9	1.5	Yes	14.7	1.5	Yes
86	Residential	City	8.7	1.5	Yes	9.8	1.5	Yes	9.7	1.5	Yes
87	Residential	City	13.2	1.5	Yes	14.4	1.5	Yes	14.1	1.5	Yes
88	Residential	City	13.8	1.5	Yes	14.9	1.5	Yes	14.7	1.5	Yes
89	Residential	City	14.2	1.5	Yes	15.5	1.5	Yes	15.2	1.5	Yes
90	Residential	City	16.5	1.5	Yes	17.7	1.5	Yes	17.5	1.5	Yes

Notes:

1. See **Figure 5.12-11** through **Figure 5.12-13** for receptor locations.
2. Incremental standards are based on FICON methodology using measured ambient levels as described in **Section 5.12.3 (Methodology for Evaluating Impacts)** and **Section 5.12.5 (Impact Thresholds and Significance Criteria)**.

Source: SoundPLAN Essential version 5.1. Please see **Appendix 5.12 BIG-1: Noise and Vibration Technical Report - Appendix A** for complete modeling results and impact screening analysis for all receptors.

As shown in **Table 5.12-29** and **Table 5.12-30**, BIG operational noise levels at 12 modeled receptors would either exceed a City or County noise standard or result in a substantial noise increase when compared to No BIG conditions. All 12 impacted receptors are located south of BIG:

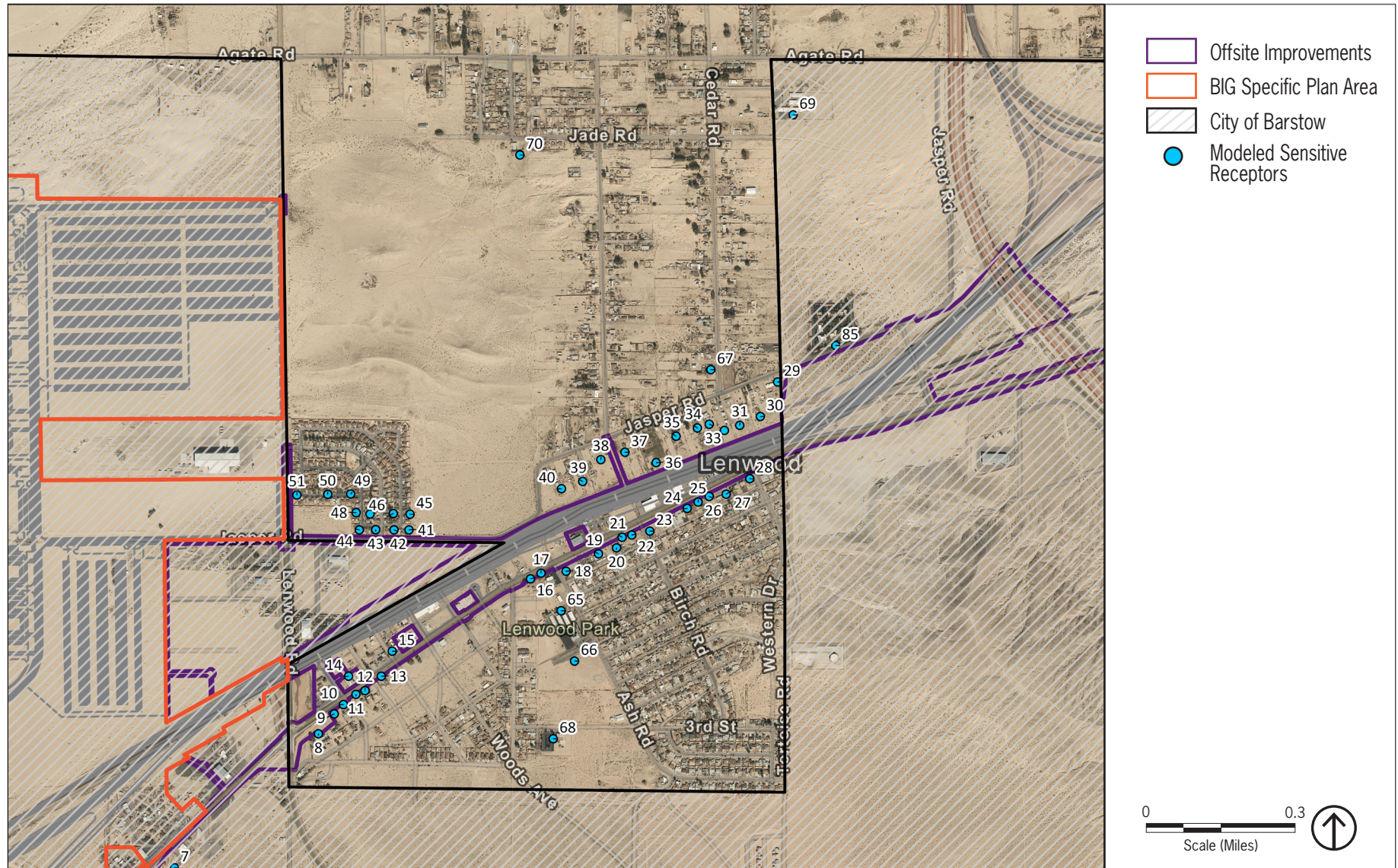
- Receptors 1, 2, and 4: located directly south of the intermodal facility and block swap yard;
- Receptors 5, 6, 83, and 84: located directly south of the north and south mainline tracks, and northeast of the solar farm
- Receptor 86: located south of the intermodal facility, block swap yard, and solar farm; and
- Receptors 87 through 90: located directly south of the solar farm.

The following noise barriers were determined to be financially feasible as mitigation to reduce BIG operational noise impacts:

- **Barrier 2 (BAR-2):** a 10-foot-high absorptive noise barrier approximately 700 feet in length surrounding the BESS equipment in the northeastern portion of the solar farm; and
- **Barrier 3 (BAR-3):** a 10-foot-high absorptive noise barrier approximately 470 feet in length surrounding the substation in the northeastern portion of the solar farm.

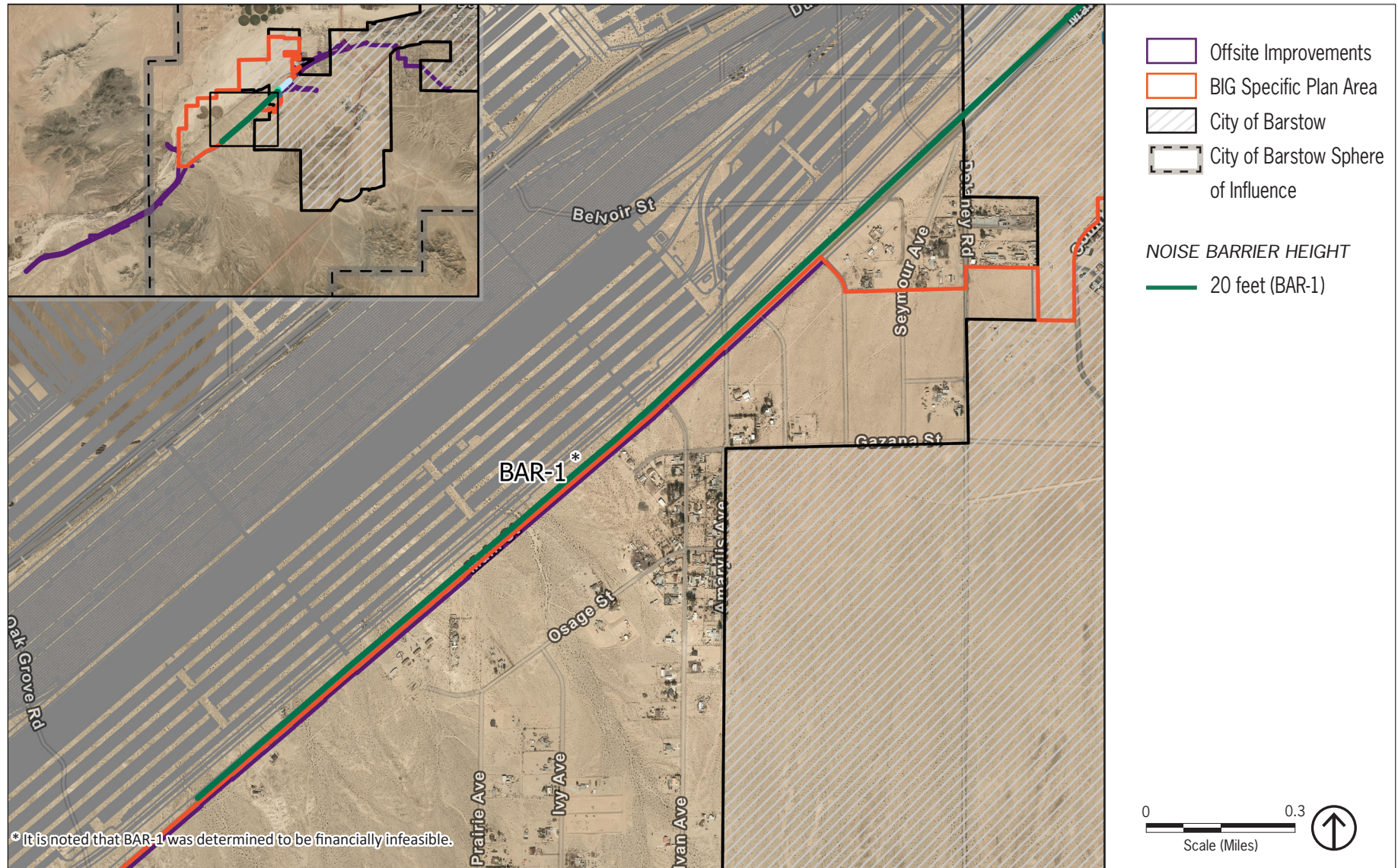
BAR-2 and BAR-3 are depicted in **Figure 5.12-14: Modeled Noise Barrier** and **Figure 5.12-15: Modeled Noise Barrier (BIG Specific Plan Area)**. It should be noted that BAR-1 and BAR-4 (as shown in **Figure 5.12-14** and **Figure 5.12-15**) were determined to be financially infeasible and therefore, are excluded from the mitigated noise analysis in this EIR section; see **Appendix 5.12 BIG -1** for the complete Noise Barrier Financial Feasibility Analysis analyzing the feasibility of all potential noise barriers. Barrier 5 (BAR-5) is also excluded from this analysis, as this barrier would reduce emergency generator noise only and would not reduce typical (non-emergency situation) BIG operational noise levels.

Opening Year 2028 With BIG operational noise levels with incorporation of the noise barriers discussed above were modeled in SoundPLAN and the impacted receptor results are provided in **Table 5.12-31: Opening Year 2028 Mitigated BIG Operational Noise Levels– City/County Noise Standards Impact Analysis** and **Table 5.12-32: Opening Year 2028 Mitigated BIG Operational Noise Levels – Noise Increase Impact Analysis**. As indicated in **Table 5.12-31**, BAR-2 and BAR-3 would reduce BIG operational noise levels below the applicable City and/or County noise standards at all impacted receptor locations except for Receptors 1, 2, 4 and 5, which would still exceed City/County noise thresholds despite construction of these noise barriers. In addition, BAR-2 and BAR-3 would not reduce noise levels below the incremental increase threshold(s) and all receptors would experience a substantial noise increase over ambient conditions as a result of BIG operations. Therefore, a significant noise impact would occur in this regard. It is noted the maximum noise level reduction from BAR-2 and BAR-3 under Opening Year 2028 With BIG conditions would be approximately 3.8 dBA.



Sources:
County of San Bernardino, Y2023_PUA_Cache [aerial imagery], 2023; Kimley-Horn and Associates,
Modeled Noise Receptors, 2024.

Figure 5.12-13
Modeled Sensitive Receptor Locations (Lenwood)



Sources:
County of San Bernardino, Y2023_PUA_Cache [aerial imagery], 2023; Kimley-Horn and Associates, Noise Sources, 2022; Kimley-Horn and Associates, Noise Barrier Height, 2024.

Figure 5.12-14
Modeled Noise Barriers (Main Street)

Table 5.12-31: Opening Year 2028 Mitigated BIG Operational Noise Levels– City/County Noise Standards Impact Analysis												
Receptor No. ¹	Land Use	Jurisdiction	Noise Barrier	Daytime			Nighttime			24-Hour		
				Modeled Noise Level (dBA)	Noise Standard (dBA) ³	Exceeds Standard?	Modeled Noise Level (dBA)	Noise Standard (dBA) ³	Exceeds Standard?	Modeled Noise Level (dBA Ldn)	Noise Standard (dBA Ldn) ³	Exceeds Standard?
WITH BIG												
1	Residential	County	N/A ²	61.5	55	Yes	60.9	45	Yes	67.4	60	Yes
2	Residential	County	N/A ²	59.2	55	Yes	58.9	45	Yes	65.3	60	Yes
4	Residential	City	N/A ²	59.1	65	No	58.6	65	No	65.1	65	Yes
5	Residential	City	N/A ²	60.3	65	No	60.0	65	No	66.4	65	Yes
6	Residential	City	N/A ²	57.4	65	No	57.2	65	No	63.6	65	No
83	Residential	City	BAR-2 and BAR-3	57.4	65	No	57.4	65	No	63.8	65	No
84	Residential	City	BAR-2 and BAR-3	57.5	65	No	57.4	65	No	63.8	65	No
88	Residential	City	BAR-2 and BAR-3	56.9	65	No	56.7	65	No	63.1	65	No
89	Residential	City	BAR-2 and BAR-3	57.0	65	No	56.8	65	No	63.3	65	No
90	Residential	City	BAR-2 and BAR-3	58.3	65	No	58.2	65	No	64.6	65	No
Notes: 1. See Figure 5.12-11 through Figure 5.12-13 for receptor locations. 2. Impacted receptors 1, 2, and 4 through 6 would not receive noise level reductions from feasible barriers (BAR-2 and BAR-3); see Appendix 5.12 BIG-1 for noise barrier feasibility analysis and complete modeling results. 3. City and County noise standards obtained from Table 5.12-8 , and Table 5.12-11 .												
Source: SoundPLAN Essential version 5.1. Please see Appendix 5.12 BIG-1: Noise and Vibration Technical Report - Appendix A for complete modeling results for all receptors.												

Table 5.12-32: Opening Year 2028 Mitigated BIG Operational Noise Levels – Noise Increase Impact Analysis												
Receptor No. ¹	Land Use	Jurisdiction	Noise Barrier	Daytime			Nighttime			24-Hour		
				Incremental Increase (dBA) (With BIG Condition Minus No BIG Condition) ³	Incremental Standard (dBA) ³	Exceeds Standard?	Incremental Increase (dBA) (With BIG Condition Minus No BIG Condition) ³	Incremental Standard (dBA) ³	Exceeds Standard?	Incremental Increase (dBA Ldn) (With BIG Condition Minus No BIG Condition) ³	Incremental Standard (dBA Ldn) ³	Exceeds Standard?
1	Residential	County	N/A ²	2.0	1.5	Yes	2.8	1.5	Yes	2.7	1.5	Yes
2	Residential	County	N/A ²	0.8	1.5	No	1.9	1.5	Yes	1.6	1.5	Yes
4	Residential	City	N/A ²	2.1	1.5	Yes	3.0	1.5	Yes	2.8	1.5	Yes
5	Residential	City	N/A ²	1.6	1.5	Yes	2.6	1.5	Yes	2.4	1.5	Yes
6	Residential	City	N/A ²	4.3	5.0	No	5.5	5.0	Yes	5.3	5.0	Yes
83	Residential	City	BAR-2 and BAR-3	10.1	1.5	Yes	11.5	1.5	Yes	11.2	1.5	Yes
84	Residential	City	BAR-2 and BAR-3	11.3	1.5	Yes	12.5	1.5	Yes	12.3	1.5	Yes
86	Residential	City	N/A ²	7.8	1.5	Yes	8.9	1.5	Yes	8.8	1.5	Yes
87	Residential	City	N/A ²	11.3	1.5	Yes	12.3	1.5	Yes	12.1	1.5	Yes
88	Residential	City	BAR-2 and BAR-3	11.4	1.5	Yes	12.5	1.5	Yes	12.3	1.5	Yes
89	Residential	City	BAR-2 and BAR-3	11.4	1.5	Yes	12.6	1.5	Yes	12.4	1.5	Yes
90	Residential	City	BAR-2 and BAR-3	13.2	1.5	Yes	14.4	1.5	Yes	14.2	1.5	Yes
Notes:												
1. See Figure 5.12-11 through Figure 5.12-13 for receptor locations.												
2. Impacted receptors 1, 2, and 4 through 6 would not receive noise level reductions from feasible barriers (BAR-2 and BAR-3); see Appendix 5.12 BIG-1 for barrier feasibility analysis and complete modeling results.												
3. Incremental standards are based on FICON methodology using measured ambient levels as described in Section 5.12.3 (Methodology for Evaluating Impacts) and Section 5.12.5 (Impact Thresholds and Significance Criteria).												
Sources: SoundPLAN Essential version 5.1. Please see Appendix 5.12 BIG-1: Noise and Vibration Technical Report - Appendix A for complete modeling results and impact screening analysis for all receptors.												

Operational Exterior Noise Levels – Interim Year 2033

The 2033 operational noise levels are found in **Table 5.12-33: Interim Year 2033 BIG Operational Noise Levels – City/County Noise Standards Impact Analysis** and the impact analysis is provided in **Table 5.12-34: Interim Year 2033 BIG Operational Noise Levels – Noise Increase Impact Analysis**. Only receptors that would, under “with BIG” conditions, exceed either the absolute noise standard or the incremental noise increase thresholds described in **Section 5.12.5 (Impacts Thresholds and Significance Criteria)** are provided. See **Appendix 5.12 BIG-1 - Appendix A** for SoundPLAN results and impact screening analyses for all receptors.

As shown in **Table 5.12-33** and **Table 5.12-34**, BIG operational noise levels at 12 modeled receptors would exceed a City or County noise standard or result in a substantial noise increase when compared to No BIG conditions. Similar to the Opening Year 2028 analysis above, all 12 impacted receptors are located south of BIG:

- Receptors 1, 2, and 4: located directly south of the intermodal facility and block swap yard;
- Receptors 5, 6, 83, and 84: located directly south of the north and south mainline tracks, and northeast of the solar farm;
- Receptor 86: located south of the intermodal facility, block swap yard, and solar farm; and
- Receptors 87-90: located directly south of the solar farm.

Noise barriers BAR-2 and BAR-3 were evaluated for Interim Year 2033 With BIG conditions to reduce operational noise impacts. It should be noted that BAR-5 is excluded from the analysis, as this barrier would reduce emergency generator noise only would not affect or influence typical BIG operational noise levels. The Interim Year 2033 With BIG results with incorporation of noise barriers for impacted receptors are provided in **Table 5.12-35: Interim Year 2033 Mitigated BIG Operational Noise Levels– City/County Noise Standards Impact Analysis** and **Table 5.12-36: Interim Year 2033 Mitigated BIG Operational Noise Levels – Noise Increase Impact Analysis**. As indicated in **Table 5.12-35**, BAR-2 and BAR-3 would reduce BIG operational noise levels below the applicable City and/or County noise standards at all impacted receptor locations except for Receptors 1, 2, 4 and 5, which would exceed City/County noise thresholds despite construction of these noise barriers. In addition, BAR-2 and BAR-3 would not reduce noise levels below the incremental increase threshold(s) and all receptors would still experience a substantial noise increase over ambient conditions as a result of BIG operations; see **Table 5.12-36**. Therefore, a significant noise impact would occur in this regard. It is noted the maximum noise level reduction from BAR-2 through BAR-3 under Interim Year 2033 With BIG conditions would be approximately 3.8 dBA.

Table 5.12-33: Interim Year 2033 BIG Operational Noise Levels – City/County Noise Standards Impact Analysis											
Receptor No. ¹	Land Use	Jurisdiction	Daytime			Nighttime			24-hour		
			Modeled Noise Level (dBA)	Noise Standard (dBA) ²	Exceeds Standard?	Modeled Noise Level (dBA)	Noise Standard (dBA) ²	Exceeds Standard?	Modeled Noise Level	Noise Standard (dBA L _{dn}) ³	Exceeds Standard?
NO BIG											
1	Residential	County	59.8	55	Yes	58.4	45	Yes	65.0	60	Yes
2	Residential	County	58.7	55	Yes	57.3	45	Yes	64.0	60	Yes
4	Residential	City	57.3	65	No	55.9	65	No	62.6	65	No
5	Residential	City	59.1	65	No	57.7	65	No	64.3	65	No
6	Residential	City	53.4	65	No	52.0	65	No	58.6	65	No
83	Residential	City	47.6	65	No	46.2	65	No	52.9	65	No
84	Residential	City	46.6	65	No	45.2	65	No	51.8	65	No
88	Residential	City	45.9	65	No	44.5	65	No	51.1	65	No
89	Residential	City	45.9	65	No	44.5	65	No	51.1	65	No
90	Residential	City	45.5	65	No	44.0	65	No	50.7	65	No
WITH BIG											
1	Residential	County	61.7	55	Yes	60.9	45	Yes	67.5	60	Yes
2	Residential	County	59.3	55	Yes	58.9	45	Yes	65.4	60	Yes
4	Residential	City	59.3	65	No	58.7	65	No	65.2	65	Yes
5	Residential	City	64.0	65	No	63.8	65	No	70.2	65	Yes
6	Residential	City	59.7	65	No	59.5	65	No	66.0	65	Yes
83	Residential	City	59.8	65	No	59.7	65	No	66.2	65	Yes
84	Residential	City	59.8	65	No	59.8	65	No	66.2	65	Yes
88	Residential	City	59.3	65	No	59.1	65	No	65.5	65	Yes
89	Residential	City	59.8	65	No	59.7	65	No	66.1	65	Yes
90	Residential	City	61.6	65	No	61.5	65	No	67.9	65	Yes
Notes:											
1. See Figure 5.12-11 through Figure 5.12-13 for receptor locations.											
2. City and County noise standards obtained from Table 5.12-8 , and Table 5.12-11 .											
3. City and County 24-hour average (dBA Ldn) noise standard obtained from Table 5.12-9 .											
Source: SoundPLAN Essential version 5.1. Please see Appendix 5.12 BIG-1: Noise and Vibration Technical Report - Appendix A for complete modeling results for all receptors.											

Table 5.12-34: Interim Year 2033 BIG Operational Noise Levels – Noise Increase Impact Analysis											
Receptor No. ¹	Land Use	Jurisdiction	Daytime			Nighttime			24-Hour		
			Incremental Increase (dBA) (With BIG Condition Minus No BIG Condition)	Incremental Standard (dBA) ²	Exceeds Standard?	Incremental Increase (dBA) (With BIG Condition Minus No BIG Condition)	Incremental Standard (dBA) ²	Exceeds Standard?	Incremental Increase (dBA L _{dn}) (With BIG Condition Minus No BIG Condition)	Incremental Standard (dBA L _{dn}) ²	Exceeds Standard?
1	Residential	County	1.9	1.5	Yes	2.5	1.5	Yes	2.5	1.5	Yes
2	Residential	County	0.6	1.5	No	1.6	1.5	Yes	1.4	1.5	No
4	Residential	City	2.0	1.5	Yes	2.8	1.5	Yes	2.6	1.5	Yes
5	Residential	City	4.9	1.5	Yes	6.1	1.5	Yes	5.9	1.5	Yes
6	Residential	City	6.3	5.0	Yes	7.5	5.0	Yes	7.4	5.0	Yes
83	Residential	City	12.2	1.5	Yes	13.5	1.5	Yes	13.3	1.5	Yes
84	Residential	City	13.2	1.5	Yes	14.6	1.5	Yes	14.4	1.5	Yes
86	Residential	City	8.3	1.5	Yes	9.5	1.5	Yes	9.4	1.5	Yes
87	Residential	City	12.9	1.5	Yes	14.1	1.5	Yes	13.8	1.5	Yes
88	Residential	City	13.4	1.5	Yes	14.6	1.5	Yes	14.4	1.5	Yes
89	Residential	City	13.9	1.5	Yes	15.2	1.5	Yes	15.0	1.5	Yes
90	Residential	City	16.1	1.5	Yes	17.5	1.5	Yes	17.2	1.5	Yes
Notes:											
1. See Figure 5.12-11 through Figure 5.12-13 for receptor locations.											
2. Incremental standards are based on FICON methodology using measured ambient levels as described in Section 5.12.3 (Methodology for Evaluating Impacts) and Section 5.12.5 (Impact Thresholds and Significance Criteria).											
Sources: SoundPLAN Essential version 5.1. Please see Appendix 5.12 BIG-1: Noise and Vibration Technical Report - Appendix A for complete modeling results and impact screening analysis for all receptors.											

Table 5.12-35: Interim Year 2033 Mitigated BIG Operational Noise Levels– City/County Noise Standards Impact Analysis												
Receptor No. ¹	Land Use	Jurisdiction	Noise Barrier	Daytime			Nighttime			24-Hour		
				Modeled Noise Level (dBA)	Noise Standard (dBA) ³	Exceeds Standard?	Modeled Noise Level (dBA)	Noise Standard (dBA) ³	Exceeds Standard?	Modeled Noise Level (dBA L _{dn})	Noise Standard (dBA L _{dn}) ³	Exceeds Standard?
WITH BIG												
1	Residential	County	N/A ²	61.7	55	Yes	60.9	45	Yes	67.5	60	Yes
2	Residential	County	N/A ²	59.3	55	Yes	58.9	45	Yes	65.4	60	Yes
4	Residential	City	N/A ²	59.2	65	No	58.6	65	No	65.1	65	Yes
5	Residential	City	N/A ²	60.4	65	No	60.0	65	No	66.4	65	Yes
6	Residential	City	N/A ²	57.4	65	No	57.2	65	No	63.6	65	No
83	Residential	City	BAR-2 and BAR-3	57.5	65	No	57.4	65	No	63.8	65	No
84	Residential	City	BAR-2 and BAR-3	57.5	65	No	57.4	65	No	63.8	65	No
88	Residential	City	BAR-2 and BAR-3	57.0	65	No	56.7	65	No	63.1	65	No
89	Residential	City	BAR-2 and BAR-3	57.1	65	No	56.8	65	No	63.3	65	No
90	Residential	City	BAR-2 and BAR-3	58.3	65	No	58.2	65	No	64.6	65	No
Notes: 1. See Figure 5.12-11 through Figure 5.12-13 for receptor locations. 2. Impacted receptors 1, 2, and 4 through 6 would not receive noise level reductions from feasible barriers (BAR-2 and BAR-3); see Appendix 5.12 BIG-1 for barrier feasibility analysis and complete modeling results 3. City and County noise standards obtained from Table 5.12-8 , and Table 5.12-11 .												
Source: SoundPLAN Essential version 5.1. Please see Appendix 5.12 BIG-1: Noise and Vibration Technical Report - Appendix A for complete modeling results for all receptors.												

Table 5.12-36: Interim Year 2033 Mitigated BIG Operational Noise Levels – Noise Increase Impact Analysis												
Receptor No. ¹	Land Use	Jurisdiction	Noise Barrier	Daytime			Nighttime			24-Hour		
				Incremental Increase (dBA) (With BIG Condition Minus No BIG Condition) ³	Incremental Standard (dBA) ³	Exceeds Standard?	Incremental Increase (dBA) (With BIG Condition Minus No BIG Condition) ³	Incremental Standard (dBA) ³	Exceeds Standard?	Incremental Increase (dBA Ldn) (With BIG Condition Minus No BIG Condition) ³	Incremental Standard (dBA Ldn) ³	Exceeds Standard?
1	Residential	County	N/A ²	1.9	1.5	Yes	2.5	1.5	Yes	2.5	1.5	Yes
2	Residential	County	N/A ²	0.6	1.5	No	1.6	1.5	Yes	1.4	1.5	No
4	Residential	City	N/A ²	1.9	1.5	Yes	2.7	1.5	Yes	2.5	1.5	Yes
5	Residential	City	N/A ²	1.3	1.5	No	2.3	1.5	Yes	2.1	1.5	Yes
6	Residential	City	N/A ²	4.0	5.0	No	5.2	5.0	Yes	5.0	5.0	No
83	Residential	City	BAR-2 and BAR-3	9.9	1.5	Yes	11.2	1.5	Yes	10.9	1.5	Yes
84	Residential	City	BAR-2 and BAR-3	10.9	1.5	Yes	12.2	1.5	Yes	12.0	1.5	Yes
86	Residential	City	N/A ²	7.4	1.5	Yes	8.6	1.5	Yes	8.5	1.5	Yes
87	Residential	City	N/A ²	11.1	1.5	Yes	12.0	1.5	Yes	11.8	1.5	Yes
88	Residential	City	BAR-2 and BAR-3	11.1	1.5	Yes	12.2	1.5	Yes	12.0	1.5	Yes
89	Residential	City	BAR-2 and BAR-3	11.2	1.5	Yes	12.3	1.5	Yes	12.2	1.5	Yes
89	Residential	City	BAR-2 and BAR-3	12.8	1.5	Yes	14.2	1.5	Yes	13.9	1.5	Yes
Notes: 1. See Figure 5.12-11 through Figure 5.12-13 for receptor locations. 2. Impacted receptors 1, 2, 4 through 6, 86 and 87 would not receive noise level reductions from feasible barriers (BAR-2 and BAR-3); see Appendix 5.12 BIG-1 for barrier feasibility analysis and complete modeling results. 3. Incremental standards are based on FICON methodology using measured ambient levels as described in Section 5.12.3 (Methodology for Evaluating Impacts) and Section 5.12.5 (Impact Thresholds and Significance Criteria). Sources: SoundPLAN Essential version 5.1. Please see Appendix 5.12 BIG-1: Noise and Vibration Technical Report - Appendix A for complete modeling results and impact screening analysis for all receptors.												

Operational Exterior Noise Levels – Horizon Year 2048

The Horizon Year 2048 operational noise levels are found in **Table 5.12-37: Horizon Year 2048 BIG Operational Noise Levels – City/County Noise Standards Impact Analysis** and the incremental noise analysis is provided in **Table 5.12-38: Horizon Year 2048 BIG Operational Noise Levels – Noise Increase Impact Analysis**. Only receptors that would, under “with BIG” conditions, exceed either the absolute noise standard or the incremental noise increase thresholds described in **Section 5.12.5 (Impact Thresholds and Significance Criteria)** are provided. See **Appendix 5.12 BIG-1 - Appendix A** for SoundPLAN results and impact screening analyses for all receptors.

As shown in **Table 5.12-37** and **Table 5.12-38**, BIG Operational noise levels at 11 modeled receptors would exceed a City or County noise standard or result in a substantial noise increase when compared to No BIG conditions. Similar to the Opening Year 2028 and Interim Year 2033 analyses above, all 11 impacted receptors are located south of BIG:

- Receptors 1 and 4: located directly south of the intermodal facility and block swap yard;
- Receptors 5, 6, 83, and 84: located directly south of the north and south mainline tracks, and northeast of the solar farm;
- Receptor 86: located south of the intermodal facility, block swap yard, and solar farm; and
- Receptors 87-90: located directly south of the solar farm.

Noise barriers BAR-2 and BAR-3 were evaluated for Horizon Year 2048 With BIG conditions to reduce operational noise impacts. It should be noted that BAR-5 is excluded from the analysis, as this barrier would reduce emergency generator noise only would not affect or influence typical BIG operational noise levels. The Horizon Year 2048 results with incorporation of noise barriers for impacted receptors are provided in **Table 5.12-39: Horizon Year 2048 Mitigated BIG Operational Noise Levels – City/County Noise Standards Impact Analysis** and **Table 5.12-40: Horizon Year 2048 Mitigated BIG Operational Noise Levels – Noise Increase Impact Analysis**. As indicated in **Table 5.12-39**, BAR-2 and BAR-3 would reduce BIG operational noise levels below the applicable City and/or County noise standards at all impacted receptor locations except for Receptor 1, 4, and 5 which would exceed City/County noise thresholds despite construction of these noise barriers. In addition, BAR-2 and BAR-3 would not reduce noise levels below the incremental increase threshold(s) and all receptors would still experience a substantial noise increase over ambient conditions as a result of BIG operations; see **Table 5.12-40**. Therefore, a significant noise impact would occur in this regard. It is noted the maximum noise level reduction from BAR-2 and BAR-3 under Horizon Year 2048 With BIG conditions would be approximately 3.9 dBA.

Table 5.12-37: Horizon Year 2048 BIG Operational Noise Levels – City/County Noise Standards Impact Analysis											
Receptor No. ¹	Land Use	Jurisdiction	Daytime			Nighttime			24-hour		
			Modeled Noise Level (dBA)	Noise Standard (dBA) ²	Exceeds Standard?	Modeled Noise Level (dBA)	Noise Standard (dBA) ²	Exceeds Standard?	Modeled Noise Level	Noise Standard (dBA L _{dn}) ²	Exceeds Standard?
NO BIG											
1	Residential	County	60.9	55	Yes	59.4	45	Yes	66.0	60	Yes
4	Residential	City	58.4	65	No	56.9	65	No	63.6	65	No
5	Residential	City	60.1	65	No	58.6	65	No	65.3	65	Yes
6	Residential	City	54.5	65	No	53.0	65	No	59.6	65	No
83	Residential	City	48.7	65	No	47.2	65	No	53.8	65	No
84	Residential	City	47.6	65	No	46.1	65	No	52.8	65	No
88	Residential	City	46.9	65	No	45.4	65	No	52.1	65	No
89	Residential	City	47.0	65	No	45.5	65	No	52.1	65	No
90	Residential	City	46.5	65	No	45.0	65	No	51.7	65	No
WITH BIG											
1	Residential	County	61.9	55	Yes	61.3	45	Yes	67.8	60	Yes
4	Residential	City	59.5	65	No	59.0	65	No	65.5	65	Yes
5	Residential	City	64.0	65	No	63.9	65	No	70.3	65	Yes
6	Residential	City	59.7	65	No	59.6	65	No	66.0	65	Yes
83	Residential	City	59.8	65	No	59.8	65	No	66.2	65	Yes
84	Residential	City	59.8	65	No	59.8	65	No	66.2	65	Yes
88	Residential	City	59.3	65	No	59.1	65	No	65.6	65	Yes
89	Residential	City	59.8	65	No	59.7	65	No	66.1	65	Yes
90	Residential	City	61.6	65	No	61.5	65	No	67.9	65	Yes
Notes: 1. See Figure 5.12-11 through Figure 5.12-13 for receptor locations. 2. City and County noise standards obtained from Table 5.12-8 , from Table 5.12-9 , and Table 5.12-11 .											
Source: SoundPLAN Essential version 5.1. Please see Appendix 5.12 BIG-1: Noise and Vibration Technical Report - Appendix A for complete modeling results for all receptors.											

Table 5.12-38: Horizon Year 2048 BIG Operational Noise Levels – Noise Increase Impact Analysis											
Receptor No. ¹	Land Use	Jurisdiction	Daytime			Nighttime			24-Hour		
			Incremental Increase (dBA) (With BIG Condition Minus No BIG Condition)	Incremental Standard (dBA) ²	Exceeds Standard?	Incremental Increase (dBA) (With BIG Condition Minus No BIG Condition)	Incremental Standard (dBA) ²	Exceeds Standard?	Incremental Increase (dBA L _{dn}) (With BIG Condition Minus No BIG Condition)	Incremental Standard (dBA L _{dn}) ²	Exceeds Standard?
1	Residential	County	1.3	1.5	No	2.2	1.5	Yes	2.1	1.5	Yes
4	Residential	City	1.4	1.5	No	2.4	1.5	Yes	2.2	1.5	Yes
5	Residential	City	4.0	1.5	Yes	5.4	1.5	Yes	5.1	1.5	Yes
6	Residential	City	5.3	5.0	Yes	6.7	5.0	Yes	6.5	5.0	Yes
83	Residential	City	11.1	1.5	Yes	12.6	1.5	Yes	12.4	1.5	Yes
84	Residential	City	12.2	1.5	Yes	13.7	1.5	Yes	13.4	1.5	Yes
86	Residential	City	7.4	1.5	Yes	8.7	1.5	Yes	8.5	1.5	Yes
87	Residential	City	11.9	1.5	Yes	13.1	1.5	Yes	13.0	1.5	Yes
88	Residential	City	12.4	1.5	Yes	13.7	1.5	Yes	13.5	1.5	Yes
89	Residential	City	12.8	1.5	Yes	14.2	1.5	Yes	14.0	1.5	Yes
90	Residential	City	15.1	1.5	Yes	16.5	1.5	Yes	16.2	1.5	Yes
Notes: 1. See Figure 5.12-11 through Figure 5.12-13 for receptor locations. 2. Incremental standards are based on FICON methodology using measured ambient levels as described in Section 5.12.3 (Methodology for Evaluating Impacts) and Section 5.12.5 (Impact Thresholds and Significance Criteria).											
Sources: SoundPLAN Essential version 5.1. Please see Appendix 5.12 BIG-1: Noise and Vibration Technical Report - Appendix A for complete modeling results and impact screening analysis for all receptors.											

Table 5.12-39: Horizon Year 2048 Mitigated BIG Operational Noise Levels – City/County Noise Standards Impact Analysis												
Receptor No. ¹	Land Use	Jurisdiction	Noise Barriers	Daytime ²			Nighttime ²			24-Hour ³		
				Modeled Noise Level (dBA)	Noise Standard (dBA) ³	Exceeds Standard?	Modeled Noise Level (dBA)	Noise Standard (dBA) ³	Exceeds Standard?	Modeled Noise Level (dBA L _{dn})	Noise Standard (dBA L _{dn}) ⁴	Exceeds Standard?
WITH BIG												
1	Residential	County	N/A ²	62.2	55	Yes	61.6	45	Yes	68.1	60	Yes
4	Residential	City	N/A ²	59.7	65	No	59.2	65	No	65.7	65	Yes
5	Residential	City	N/A ²	60.4	65	No	60.1	65	No	66.6	65	Yes
6	Residential	City	N/A ²	57.6	65	No	57.4	65	No	63.8	65	No
83	Residential	City	N/A ²	57.5	65	No	57.4	65	No	63.9	65	No
84	Residential	City	BAR-2 and BAR-3	57.5	65	No	57.5	65	No	63.9	65	No
88	Residential	City	BAR-2 and BAR-3	57.0	65	No	56.8	65	No	63.2	65	No
89	Residential	City	N/A ²	57.1	65	No	56.9	65	No	63.3	65	No
90	Residential	City	N/A ²	58.3	65	No	58.2	65	No	64.6	65	No
Notes:												
1. See Figure 5.12-11 through Figure 5.12-13 for receptor locations.												
2. Impacted receptors 1, 2, 4 through 6, 89, and 90 would not receive noise level reductions from feasible barriers (BAR-2 and BAR-3); see Appendix 5.12 BIG-1 for barrier feasibility analysis and complete modeling results.												
3. City and County noise standards obtained from Table 5.12-8, and Table 5.12-11 .												
Source: SoundPLAN Essential version 5.1. Please see Appendix 5.12 BIG-1: Noise and Vibration Technical Report - Appendix A for complete modeling results for all receptors.												

Table 5.12-40: Horizon Year 2048 Mitigated BIG Operational Noise Levels – Noise Increase Impact Analysis

Receptor No. ¹	Land Use	Jurisdiction	Noise Barrier	Daytime			Nighttime			24-Hour		
				Incremental Increase (dBA) (With BIG Condition Minus No BIG Condition) ³	Incremental Standard (dBA) ³	Exceeds Standard?	Incremental Increase (dBA) (With BIG Condition Minus No BIG Condition) ³	Incremental Standard (dBA) ³	Exceeds Standard?	Incremental Increase (dBA L _{dn}) (With BIG Condition Minus No BIG Condition) ³	Incremental Standard (dBA L _{dn}) ³	Exceeds Standard?
1	Residential	County	N/A ²	1.3	1.5	No	2.2	1.5	Yes	2.1	1.5	Yes
4	Residential	City	N/A ²	1.3	1.5	No	2.3	1.5	Yes	2.1	1.5	Yes
5	Residential	City	N/A ²	0.3	1.5	Yes	1.5	1.5	Yes	1.3	1.5	Yes
6	Residential	City	N/A ²	3.1	5.0	Yes	4.4	5.0	Yes	4.2	5.0	Yes
83	Residential	City	N/A ²	8.8	1.5	Yes	10.2	1.5	Yes	10.1	1.5	Yes
84	Residential	City	BAR-2 and BAR-3	9.9	1.5	Yes	11.4	1.5	Yes	11.1	1.5	Yes
86	Residential	City	BAR-2 and BAR-3	6.5	1.5	Yes	7.8	1.5	Yes	7.6	1.5	Yes
87	Residential	City	N/A ²	10.0	1.5	Yes	11.1	1.5	Yes	11.0	1.5	Yes
88	Residential	City	N/A ²	10.1	1.5	Yes	11.4	1.5	Yes	11.1	1.5	Yes
89	Residential	City	BAR-2 and BAR-3	10.1	1.5	Yes	11.4	1.5	Yes	11.2	1.5	Yes
90	Residential	City	BAR-2 and BAR-3	11.8	1.5	Yes	13.2	1.5	Yes	12.9	1.5	Yes
Notes:												
1. See Figure 5.12-11 through Figure 5.12-13 for receptor locations.												
2. Impacted receptors 1, 2, 4 through 6, 87, and 89 would not receive noise level reductions from feasible barriers (BAR-2 and BAR-3); see Appendix 5.12 BIG-1 for barrier feasibility analysis and complete modeling results												
3. Incremental standards are based on FICON methodology using measured ambient levels as described in Section 5.12.3 (Methodology for Evaluating Impacts) and Section 5.12.5 (Impact Thresholds and Significance Criteria)												
Sources: SoundPLAN Essential version 5.1. Please see Appendix 5.12 BIG-1: Noise and Vibration Technical Report - Appendix A for complete modeling results and impact screening analysis for all receptors.												

While there are several impacted receptors identified for Opening Year 2028 With BIG, Interim Year 2033 With BIG, and Horizon Year 2048 with BIG conditions, it is worth noting that numerous receptors would see a reduction in operational noise levels when compared to No BIG conditions; see **Appendix 5.12 BIG-1 - Appendix A**. Based on the modeling results this is due to several factors, including an estimated grade separation/change of up to approximately 30 feet in the southernmost extent of the BIG footprint along Main Street that breaks the line of sight between the rail yard and mainlines, the removal of the Hinkley Road at-grade crossing (train horns would no longer be used at this location), and slower train speeds as a result of BIG (i.e., more trains would be traveling at slower speeds [20/40 mph] as they enter BIG) compared to No BIG conditions where maximum speeds up to 70 mph are often reached.

Operational Interior Noise Levels – Opening Year 2028

The Opening Year 2028 operational interior noise levels are evaluated against interior noise standards in **Table 5.12-41: Opening Year 2028 BIG Operational Interior Noise Levels – Interior Noise Standard Analysis** and the incremental noise impact analysis is provided in **Table 5.12-42: Opening Year 2028 BIG Operational Interior Noise Levels – Noise Impact Analysis**. Only receptors that would exceed the absolute noise standard of 45 dBA L_{dn} as a result of BIG or the incremental increase standard are provided. See **Appendix 5.12 BIG-1 - Appendix A** for SoundPLAN results and impact screening analyses for all receptors.

As shown in **Table 5.12-41** and **Table 5.12-42**, BIG operational noise levels at 12 modeled receptors would exceed both the interior noise standard of 45 dBA L_{dn} and result in a substantial noise increase under a windows open condition. In addition, BIG would also result in a substantial noise increase at 12 receptors under a windows closed condition; see **Table 5.12-42**. All 12 impacted receptors are located south of BIG:

- Receptors 1,2, and 4: located directly south of the intermodal facility and block swap yard;
- Receptors 5, 6, 83, and 84: located directly south of the north and south mainline tracks, and northeast of the solar farm;
- Receptor 86: located south of the intermodal facility, block swap yard, and solar farm; and
- Receptors 87-90: located directly south of the solar farm.

Noise barriers BAR-2 and BAR-3 were evaluated for Opening Year 2028 With BIG conditions to reduce operational interior noise impacts. It should be noted that BAR-5 is excluded from the analysis, as this barrier would reduce emergency generator noise only would not affect or influence typical BIG operational noise levels. The interior Opening Year 2028 results with incorporation of noise barriers for impacted receptors are provided in **Table 5.12-43: Opening Year 2028 Mitigated BIG Operational Interior Noise Levels** and **Table 5.12-44: Opening Year 2028 Mitigated BIG Operational Interior Noise Levels – Noise Increase Impact Analysis**. As shown in **Table 5.12-43**, interior noise levels at all impacted receptors would remain above the 45 dBA L_{dn} noise standard despite implementation of noise barriers BAR-2 and BAR-3 for a windows open condition. **Table 5.12-44** shows that all impacted receptors would also experience a substantial noise increase despite implementation of noise barriers BAR-2 and BAR-3. It is noted the maximum interior noise level reduction from BAR-2 and BAR-3 under Opening Year 2028 With BIG conditions would be approximately 3.8 dBA, which is considered barely noticeable.

Table 5.12-41: Opening Year 2028 BIG Operational Interior Noise Levels – Interior Noise Standard Analysis

Receptor No. ¹	Land Use	Windows Open			Windows Closed		
		Modeled Interior Noise Level (dBA L _{dn}) ²	Noise Standard (dBA L _{dn})	Exceeds Standard?	Modeled Interior Noise Level (dBA L _{dn}) ²	Noise Standard (dBA L _{dn})	Exceeds Standard?
NO BIG							
1	Residential	54.7	45	Yes	36.7	45	No
2	Residential	53.7	45	Yes	35.7	45	No
4	Residential	52.3	45	Yes	34.3	45	No
5	Residential	54.0	45	Yes	36.0	45	No
6	Residential	48.3	45	Yes	30.3	45	No
83	Residential	42.6	45	No	24.6	45	No
84	Residential	41.5	45	No	23.5	45	No
86	Residential	42.0	45	No	24.0	45	No
87	Residential	40.3	45	No	22.3	45	No
88	Residential	40.8	45	No	22.8	45	No
89	Residential	40.9	45	No	22.9	45	No
90	Residential	40.4	45	No	22.4	45	No
WITH BIG							
1	Residential	57.4	45	Yes	39.4	45	No
2	Residential	55.3	45	Yes	37.3	45	No
4	Residential	55.3	45	Yes	37.3	45	No
5	Residential	55.2	45	Yes	37.2	45	No
6	Residential	60.2	45	Yes	42.2	45	No
83	Residential	56.0	45	Yes	38.0	45	No
84	Residential	56.2	45	Yes	38.2	45	No
86	Residential	56.2	45	Yes	38.2	45	No
87	Residential	51.7	45	Yes	33.7	45	No
88	Residential	54.4	45	Yes	36.4	45	No
89	Residential	55.5	45	Yes	37.5	45	No
90	Residential	56.1	45	Yes	38.1	45	No
1. See Figure 5.12-11 through Figure 5.12-13 for receptor locations.							
2. Interior noise levels calculated using the modeled exterior noise levels and using an outdoor-to-indoor noise reduction of 10 dBA for windows open and 28 dBA for windows closed per the Locher et al., Differences between Outdoor and Indoor Sound Levels for open, Tilted, and Closed Windows, 2018							
Source: SoundPLAN Essential version 5.1. Please see Appendix 5.12 BIG-1: Noise and Vibration Technical Report - Appendix A for complete modeling results for all receptors.							

Table 5.12-42: Opening Year 2028 BIG Operational Interior Noise Levels – Noise Impact Analysis

Receptor No. ¹	Land Use	Windows Open			Windows Closed		
		Incremental Increase (With BIG Condition Minus No BIG Condition) (dBA L _{dn})	Incremental Standard (dBA L _{dn}) ²	Exceeds Standard?	Incremental Increase (With BIG Condition Minus No BIG Condition) (dBA L _{dn})	Incremental Noise Standard (dBA L _{dn}) ²	Exceeds Standard?
1	Residential	2.7	1.5	Yes	2.7	1.5	Yes
2	Residential	1.6	1.5	Yes	1.6	1.5	Yes
4	Residential	2.9	1.5	Yes	2.9	1.5	Yes
5	Residential	6.2	1.5	Yes	6.2	1.5	Yes
6	Residential	7.7	5.0	Yes	7.7	5.0	Yes
83	Residential	13.6	1.5	Yes	13.6	1.5	Yes
84	Residential	14.7	1.5	Yes	14.7	1.5	Yes
86	Residential	9.7	1.5	Yes	9.7	1.5	Yes
87	Residential	14.1	1.5	Yes	14.1	1.5	Yes
88	Residential	14.7	1.5	Yes	14.7	1.5	Yes
89	Residential	15.2	1.5	Yes	15.2	1.5	Yes
90	Residential	17.5	1.5	Yes	17.5	1.5	Yes
Notes:							
1. See Figure 5.12-11 through Figure 5.12-13 for receptor locations.							
2. Incremental standards are based on FICON methodology using measured ambient levels as described in Section 4.1 (Impact Analysis Methodology) and Section 4.2 (Thresholds of Significance).							
Source: SoundPLAN Essential version 5.1. Please see Appendix 5.12 BIG-1: Noise and Vibration Technical Report - Appendix A for complete modeling results for all receptors.							

Table 5.12-43: Opening Year 2028 Mitigated BIG Operational Interior Noise Levels

Receptor No. ¹	Land Use	Noise Barrier	Windows Open			Windows Closed		
			Modeled Interior Noise Level (dBA L _{dn}) ²	Noise Standard (dBA L _{dn})	Exceeds Standard?	Modeled Interior Noise Level (dBA L _{dn}) ²	Noise Standard (dBA L _{dn})	Exceeds Standard?
WITH BIG								
1	Residential	N/A ³	57.4	45	Yes	39.4	45	No
2	Residential	N/A ³	55.3	45	Yes	37.3	45	No
4	Residential	N/A ³	55.1	45	Yes	37.1	45	No
5	Residential	N/A ³	56.4	45	Yes	38.4	45	No
6	Residential	N/A ³	53.6	45	Yes	35.6	45	No
83	Residential	BAR-2 and BAR-3	53.8	45	Yes	35.8	45	No
84	Residential	BAR-2 and BAR-3	53.8	45	Yes	35.8	45	No
86	Residential	N/A ³	50.8	45	Yes	32.8	45	No
87	Residential	N/A ³	52.4	45	Yes	34.4	45	No
88	Residential	BAR-2 and BAR-3	53.1	45	Yes	35.1	45	No
89	Residential	BAR-2 and BAR-3	53.3	45	Yes	35.3	45	No
90	Residential	BAR-2 and BAR-3	54.6	45	Yes	36.6	45	No
Notes: 1. See Figure 5.12-11 through Figure 5.12-13 for receptor locations. 2. Interior noise levels calculated using the modeled exterior noise levels and using an outdoor-to-indoor noise reduction of 10 dBA for windows open and 28 dBA for windows closed per the International Journal of Environmental Research and Public Health, Differences between Outdoor and Indoor Sound Levels for open, Tilted, and Closed Windows, 2018. 3. Impacted receptors 1, 2, 4 through 6, 86, and 87 would not receive noise level reductions from feasible barriers (BAR-2 and BAR-3); see Appendix 5.12 BIG-1 for barrier feasibility analysis and complete modeling results								
Source: SoundPLAN Essential version 5.1. Please see Appendix 5.12 BIG-1: Noise and Vibration Technical Report - Appendix A for complete modeling results for all receptors.								

Table 5.12-44: Opening Year 2028 Mitigated BIG Operational Interior Noise Levels – Noise Increase Impact Analysis

Receptor No. ¹	Land Use	Noise Barriers	Windows Open			Windows Closed		
			Incremental Increase (With BIG Condition Minus No BIG Condition) (dBA L _{dn})	Incremental Standard (dBA L _{dn}) ³	Exceeds Standard?	Incremental Increase (With BIG Condition Minus No BIG Condition) (dBA L _{dn})	Incremental Noise Standard (dBA L _{dn}) ³	Exceeds Standard?
1	Residential	N/A ²	2.7	1.5	Yes	2.7	1.5	Yes
2	Residential	N/A ²	1.6	1.5	Yes	1.6	1.5	Yes
4	Residential	N/A ²	2.8	1.5	Yes	2.8	1.5	Yes
5	Residential	N/A ²	2.4	1.5	Yes	2.4	1.5	Yes
6	Residential	N/A ²	5.3	5.0	Yes	5.3	5.0	Yes
83	Residential	BAR-2 and BAR-3	11.2	1.5	Yes	11.2	1.5	Yes
84	Residential	BAR-2 and BAR-3	12.3	1.5	Yes	12.3	1.5	Yes
86	Residential	N/A ²	8.8	1.5	Yes	8.8	1.5	Yes
87	Residential	N/A ²	12.1	1.5	Yes	12.1	1.5	Yes
88	Residential	BAR-2 and BAR-3	12.3	1.5	Yes	12.3	1.5	Yes
89	Residential	BAR-2 and BAR-3	12.4	1.5	Yes	12.4	1.5	Yes
90	Residential	BAR-2 and BAR-3	14.2	1.5	Yes	14.2	1.5	Yes

Notes:

1. See **Figure 5.12-11** through **Figure 5.12-13** for receptor locations.
2. Impacted receptors 1, 2, 4 through 6, 86, and 87 would not receive noise level reductions from feasible barriers (BAR-2 and BAR-3); see **Appendix 5.12 BIG-1** for barrier feasibility analysis and complete modeling results
3. Incremental standards are based on FICON methodology using measured ambient levels as described in Section 4.1 (Impact Analysis Methodology) and Section 4.2 (Thresholds of Significance).

Source: SoundPLAN Essential version 5.1. Please see **Appendix 5.12 BIG-1: Noise and Vibration Technical Report - Appendix A** for complete modeling results for all receptors.

Increased noise barrier heights for BAR-2 and BAR-3 were modeled in SoundPLAN to evaluate their effectiveness and determine whether they could reduce interior noise impacts at the affected receptors below standards for the windows open condition. The modeling results indicate the increased barrier heights would not achieve a large enough noise level reduction to bring interior noise levels below standards for the windows open condition, and thus, a potentially significant impact would occur. Other options to reduce interior noise levels for a windows open condition are limited, as upgraded windows are ineffective and BIG cannot willfully construct a noise barrier on a private property. Therefore, as there are no feasible interior noise abatement measures for a windows open condition, a significant and unavoidable impact would occur in this regard. It is noted that no impacts would occur for the windows closed condition.

Operational Interior Noise Levels – Interim Year 2033

The Interim Year 2033 operational interior noise levels are found in **Table 5.12-45: Interim Year 2033 BIG Operational Interior Noise Levels** and **Table 5.12-46: Interim Year 2033 BIG Operational Interior Noise Levels – Noise Increase Impact Analysis**. Only receptors that would exceed the absolute noise standard of 45 dBA L_{dn} as a result of BIG or the incremental increase standard described in **Section 5.12.5 (Impact Thresholds and Significance Criteria)** are provided. See **Appendix 5.12 BIG-1 - Appendix A** for SoundPLAN results and impact screening analyses for all receptors.

As shown in **Table 5.12-45** and **Table 5.12-46**, BIG operational noise levels at 11 modeled receptors would exceed both the interior noise standard of 45 dBA L_{dn} and result in a substantial noise increase under a windows open condition. In addition, BIG would also result in a substantial noise increase at 11 receptors under a windows closed condition; see **Table 5.12-46**. All 11 impacted receptors are located south of BIG:

- Receptors 1 and 4: located directly south of the intermodal facility and block swap yard;
- Receptors 5, 6, 83, and 84: located directly south of the north and south mainline tracks, and northeast of the solar farm;
- Receptor 86: located south of the intermodal facility, block swap yard, and solar farm; and
- Receptors 87-90: located directly south of the solar farm.

Noise barriers BAR-2 and BAR-3 were evaluated for Interim Year 2033 With BIG conditions to reduce operational interior noise impacts. It should be noted that BAR-5 is excluded from the analysis, as this barrier would reduce emergency generator noise only would not affect or influence typical BIG operational noise levels. The interior Interim Year 2033 results with incorporation of noise barriers for impacted receptors are provided in **Table 5.12-47: Interim Year 2033 Mitigation BIG Operational Interior Noise Levels** and **Table 5.12-48: Interim Year 2033 Mitigated BIG Operational Interior Noise Levels – Noise Increase Impact Analysis**. As shown in **Table 5.12-47**, interior noise levels at all impacted receptors would remain above the 45 dBA L_{dn} noise standard despite implementation of noise barriers BAR-2 and BAR-3 for a windows open condition. **Table 5.12-48** shows that all impacted receptors would also experience a substantial noise increase despite implementation of noise barriers. It is noted the maximum interior noise level reduction from BAR-2 and BAR-3 under Interim Year 2033 With BIG conditions would be approximately 3.8 dBA, which is considered barely noticeable.

Table 5.12-45: Interim Year 2033 BIG Operational Interior Noise Levels

Receptor No. ¹	Land Use	Windows Open			Windows Closed		
		Modeled Interior Noise Level (dBA L _{dn}) ²	Noise Standard (dBA L _{dn})	Exceeds Standard?	Modeled Interior Noise Level (dBA L _{dn}) ²	Noise Standard (dBA L _{dn}) ²	Exceeds Standard?
NO BIG							
1	Residential	55.0	45	Yes	37.0	45	No
4	Residential	52.6	45	Yes	34.6	45	No
5	Residential	54.3	45	Yes	36.3	45	No
6	Residential	48.6	45	Yes	30.6	45	No
83	Residential	42.9	45	No	24.9	45	No
84	Residential	41.8	45	No	23.8	45	No
86	Residential	42.3	45	No	24.3	45	No
87	Residential	40.6	45	No	22.6	45	No
88	Residential	41.1	45	No	23.1	45	No
89	Residential	41.1	45	No	23.1	45	No
90	Residential	40.7	45	No	22.7	45	No
WITH BIG							
1	Residential	57.1	45	Yes	39.1	45	No
4	Residential	54.9	45	Yes	36.9	45	No
5	Residential	60.2	45	Yes	42.2	45	No
6	Residential	55.9	45	Yes	37.9	45	No
83	Residential	56.1	45	Yes	38.1	45	No
84	Residential	56.2	45	Yes	38.2	45	No
86	Residential	51.6	45	Yes	33.6	45	No
87	Residential	54.4	45	Yes	36.4	45	No
88	Residential	55.5	45	Yes	37.5	45	No
89	Residential	56.1	45	Yes	38.1	45	No
90	Residential	57.9	45	Yes	39.9	45	No
Notes:							
1. See Figure 5.12-11 through Figure 5.12-13 for receptor locations.							
2. Interior noise levels calculated using the modeled exterior noise levels and using an outdoor-to-indoor noise reduction of 10 dBA for windows open and 28 dBA for windows closed per the International Journal of Environmental Research and Public Health, <i>Differences between Outdoor and Indoor Sound Levels for open, Tilted, and Closed Windows</i> , 2018.							
Source: SoundPLAN Essential version 5.1. Please see Appendix 5.12 BIG-1: Noise and Vibration Technical Report - Appendix A for complete modeling results for all receptors.							

Table 5.12-46: Interim Year 2033 BIG Operational Interior Noise Levels – Noise Increase Impact Analysis							
Receptor No. ¹	Land Use	Windows Open			Windows Closed		
		Incremental Increase (With BIG Condition Minus No BIG Condition) (dBA L _{dn})	Incremental Noise Standard (dBA L _{dn}) ²	Exceeds Standard?	Incremental Increase (With BIG Condition Minus No BIG Condition) (dBA L _{dn})	Incremental Noise Standard (dBA L _{dn}) ²	Exceeds Standard?
1	Residential	2.5	1.5	Yes	2.5	1.5	Yes
4	Residential	2.6	1.5	Yes	2.6	1.5	Yes
5	Residential	5.9	1.5	Yes	5.9	1.5	Yes
6	Residential	7.4	5.0	Yes	7.4	5.0	Yes
83	Residential	13.3	1.5	Yes	13.3	1.5	Yes
84	Residential	14.4	1.5	Yes	14.4	1.5	Yes
86	Residential	9.4	1.5	Yes	9.4	1.5	Yes
87	Residential	13.8	1.5	Yes	13.8	1.5	Yes
88	Residential	14.4	1.5	Yes	14.4	1.5	Yes
89	Residential	15.0	1.5	Yes	15.0	1.5	Yes
90	Residential	17.2	1.5	Yes	17.2	1.5	Yes
Notes: 1. See Figure 5.12-11 through Figure 5.12-13 for receptor locations. 2. Incremental standards are based on FICON methodology using measured ambient levels as described in Section 4.1 (Impact Analysis Methodology) and Section 4.2 (Thresholds of Significance). Source: SoundPLAN Essential version 5.1. Please see Appendix 5.12 BIG-1: Noise and Vibration Technical Report - Appendix A for complete modeling results for all receptors.							

Table 5.12-47: Interim Year 2033 Mitigation BIG Operational Interior Noise Levels

Table 5.12-47: Interim Year 2033 Mitigation BIG Operational Interior Noise Levels								
Receptor No. ¹	Land Use	Noise Barrier	Windows Open			Windows Closed		
			Modeled Interior Noise Level (dBA L _{dn}) ²	Noise Standard (dBA L _{dn})	Exceeds Standard?	Modeled Interior Noise Level (dBA L _{dn}) ²	Noise Standard (dBA L _{dn}) ²	Exceeds Standard?
WITH BIG								
1	Residential	N/A ³	57.5	45	Yes	39.5	45	No
2	Residential	N/A ³	55.4	45	Yes	37.4	45	No
4	Residential	N/A ³	55.1	45	Yes	37.1	45	No
5	Residential	N/A ³	56.4	45	Yes	38.4	45	No
6	Residential	N/A ³	53.6	45	Yes	35.6	45	No
83	Residential	BAR-2 and BAR-3	53.8	45	Yes	35.8	45	No
84	Residential	BAR-2 and BAR-3	53.8	45	Yes	35.8	45	No
86	Residential	N/A ³	50.8	45	Yes	32.8	45	No
87	Residential	N/A ³	52.4	45	Yes	34.4	45	No
88	Residential	BAR-2 and BAR-3	53.1	45	Yes	35.1	45	No
89	Residential	BAR-2 and BAR-3	53.3	45	Yes	35.3	45	No
90	Residential	N/A ³	54.6	45	Yes	36.6	45	No
Notes:								
1. See Figure 5.12-11 through Figure 5.12-13 for receptor locations.								
2. Interior noise levels calculated using the modeled exterior noise levels and using an outdoor-to-indoor noise reduction of 10 dBA for windows open and 28 dBA for windows closed per the International Journal of Environmental Research and Public Health, <i>Differences between Outdoor and Indoor Sound Levels for open, Tilted, and Closed Windows</i> , 2018.								
3. Impacted receptors 1, 2,4 through 6 86, and 87 would not receive noise level reductions from feasible barriers (BAR-2 and BAR-3); see Appendix 5.12 BIG-1 for barrier feasibility analysis and complete modeling result.								
Source: SoundPLAN Essential version 5.1. Please see Appendix 5.12 BIG-1 - Appendix A for complete modeling results for all receptors.								

Table 5.12-48: Interim Year 2033 Mitigated BIG Operational Interior Noise Levels – Noise Increase Impact Analysis

Receptor No. ¹	Land Use	Noise Barrier	Windows Open			Windows Closed		
			Incremental Increase (With BIG Condition Minus No BIG Condition) (dBA L _{dn})	Incremental Standard (dBA L _{dn}) ³	Exceeds Standard?	Incremental Increase (With BIG Condition Minus No BIG Condition) (dBA L _{dn})	Incremental Noise Standard (dBA L _{dn}) ³	Exceeds Standard?
1	Residential	N/A ²	2.5	1.5	Yes	2.5	1.5	Yes
4	Residential	N/A ²	2.5	1.5	Yes	2.5	1.5	Yes
5	Residential	N/A ²	2.1	1.5	Yes	2.1	1.5	Yes
6	Residential	N/A ²	5.0	5.0	Yes	5.0	5.0	Yes
83	Residential	BAR-2 and BAR-3	10.9	1.5	Yes	10.9	1.5	Yes
84	Residential	BAR-2 and BAR-3	12.0	1.5	Yes	12.0	1.5	Yes
86	Residential	N/A ²	8.5	1.5	Yes	8.5	1.5	Yes
87	Residential	N/A ²	11.8	1.5	Yes	11.8	1.5	Yes
88	Residential	BAR-2 and BAR-3	12.0	1.5	Yes	12.0	1.5	Yes
89	Residential	BAR-2 and BAR-3	12.2	1.5	Yes	12.2	1.5	Yes
90	Residential	N/A ²	13.9	1.5	Yes	13.9	1.5	Yes

Notes:

1. See **Figure 5.12-11** through **Figure 5.12-13** for receptor locations.
2. Impacted receptors 1, 2, 4 through 6, 83, 86, and 87 would not receive noise level reductions from feasible barriers (BAR-2 and BAR-3); see **Appendix 5.12 BIG-1** for barrier feasibility analysis and complete modeling results.
3. Incremental standards are based on FICON methodology using measured ambient levels as described in Section 4.1 (Impact Analysis Methodology) and Section 4.2 (Thresholds of Significance)

Source: SoundPLAN Essential version 5.1. Please see **Appendix 5.12 BIG-1: Noise and Vibration Technical Report - Appendix A** for complete modeling results for all receptors.

Increased noise barrier heights for BAR-2 and BAR-3 were modeled in SoundPLAN to evaluate their effectiveness and determine whether they could reduce interior noise impacts at the affected receptors for the windows open condition. The modeling results indicate the increased barrier heights would not achieve a large enough reduction to bring interior noise levels below standards for the windows open condition, and thus, a potentially significant impact would occur. Other options to reduce interior noise levels for a windows open condition are limited, as upgraded windows are ineffective under such condition and BIG cannot willfully construct a noise barrier on a private property. Therefore, as there are no feasible interior noise abatement measures for a windows open condition, a significant and unavoidable impact would occur in this regard. It is noted that no impacts would occur for the windows closed condition.

Operational Interior Noise Levels – Horizon Year 2048

The 2048 operational interior noise levels are found in **Table 5.12-49: Horizon Year 2048 BIG Operational Interior Noise Levels** and the incremental noise impact analysis is provided in **Table 5.12-50: Horizon Year 2048 Unmitigated BIG Operational Interior Noise Levels – Noise Increase Impact Analysis**. Only receptors that would exceed the absolute noise standard of 45 dBA L_{dn} as a result of BIG or the incremental increase standard described in **Section 5.12.5 (Impact Thresholds and Significance Criteria)** are provided. See **Appendix 5.12 BIG-1 - Appendix A** for SoundPLAN results and impact screening analyses for all receptors.

As shown in **Table 5.12-49** and **Table 5.12-50**, BIG operational noise levels at 11 modeled receptors would exceed both the interior noise standard of 45 dBA L_{dn} and result in a substantial noise increase under a windows open condition. In addition, BIG would also result in a substantial noise increase at 11 receptors under a windows closed condition; see **Table 5.12-50**. All 11 impacted receptors are located south of BIG:

- Receptors 1 and 4: located directly south of the intermodal facility and block swap yard;
- Receptors 5, 6, 83, and 84: located directly south of the north and south mainline tracks, and northeast of the solar farm;
- Receptor 86: located south of the intermodal facility, block swap yard, and solar farm; and
- Receptors 87-90: located directly south of the solar farm.

Noise barriers BAR-2 and BAR-3 were evaluated for Horizon Year 2048 With BIG conditions to reduce operational interior noise impacts. It should be noted that BAR-5 is excluded from the analysis, as this barrier would reduce emergency generator noise only would not affect or influence typical BIG operational noise levels. The interior Horizon Year 2048 results with incorporation of noise barriers for impacted receptors are provided in **Table 5.12-51: Horizon Year 2048 Mitigated BIG Operational Interior Noise Levels** and **Table 5.12-52: Horizon Year 2048 Mitigated BIG Operational Interior Noise Levels – Noise Increase Impact Analysis**. As shown in **Table 5.12-51**, interior noise levels at all impacted receptors would remain above the 45 dBA L_{dn} noise standard despite implementation of noise barriers BAR-2 and BAR-3 for a windows open condition. **Table 5.12-52** shows that receptors 1, 4, 6 83, 84 and 86 through 90 would experience a substantial noise increase despite implementation of noise barriers. The maximum interior noise level reduction from BAR-2 and BAR-3 under Horizon Year 2048 With BIG conditions would be approximately 3.8 dBA, which is considered just-perceptible.

Table 5.12-49: Horizon Year 2048 BIG Operational Interior Noise Levels							
Receptor No.1	Land Use	Windows Open			Windows Closed		
		Modeled Interior Noise Level (dBA L _{dn}) ²	Noise Standard (dBA L _{dn})	Exceeds Standard?	Modeled Interior Noise Level (dBA L _{dn}) ²	Noise Standard (dBA L _{dn}) ²	Exceeds Standard?
NO BIG							
1	Residential	56.0	45	Yes	38.0	45	No
4	Residential	53.6	45	Yes	35.6	45	No
5	Residential	55.3	45	Yes	37.3	45	No
6	Residential	49.6	45	Yes	31.6	45	No
83	Residential	43.8	45	No	25.8	45	No
84	Residential	42.8	45	No	24.8	45	No
86	Residential	43.3	45	No	25.3	45	No
87	Residential	41.5	45	No	23.5	45	No
88	Residential	42.1	45	No	24.1	45	No
89	Residential	42.1	45	No	24.1	45	No
90	Residential	41.7	45	No	23.7	45	No
WITH BIG							
1	Residential	58.1	45	Yes	40.1	45	No
4	Residential	55.8	45	Yes	37.8	45	No
5	Residential	60.4	45	Yes	42.4	45	No
6	Residential	56.1	45	Yes	38.1	45	No
83	Residential	56.2	45	Yes	38.2	45	No
84	Residential	56.2	45	Yes	38.2	45	No
86	Residential	51.8	45	Yes	33.8	45	No
87	Residential	54.5	45	Yes	36.5	45	No
88	Residential	55.6	45	Yes	37.6	45	No
89	Residential	56.1	45	Yes	38.1	45	No
90	Residential	57.9	45	Yes	39.9	45	No
Notes:							
1. See Figure 5.12-11 through Figure 5.12-13 for receptor locations.							
2. Interior noise levels calculated using the modeled exterior noise levels and using an outdoor-to-indoor noise reduction of 10 dBA for windows open and 28 dBA for windows closed per the International Journal of Environmental Research and Public Health, <i>Differences between Outdoor and Indoor Sound Levels for open, Tilted, and Closed Windows</i> , 2018.							
Source: SoundPLAN Essential version 5.1. Please see Appendix 5.12 BIG-1: Noise and Vibration Technical Report - Appendix A for complete modeling results for all receptors.							

Table 5.12-50: Horizon Year 2048 Unmitigated BIG Operational Interior Noise Levels – Noise Increase Impact Analysis							
Receptor No. ¹	Land Use	Windows Open			Windows Closed		
		Incremental Increase (With BIG Condition Minus No BIG Condition) (dBA L _{dn})	Incremental Standard (dBA L _{dn}) ²	Exceeds Standard?	Incremental Increase (With BIG Condition Minus No BIG Condition) (dBA L _{dn})	Incremental Noise Standard (dBA L _{dn}) ²	Exceeds Standard?
1	Residential	2.1	1.5	Yes	2.1	1.5	Yes
4	Residential	2.2	1.5	Yes	2.2	1.5	Yes
5	Residential	5.1	1.5	Yes	5.1	1.5	Yes
6	Residential	6.5	5.0	Yes	6.5	5.0	Yes
83	Residential	12.4	1.5	Yes	12.4	1.5	Yes
84	Residential	13.4	1.5	Yes	13.4	1.5	Yes
86	Residential	8.5	1.5	Yes	8.5	1.5	Yes
87	Residential	13.0	1.5	Yes	13.0	1.5	Yes
88	Residential	13.5	1.5	Yes	13.5	1.5	Yes
89	Residential	14.0	1.5	Yes	14.0	1.5	Yes
90	Residential	16.2	1.5	Yes	16.2	1.5	Yes
Notes: 1. See Figure 5.12-11 through Figure 5.12-13 for receptor locations. 2. Incremental standards are based on FICON methodology using measured ambient levels as described in Section 4.1 (Impact Analysis Methodology) and Section 4.2 (Thresholds of Significance).							
Source: SoundPLAN Essential version 5.1. Please see Appendix 5.12 BIG-1: Noise and Vibration Technical Report - Appendix A for complete modeling results for all receptors.							

Table 5.12-51: Horizon Year 2048 Mitigated BIG Operational Interior Noise Levels

Receptor No.1	Land Use	Noise Barrier	Windows Open			Windows Closed		
			Modeled Interior Noise Level (dBA L _{dn})2	Noise Standard (dBA L _{dn})	Exceeds Standard?	Modeled Interior Noise Level (dBA L _{dn})2	Noise Standard (dBA L _{dn})	Exceeds Standard?
WITH BIG								
1	Residential	N/A3	58.1	45	Yes	40.1	45	No
4	Residential	N/A3	55.7	45	Yes	37.7	45	No
5	Residential	N/A3	56.6	45	Yes	38.6	45	No
6	Residential	N/A3	53.8	45	Yes	35.8	45	No
83	Residential	N/A3	53.9	45	Yes	35.9	45	No
84	Residential	BAR-2 and BAR-3	53.9	45	Yes	35.9	45	No
86	Residential	BAR-2 and BAR-3	50.9	45	Yes	32.9	45	No
87	Residential	N/A3	52.5	45	Yes	34.5	45	No
88	Residential	N/A3	53.2	45	Yes	35.2	45	No
89	Residential	BAR-2 and BAR-3	53.3	45	Yes	35.3	45	No
90	Residential	BAR-2 and BAR-3	54.6	45	Yes	36.6	45	No
Notes: 1. See Figure 5.12-11 through Figure 5.12-13 for receptor locations. 2. Interior noise levels calculated using the modeled exterior noise levels and using an outdoor-to-indoor noise reduction of 10 dBA for windows open and 28 dBA for windows closed per the Locher, et al., Differences between Outdoor and Indoor Sound Levels for open, Tilted, and Closed Windows, 2018. 3 Impacted receptors 1, 2,4 through 6, 83, 86, and 87 would not receive noise level reductions from feasible barriers (BAR-2 and BAR-3); see Appendix 5.12 BIG-1 for barrier feasibility analysis and complete modeling results.								
Source: SoundPLAN Essential version 5.1. Please see Appendix 5.12 BIG-1: Noise and Vibration Technical Report - Appendix A for complete modeling results for all receptors.								

Table 5.12-52: Horizon Year 2048 Mitigated BIG Operational Interior Noise Levels – Noise Increase Impact Analysis

Receptor No. ¹	Land Use	Noise Barriers	Windows Open			Windows Closed		
			Incremental Increase (With BIG Condition Minus No BIG Condition) (dBA L _{dn})	Incremental Standard (dBA L _{dn}) ³	Exceeds Standard?	Incremental Increase (With BIG Condition Minus No BIG Condition) (dBA L _{dn})	Incremental Noise Standard (dBA L _{dn}) ³	Exceeds Standard?
1	Residential	N/A ²	2.1	1.5	Yes	2.1	1.5	Yes
4	Residential	N/A ²	2.1	1.5	Yes	2.1	1.5	Yes
5	Residential	N/A ²	1.3	1.5	No	1.3	1.5	No
6	Residential	N/A ²	4.2	5.0	Yes	4.2	5.0	Yes
83	Residential	N/A ²	10.1	1.5	Yes	10.1	1.5	Yes
84	Residential	BAR-2 and BAR-3	11.1	1.5	Yes	11.1	1.5	Yes
86	Residential	BAR-2 and BAR-3	7.6	1.5	Yes	7.6	1.5	Yes
87	Residential	N/A ²	11.0	1.5	Yes	11.0	1.5	Yes
88	Residential	N/A ²	11.1	1.5	Yes	11.1	1.5	Yes
89	Residential	BAR-2 and BAR-3	11.2	1.5	Yes	11.2	1.5	Yes
90	Residential	BAR-2 and BAR-3	12.9	1.5	Yes	12.9	1.5	Yes

Notes:

1. See **Figure 5.12-11** through **Figure 5.12-13** for receptor locations.

2. Impacted receptors 1, 2, 4 through 6, 83, 86, and 87 would not receive noise level reductions from feasible barriers (BAR-2 and BAR-3); see **Appendix 5.12 BIG-1** for barrier feasibility analysis and complete modeling results.

3. Incremental standards are based on FICON methodology using measured ambient levels as described in Section 4.1 (Impact Analysis Methodology) and Section 4.2 (Thresholds of Significance).

Source: SoundPLAN Essential version 5.1. Please see **Appendix 5.12 BIG-1: Noise and Vibration Technical Report - Appendix A** for complete modeling results for all receptors.

Increased noise barrier heights for BAR-2 and BAR-3 were modeled in SoundPLAN to evaluate their effectiveness and determine whether they could reduce interior noise impacts at the affected receptors for the windows open condition. The modeling results indicate the increased barrier heights would not achieve a large enough reduction to bring interior noise levels below standards for the windows open condition, and a potentially significant impact would occur. Other options to reduce interior noise levels for a windows open condition are limited, as upgraded windows are ineffective and BIG cannot willfully construct a noise barrier on a private property. Therefore, as there are no feasible interior noise abatement measures for a windows open condition, a significant and unavoidable impact would occur in this regard. It is noted that no impacts would occur for the windows closed condition.

Emergency Generator Noise

To provide backup power in the event of electrical service interruptions, diesel emergency generators are proposed at various locations across the rail yard and transload warehouse center. The rail yard would include 10 emergency generators at the southeastern portion of the intermodal facility, while the transload warehouse center would include 29 emergency generators dispersed throughout. The 39 emergency generators would undergo regular testing for up to 50 hours per year, for a total of approximately 1,950 hours of generator testing per year. However, to provide a worst-case analysis of potential noise impacts from emergency generators, the proposed 39 emergency generators were modeled in SoundPLAN assuming all generators would operate simultaneously during an emergency situation at their specific/identified locations in BIG's site plans. Under this emergency scenario, BIG generators would produce noise levels up to approximately 51.9 dBA at the nearest sensitive receptors (residential uses adjacent to the 10 generators in the southeastern portion of the intermodal facility) and would exceed the County's most stringent 45 dBA nighttime noise standard for stationary sources but would not exceed the City's 65 dBA CNEL noise standard for residential uses. Interior noise levels would not exceed the 45 dBA noise standard under and windows open or closed condition; see **Appendix 5.12 BIG-1 – Appendix A**. Noise barriers were modeled as potential mitigation in SoundPLAN to reduce emergency generator noise levels at nearby receptors; see generator noise modeling results in **Appendix 5.12 BIG-1**. This noise barrier is depicted as BAR-5 in **Figure 5.12-15**.

Operations – Roadway Traffic Noise

Roadway Traffic Noise – Exterior Noise Analysis

Opening Year 2028

BIG operations are anticipated to result in additional traffic within the noise and vibration study area roadways/highways thereby increasing vehicular noise at nearby land uses. BIG would result in new net daily trips in Opening Year 2028, Interim Year 2033, and Horizon Year 2048; see **Appendix 5.15 BIG-2: Level of Service Assessment – Transportation Analysis. Table 5.12-53: Opening Year 2028 Plus BIG Conditions Roadway Traffic Noise Levels** shows roadway traffic noise levels along roadway segments for Opening Year 2028 Plus BIG.

Table 5.12-53: Opening Year 2028 Plus BIG Conditions Roadway Traffic Noise Levels													
Roadway	Segment	Opening Year 2028		Opening Year 2028 + BIG		Incremental Increase	Incremental Increase Threshold	Exceeds Threshold? ²	Nearest Receptor Land Use Type	Opening Year 2028 + BIG Noise Level at Nearest Receptor (dBA CNEL)	City/County Noise Standard (dBA CNEL)	Exceeds Standard?	Impact?
		ADT	dBA CNEL at 100 feet from Roadway Centerline	ADT	dBA CNEL at 100 feet from Roadway Centerline								
Main Street	Hinkley Road to Country Club Drive	5,046	62.9	5,396	63.0	0.0	3.0	No	SF Residential	60.8	60	Yes	No ³
	Country Club Drive to Lenwood Road	4,465	62.2	6,942	64.4	2.2	3.0	No	SF Residential	63.8	65	No	No
	Lenwood Road to County/City Boundary	9,341	61.8	10,645	62.2	0.4	3.0	No	SF Residential	65.5	65	Yes	No ³
	County/City Boundary to SR-58 Eastbound Ramps	9,341	62.8	10,645	63.2	0.4	3.0	No	Commercial	51.0	65	No	No
	SR-58 Eastbound Off-Ramps to SR-58 Westbound Ramps	7,902	63.1	10,041	63.6	0.5	3.0	No	N/A ²	-	-	-	-
	SR-58 Westbound Ramps to L Street	6,837	62.0	8,583	62.1	0.1	5.0	No	SF Residential	66.0	65	Yes	No ³
	L Street to Avenue A	12,797	61.5	13,670	61.5	0.0	3.0	No	MF Residential	65.4	65	Yes	No ³
	Avenue A to Barstow Road	12,218	60.7	12,917	60.7	0.0	3.0	No	MF Residential	56.2	65	No	No
Barstow Road	Main Street to I-15 Southbound Ramps	11,754	63.6	12,191	63.7	0.1	3.0	No	SF Residential	70.5	65	Yes	No ³
	I-15 Southbound Ramps to I-15 Northbound Ramps	12,399	64.3	12,923	64.4	0.1	3.0	No	SF Residential	56.2	65	No	No
	I-15 Northbound Ramps to Rimrock Road	13,209	64.9	13,297	64.9	0.0	3.0	No	MF Residential	67.7	65	Yes	No ³
Lenwood Road	SR-58 Westbound Ramps to Community Boulevard	1,202	59.3	2,008	62.5	3.2	5.0	No	SF Residential	65.8	60	Yes	No ³
	Community Boulevard to Agate Road	1,100	57.8	2,517	61.5	3.7	5.0	No	SF Residential	51.7	60	No	No
	Agate Road to Jasper Road	3,929	62.4	6,306	64.2	1.8	5.0	No	SF Residential	65.7	60	Yes	No ³
	Jasper Road to Main Street	5,930	64.4	11,166	66.5	2.0	3.0	No	SF Residential	54.1	60	No	No
	Main Street to High Desert Road	5,051	64.4	9,179	65.5	1.1	5.0	No	SF Residential	68.3	65	Yes	No ³
	High Desert Road to I-15 SB Off-Ramp	12,735	68.4	16,689	69.1	0.8	1.5	No	Commercial	56.0	65	No	No
	I-15 SB Off-Ramp to I-15 NB Off-Ramp	10,929	64.2	12,513	64.8	0.6	1.5	No	Commercial	60.9	65	No	No
Hinkley Road	SR-58 Westbound Ramp to BIG Driveway	348	47.9	418	47.9	0.1	5.0	No	SF Residential	49.0	60	No	No
	BIG Driveway to Main Street ¹	370	47.5	-	-	-	-	-	-	-	-		-
Notes: 1. Hinkley Road would be vacated along this segment as part of BIG. 2. There are no developed land uses or sensitive receptors along roadway segment. 3. This roadway segment would not result in a substantial increase when No BIG noise levels already exceed City/County noise standards. See Appendix 5.12 BIG-1 - Appendix A for impact screening analyses for all receptors.													
Source: Based on traffic data derived from the Traffic Impact Analysis (Kimley-Horn, 2024). Refer to Appendix 5.12 BIG-1: Noise and Vibration Technical Report - Appendix A for roadway traffic noise modeling assumptions and results.													

As indicated in **Table 5.12-53**, roadway noise levels (CNEL) would range from 47.5 dBA to 69.1 dBA at 100 feet from the roadway centerline under Opening Year 2028 Plus BIG conditions. The highest noise level of 69.1 dBA would occur along Lenwood Road from High Desert Road to I-15 Southbound Off-ramp and would result in an imperceptible increase of 0.8 dBA compared to Opening Year 2028 No BIG conditions. There are no roadway segments where the traffic noise level increase would exceed the incremental standard. Additionally, none of the roadway segments would experience noise levels that exceed the applicable land use noise standards at the nearest sensitive receptors. Therefore, BIG roadway traffic noise levels under Opening Year 2028 conditions would result in a less than significant impact.

Interim Year 2033

As identified in **Table 5.12-54: Interim Year 2033 Plus BIG Conditions Roadway Traffic Noise Levels**, roadway traffic noise levels along roadway segments for Interim Year 2033 Plus BIG. As indicated in **Table 5.12-53**, roadway noise levels (CNEL) would range from 48.0 dBA to 70.5 dBA at 100 feet from the roadway centerline under Interim Year 2033 Plus BIG conditions. The highest noise level of 70.5 dBA would occur along Lenwood Road from High Desert Road to I-15 Southbound Off-Ramp and would result in an imperceptible increase of 0.7 dBA compared to Interim Year 2033 No BIG conditions. There are no roadway segments where the traffic noise increase exceeds the incremental standard.

One roadway segment (Main Street from Country Club Drive to Lenwood Road) would experience noise levels that exceed the applicable land use noise standards at the nearest sensitive receptors. Therefore, BIG roadway traffic noise levels under Interim Year 2033 conditions would result in a potentially significant impact.

Potential mitigation measures to reduce BIG's traffic noise impact at the impacted receptors would include the construction of noise barriers, noise abatement design features (e.g., providing upgraded windows), and/or re-paving the impacted roadway segment with rubberized asphalt. However, there are several issues with the aforementioned measures that would make off-site mitigation for traffic noise impacts infeasible:

- (1) The Applicant for BIG does not have jurisdiction over the local roadways and/or existing residences to directly mitigate traffic noise impacts at the impacted receivers. Noise barriers are not feasible at the impacted residence due to driveway access issues. The noise barriers would have gaps to allow for driveway access and would be ineffective.
- (2) Noise barriers could create safety issues for ingress/egress at the residential driveway.
- (3) Upgraded windows would not be effective at reducing interior noise in a windows open condition.

Table 5.12-54: Interim Year 2033 Plus BIG Conditions Roadway Traffic Noise Levels													
Roadway	Segment	Interim Year 2033		Interim Year 2033 + BIG		Incremental Increase	Incremental Increase Threshold	Exceeds Threshold? ²	Nearest Receptor Land Use Type	Interim Year 2033 + BIG Noise Level at Nearest Receptor (dBA CNEL)	City/County Noise Standard (dBA CNEL)	Exceeds Standard?	Impact?
		ADT	dBA CNEL at 100 feet from Roadway Centerline	ADT	dBA CNEL at 100 feet from Roadway Centerline								
Main Street	Hinkley Road to Country Club Drive	6,482	65.2	6,934	65.3	0.0	3.0	No	SF Residential	63.1	60	Yes	No ³
	Country Club Drive to Lenwood Road	5,319	64.4	8,292	66.1	1.7	3.0	No	SF Residential	65.5	65	Yes	Yes
	Lenwood Road to County/City Boundary	9,031	62.0	10,692	62.5	0.5	3.0	No	SF Residential	65.8	65	Yes	No ³
	County/City Boundary to SR-58 Eastbound Ramps	9,031	63.0	10,692	63.5	1.5	3.0	No	Commercial	51.3	65	No	No
	SR-58 Eastbound Off-Ramps to SR-58 Westbound Ramps	7,484	63.4	10,250	63.9	0.6	3.0	No	N/A ²	-	-	-	-
	SR-58 Westbound Ramps to L Street	6,683	62.5	8,941	62.6	0.1	5.0	No	SF Residential	66.5	65	Yes	No ³
	L Street to Avenue A	12,793	61.6	13,979	61.7	0.1	3.0	No	MF Residential	65.6	65	Yes	No ³
	Avenue A to Barstow Road	12,245	60.7	13,036	60.7	0.0	3.0	No	MF Residential	56.2	65	No	No
Barstow Road	Main Street to I-15 Southbound Ramps	12,438	63.8	12,947	63.8	0.1	3.0	No	SF Residential	70.7	65	Yes	No ³
	I-15 Southbound Ramps to I-15 Northbound Ramps	13,698	64.7	14,348	64.8	0.1	3.0	No	SF Residential	56.6	65	No	No
	I-15 Northbound ramps to Rimrock Road	15,277	65.5	15,390	65.5	0.0	3.0	No	MF Residential	68.3	65	Yes	No ³
Lenwood Road	SR-58 Westbound Ramps to Community Boulevard	1,113	58.8	2,027	62.7	4.0	5.0	No	SF Residential	66.1	60	Yes	No
	Community Boulevard to Agate Road	910	57.2	2,558	61.8	4.6	5.0	No	SF Residential	52.0	60	No	No
	Agate Road to Jasper Road	4,028	63.4	6,861	65.1	1.8	5.0	No	SF Residential	66.6	60	Yes	No ³
	Jasper Road to Main Street	5,489	65.5	12,466	67.6	2.0	3.0	No	SF Residential	55.2	60	No	No
	Main Street to High Desert Road	6,492	66.6	12,114	67.5	0.9	5.0	No	SF Residential	70.3	65	Yes	No ³
	High Desert Road to I-15 SB Off-Ramp	14,880	69.8	19,825	70.5	0.7	1.5	No	Commercial	57.4	65	No	No
	I-15 SB Off-Ramp to I-15 NB Off-Ramp	12,877	65.6	14,983	66.1	0.6	1.5	No	Commercial	62.3	65	No	No
Hinkley Road	SR-58 Westbound Ramp to BIG Driveway	336	47.8	429	48.0	0.1	5.0	No	SF Residential	49.0	60	No	No
	BIG Driveway to Main Street ¹	379	47.5	-	-	-	-	-	-	-	-	-	-
Notes: 1. Hinkley Road would be vacated along this segment as part of BIG. 2. There are no developed land uses or sensitive receptors along this roadway segment. 3. This roadway segment would not result in a substantial increase when No BIG noise levels already exceed City/County noise standards. See Appendix 5.12 BIG-1 - Appendix A for impact screening analyses for all receptors.													
Source: Based on traffic data derived from the Traffic Impact Analysis (Kimley-Horn, 2024). Refer to Appendix 5.12 BIG-1: Noise and Vibration Technical Report - Appendix A for roadway traffic noise modeling assumptions and results.													

- (4) Rubberized asphalt surfaces would not be consistent with the rest of Main Street and/or the roadways in the surrounding area. Public roadways are improved and maintained by the City and not by project applicants. Roadway improvements are implemented based on a Capital Improvements Program (CIP) schedule, and rubberized asphalt has a different maintenance schedule and requires specialized equipment for installation compared to conventional asphalt. This could cause logistical issues for the City Public Works Department and road maintenance contractors. In addition, the cost of paving a 0.97-mile roadway segment with rubberized asphalt would not be roughly proportional to reducing a barely perceptible noise level increase in interior noise levels for the windows open condition. It is also noted that the interior noise level standard of 45 dBA L_{dn} is already exceeded along several roadway segments under the Interim Year 2033 No BIG scenario.

For the reasons mentioned above, off-site mitigation measures to reduce roadway traffic noise impacts from BIG are not feasible for implementation. Therefore, BIG roadway traffic noise levels under Interim Year 2033 conditions would be significant and unavoidable.

Horizon Year 2048

Table 5.12-55: Horizon Year 2048 Plus BIG Conditions Roadway Traffic Noise Levels shows roadway traffic noise levels along roadway segments for Horizon Year 2048 Plus BIG. As indicated in **Table 5.12-55**, roadway noise levels (CNEL) would range from 47.6 dBA to 72.9 dBA at 100 feet from the roadway centerline under Horizon Year 2048 Plus BIG conditions. The highest noise level of 72.9 dBA would occur along Lenwood Road from High Desert Road to I-15 Southbound Off-ramp and would result in an imperceptible increase of 0.5 dBA compared to Horizon Year 2048 No BIG conditions. Traffic noise levels along one roadway segment (Lenwood Road from Community Boulevard to Agate Road) would exceed the incremental standard. None of the aforementioned roadway segments would experience noise levels that exceed the applicable land use noise standard(s) at the nearest sensitive receptor(s) due to BIG. Therefore, BIG roadway traffic noise levels under Horizon Year 2048 would result in a potentially significant impact.

As previously mentioned above, off-site mitigation measures to reduce roadway traffic noise impacts are not feasible for implementation. Therefore, BIG roadway traffic noise levels under Horizon Year 2048 conditions would be significant and unavoidable.

Table 5.12-55: Horizon Year 2048 Plus BIG Conditions Roadway Traffic Noise Levels													
Roadway	Segment	Horizon Year 2048		Horizon Year 2048 + BIG		Incremental Increase	Incremental Increase Threshold	Exceeds Threshold? ²	Nearest Receptor Land Use Type	Horizon Year 2045 + BIG Noise Level at Nearest Receptor (dBA CNEL)	City/County Noise Standard (dBA CNEL)	Exceeds Standard?	Impact?
		ADT	dBA CNEL at 100 feet from Roadway Centerline	ADT	dBA CNEL at 100 feet from Roadway Centerline								
Main Street	Hinkley Road to Country Club Drive	10,790	68.7	11,300	68.7	0.0	3.0	No	SF Residential	66.5	60	Yes	No ³
	Country Club Drive to Lenwood Road	7,880	67.7	11,300	68.7	1.0	3.0	No	SF Residential	68.1	65	Yes	No ³
	Lenwood Road to County/City Boundary	8,101	62.5	10,000	63.0	0.5	3.0	No	SF Residential	66.4	65	Yes	No ³
	County/City Boundary to SR-58 Eastbound Ramps	8,101	63.4	10,000	64.0	0.5	3.0	No	Commercial	50.8	65	No	No
	SR-58 Eastbound Off-Ramps to SR-58 Westbound Ramps	6,229	64.1	9,400	64.7	0.6	3.0	No	N/A ²	-	-	-	-
	SR-58 Westbound Ramps to L Street	6,221	63.9	8,800	63.9	0.1	5.0	No	SF Residential	67.8	65	Yes	No ³
	L Street to Avenue A	12,780	61.9	14,200	62.0	0.1	3.0	No	MF Residential	65.9	65	Yes	No ³
	Avenue A to Barstow Road	12,325	60.8	13,100	60.8	0.0	3.0	No	MF Residential	56.3	65	No	No
Barstow Road	Main Street to I-15 Southbound Ramps	14,488	64.2	15,000	64.3	0.1	3.0	No	SF Residential	71.1	65	Yes	No ³
	I-15 Southbound Ramps to I-15 Northbound Ramps	17,594	65.6	18,300	65.7	0.1	3.0	No	SF Residential	57.5	65	No	No
	I-15 Northbound Ramps to Rimrock Road	21,481	66.8	21,600	66.8	0.0	3.0	No	MF Residential	69.6	65	Yes	No ³
Lenwood Road	SR-58 Westbound Ramps to Community Boulevard	846	56.7	2,100	60.6	3.9	5.0	No	SF Residential	64.0	60	Yes	No ³
	Community Boulevard to Agate Road	339	54.5	2,300	60.0	5.5	5.0	Yes	SF Residential	50.2	60	No	Yes
	Agate Road to Jasper Road	4,323	65.3	7,400	66.8	1.4	5.0	No	SF Residential	68.2	60	Yes	No ³
	Jasper Road to Main Street	4,166	67.7	12,400	69.3	1.6	3.0	No	SF Residential	56.9	60	No	No
	Main Street to High Desert Road	10,814	69.9	17,600	70.4	0.5	5.0	No	SF Residential	73.2	65	Yes	No ³
	High Desert Road to I-15 SB Off-Ramp	21,313	72.5	26,800	72.9	0.5	1.5	No	Commercial	59.8	65	No	No
	I-15 SB Off-Ramp to I-15 NB Off-Ramp	18,721	68.2	21,200	68.5	0.4	1.5	No	Commercial	64.7	65	Yes	No ³
Hinkley Road	SR-58 Westbound Ramp to BIG Driveway	299	47.5	400	47.6	0.1	5.0	No	SF Residential	48.7	60	No	No
	BIG Driveway to Main Street ¹	406	47.6	-	-	-	-	-	-		-	-	-
Notes: 1. Hinkley Road would be vacated along this segment as part of BIG. 2. There are no developed land uses or sensitive receptors along roadway segment. 3. This roadway segment would not result in a substantial increase when No BIG noise levels already exceed City/County noise standards See Appendix 5.12 BIG-1 - Appendix A for impact screening analyses for all receptors.													
Source: Based on traffic data derived from the Traffic Impact Analysis (Kimley-Horn, 2024). Refer to Appendix 5.12 BIG-1: Noise and Vibration Technical Study - Appendix A for roadway traffic noise modeling assumptions and results.													

Roadway Traffic Noise – Interior Noise Analysis

Opening Year 2028

Table 5.12-56: Opening Year 2028 Plus BIG Conditions Roadway Traffic Interior Noise Levels – Windows Open and **Table 5.12-57: Opening Year 2028 Plus BIG Conditions Roadway Traffic Interior Noise Levels – Windows Closed** show interior roadway traffic noise levels along roadway segments for Opening Year 2028 Plus BIG. As indicated in **Table 5.12-56**, interior noise levels with windows open from BIG roadway noise sources would range from 37.9 dBA to 59.1 dBA at 100 feet from the roadway centerline under Opening Year 2028 Plus BIG conditions. Roadway traffic noise would not result in an increase above the incremental standard due to BIG operations under the windows open condition. In addition, none of the studied roadway segments would exceed the interior noise standard of 45 dBA L_{dn} at the nearest sensitive receptors as a result of BIG for a windows open condition and would result in less than significant impacts.

As shown in **Table 5.12-57**, interior noise levels at the nearest sensitive receptors would also be below 45 dBA L_{dn} for the windows closed condition. Therefore, BIG roadway traffic noise levels under Opening Year 2028 windows open and windows closed conditions would be less than significant and no impacts would occur.

Interim Year 2033

Table 5.12-58: Interim Year 2033 Plus BIG Conditions Roadway Traffic Interior Noise Levels – Windows Open and **Table 5.12-59: Interim Year 2033 Plus BIG Conditions Roadway Traffic Interior Noise Levels – Windows Closed** show interior roadway traffic noise levels along roadway segments for Interim Year 2033 Plus BIG conditions. As indicated in **Table 5.12-58**, interior noise levels with windows open from BIG roadway noise sources would range from 38.0 dBA to 60.5 dBA at 100 feet from the roadway centerline under Interim Year 2033 Plus BIG conditions. Roadway traffic noise would not result in an increase above the incremental standard due to BIG operations under the windows open condition.

Residences along the one roadway segments (Lenwood Road from Jasper Road to Main Street) would exceed the interior noise standard of 45 dBA L_{dn} at the nearest sensitive receptors as a result of BIG for a windows open condition and would result in potentially significant impacts. As previously mentioned, off-site mitigation measures to reduce roadway traffic noise impacts from BIG are not feasible for implementation. As shown in **Table 5.12-59**, interior noise levels at the nearest sensitive receptors would be below 45 dBA L_{dn} for the windows closed condition. However, due to limited and infeasible interior noise mitigation options for a windows open condition, a significant and unavoidable impact would occur.

Table 5.12-56: Opening Year 2028 Plus BIG Conditions Roadway Traffic Interior Noise Levels – Windows Open											
Roadway	Segment	Opening Year 2028 Interior Noise Level (dBA CNEL) ¹	Opening Year 2028 + BIG Interior Noise Level (dBA CNEL) ¹	Incremental Increase	Incremental Increase Threshold	Exceeds Threshold? ⁴	Nearest Receptor Land Use Type	Opening Year 2028 + BIG Interior Noise Level at Nearest Receptor (dBA CNEL)	Interior Noise Standard (dBA CNEL)	Exceeds Standard?	Impact?
Main Street	Hinkley Road to Country Club Drive	52.9	53.0	0.1	3.0	No	SF Residential	50.8	45	Yes	No ⁴
	Country Club Drive to Lenwood Road	52.2	54.4	2.2	3.0	No	SF Residential	53.8	45	Yes	No ⁴
	Lenwood Road to County/City Boundary	51.8	52.2	0.4	3.0	No	SF Residential	55.5	45	Yes	No ⁴
	County/City Boundary to SR-58 Eastbound Ramps	51.8	52.2	0.4	3.0	No	Commercial	40.0	45	No	No
	SR-58 Eastbound Off-Ramps to SR-58 Westbound Ramps	53.1	53.6	0.5	3.0	No	N/A ⁵	N/A ⁵	45	-	No
	SR-58 Westbound Ramps to L Street	52.0	52.1	0.1	5.0	No	SF Residential	56.0	45	Yes	No ⁴
	L Street to Avenue A	51.5	51.5	0.0	3.0	No	MF Residential	55.4	45	Yes	No ⁴
	Avenue A to Barstow Road	50.7	50.7	0.0	3.0	No	MF Residential	46.2	45	Yes	No ⁴
Barstow Road	Main Street to I-15 Southbound Ramps	53.6	53.7	0.1	3.0	No	SF Residential	60.5	45	Yes	No ⁴
	I-15 Southbound Ramps to I-15 Northbound Ramps	54.3	54.4	0.1	3.0	No	SF Residential	46.2	45	Yes	No ⁴
	I-15 Northbound Ramps to Rimrock Road	54.9	54.9	0.0	3.0	No	MF Residential	57.7	45	Yes	No ⁴
Lenwood Road	SR-58 Westbound Ramps to Community Boulevard	49.3	52.5	3.2	5.0	No	SF Residential	55.8	45	Yes	No ⁴
	Community Boulevard to Agate Road	47.8	51.5	3.7	5.0	No	SF Residential	41.7	45	No	No
	Agate Road to Jasper Road	52.4	54.2	1.8	5.0	No	SF Residential	55.7	45	Yes	No ⁴
	Jasper Road to Main Street	54.4	56.5	2.0	3.0	No	SF Residential	44.1	45	No	No
	Main Street to High Desert Road	54.4	55.5	1.1	5.0	No	SF Residential	57.8	45	Yes	No ⁴
	High Desert Road to I-15 SB Off-Ramp	58.4	59.1	0.8	1.5	No	Commercial	46.0	50	No	No ²
	I-15 SB Off-Ramp to I-15 NB Off-Ramp	54.2	54.8	0.6	1.5	No	Commercial	50.9	50	Yes	No ^{2,4}
Hinkley Road	SR-58 Westbound Ramp to BIG Driveway	37.9	37.9	0.0	5.0	No	SF Residential	39.0	45	No	No
	BIG Driveway to Main Street ³	-	-	-	-	-	-	-	-	-	-
Notes: 1. Interior noise levels calculated using the modeled exterior noise levels and using an outdoor-to-indoor noise reduction of 10 dBA for windows open per the International Journal of Environmental Research and Public Health, <i>Differences between Outdoor and Indoor Sound Levels for open, Tilted, and Closed Windows</i>, 2018. 2. Hotels do not have operable windows, and therefore, interior noise levels would be within 45 dBA CNEL under a windows closed condition; see Table 5.12-57. 3. Hinkley Road would be vacated along this segment as part of BIG. 4. This roadway segment would not result in a substantial increase when No BIG noise levels already exceed City/County noise standards. See Appendix 5.12 BIG-1: Noise and Vibration Technical Report - Appendix A for impact screening analyses for all receptors. 5. <i>There are no developed land uses or sensitive receptors along roadway segment.</i>											
Source: Based on traffic data derived from the Traffic Impact Analysis (Kimley-Horn, 2024). Refer to Appendix 5.12 BIG-1: Noise and Vibration Technical Report - Appendix A for roadway traffic noise modeling assumptions and results.											

Table 5.12-57: Opening Year 2028 Plus BIG Conditions Roadway Traffic Interior Noise Levels – Windows Closed											
Roadway	Segment	Opening Year 2028 Interior Noise Level (dBA CNEL) ¹	Opening Year 2028 + BIG Interior Noise Level (dBA CNEL) ¹	Incremental Increase	Incremental Increase Threshold	Exceeds Threshold? ³	Nearest Receptor Land Use Type	Opening Year 2028 + BIG Interior Noise Level at Nearest Receptor (dBA CNEL)	Interior Noise Standard (dBA CNEL)	Exceeds Standard?	Impact?
Main Street	Hinkley Road to Country Club Drive	34.9	35.0	0.0	3.0	No	SF Residential	33.3	45	No	No
	Country Club Drive to Lenwood Road	34.2	36.4	2.2	3.0	No	SF Residential	35.8	45	No	No
	Lenwood Road to County/City Boundary	33.8	34.2	0.4	3.0	No	SF Residential	37.5	45	No	No
	County/City Boundary to SR-58 Eastbound Ramps	33.8	34.2	0.4	3.0	No	Commercial	22.0	45	No	No
	SR-58 Eastbound Off-Ramps to SR-58 Westbound Ramps	35.1	35.6	0.5	3.0	No	N/A ³	-	45	No	No ³
	SR-58 Westbound Ramps to L Street	34.0	34.1	0.1	5.0	No	SF Residential	38.0	45	No	No
	L Street to Avenue A	33.5	33.5	0.0	3.0	No	MF Residential	37.4	45	No	No
	Avenue A to Barstow Road	32.7	32.7	0.0	3.0	No	MF Residential	28.2	45	No	No
Barstow Road	Main Street to I-15 Southbound Ramps	35.6	35.7	0.1	3.0	No	SF Residential	42.5	45	No	No
	I-15 Southbound Ramps to I-15 Northbound Ramps	36.3	36.4	0.1	3.0	No	SF Residential	28.2	45	No	No
	I-15 Northbound Ramps to Rimrock Road	36.9	36.9	0.0	3.0	No	MF Residential	39.7	45	No	No
Lenwood Road	SR-58 Westbound Ramps to Community Boulevard	31.3	34.5	3.2	5.0	No	SF Residential	37.8	45	No	No
	Community Boulevard to Agate Road	29.8	33.5	3.7	5.0	No	SF Residential	23.7	45	No	No
	Agate Road to Jasper Road	34.4	36.2	1.8	5.0	No	SF Residential	37.7	45	No	No
	Jasper Road to Main Street	36.4	38.5	2.0	3.0	No	SF Residential	26.1	45	No	No
	Main Street to High Desert Road	36.4	37.5	1.1	5.0	No	SF Residential	39.8	45	No	No
	High Desert Road to I-15 SB Off-Ramp	40.4	41.1	0.8	1.5	No	Commercial	28.0	50	No	No
	I-15 SB Off-Ramp to I-15 NB Off-Ramp	36.2	36.8	0.6	1.5	No	Commercial	32.9	50	No	No
Hinkley Road	SR-58 Westbound Ramp to BIG Driveway	19.9	19.9	0.1	5.0	No	SF Residential	21.0	45	No	No
	BIG Driveway to Main Street ²	-	-	-	-	-	-	-	-	-	-
Notes: 1. Interior noise levels calculated using the modeled exterior noise levels and using an outdoor-to-indoor noise reduction of 28 dBA for windows closed per the International Journal of Environmental Research and Public Health, <i>Differences between Outdoor and Indoor Sound Levels for open, Tilted, and Closed Windows</i>, 2018. 2. Hinkley Road would be vacated along this segment as part of BIG. 3. There are no developed land uses or sensitive receptors along roadway segment.											
Source: Based on traffic data derived from the Traffic Impact Analysis (Kimley-Horn, 2024). Refer to Appendix 5.12 BIG-1: Noise and Vibration Technical Report - Appendix A for roadway traffic noise modeling assumptions and results.											

Table 5.12-58: Interim Year 2033 Plus BIG Conditions Roadway Traffic Interior Noise Levels – Windows Open											
Roadway	Segment	Interim Year 2033 Interior Noise Level (dBA CNEL) ¹	Interim Year 2033 + BIG Interior Noise Level (dBA CNEL) ¹	Incremental Increase	Incremental Increase Threshold	Exceeds Threshold? ⁴	Nearest Receptor Land Use Type	Interim Year 2033 + BIG Interior Noise Level at Nearest Receptor (dBA CNEL)	Interior Noise Standard (dBA CNEL)	Exceeds Standard?	Impact?
Main Street	Hinkley Road to Country Club Drive	55.2	55.3	0.0	3.0	No	SF Residential	53.1	45	Yes	No ⁴
	Country Club Drive to Lenwood Road	54.4	56.1	1.7	3.0	No	SF Residential	55.5	45	Yes	No ⁴
	Lenwood Road to County/City Boundary	52.0	52.5	0.5	3.0	No	SF Residential	55.8	45	Yes	No ⁴
	County/City Boundary to SR-58 Eastbound Ramps	52.0	52.5	0.5	3.0	No	Commercial	40.3	45	No	No
	SR-58 Eastbound Off-Ramps to SR-58 Westbound Ramps	53.4	53.9	0.6	3.0	No	N/A ⁵	-	45	No	No
	SR-58 Westbound Ramps to L Street	52.5	52.6	0.1	5.0	No	SF Residential	56.5	45	Yes	No ⁴
	L Street to Avenue A	51.6	51.7	0.1	3.0	No	MF Residential	55.6	45	Yes	No ⁴
	Avenue A to Barstow Road	50.7	50.7	0.0	3.0	No	MF Residential	46.2	45	Yes	No ⁴
Barstow Road	Main Street to I-15 Southbound Ramps	53.8	53.8	0.1	3.0	No	SF Residential	60.7	45	Yes	No ⁴
	I-15 Southbound Ramps to I-15 Northbound Ramps	54.7	54.8	0.1	3.0	No	SF Residential	46.6	45	Yes	No ⁴
	I-15 Northbound Ramps to Rimrock Road	55.5	55.5	0.0	3.0	No	MF Residential	58.3	45	Yes	No ⁴
Lenwood Road	SR-58 Westbound Ramps to Community Boulevard	48.8	52.7	4.0	5.0	No	SF Residential	56.1	45	Yes	No ⁴
	Community Boulevard to Agate Road	47.2	51.8	4.6	5.0	No	SF Residential	42.0	45	No	No
	Agate Road to Jasper Road	53.4	55.1	1.8	5.0	No	SF Residential	56.6	45	Yes	No ⁴
	Jasper Road to Main Street	55.5	57.6	2.0	3.0	No	SF Residential	45.2	45	Yes	Yes
	Main Street to High Desert Road	56.6	57.5	0.9	5.0	No	SF Residential	59.8	45	Yes	No ⁴
	High Desert Road to I-15 SB Off-Ramp	59.8	60.5	0.7	1.5	No	Commercial	47.4	50	No	No ^{2,4}
	I-15 SB Off-Ramp to I-15 NB Off-Ramp	55.6	56.1	0.6	1.5	No	Commercial	52.3	50	Yes	No ^{2,4}
Hinkley Road	SR-58 Westbound Ramp to BIG Driveway	37.8	38.0	0.1	5.0	No	SF Residential	39.0	45	No	No
	BIG Driveway to Main Street ³	-	-	-	-	-	-	-	-	-	-
Notes: 1. Interior noise levels calculated using the modeled exterior noise levels and using an outdoor-to-indoor noise reduction of 10 dBA for windows open per the International Journal of Environmental Research and Public Health, <i>Differences between Outdoor and Indoor Sound Levels for open, Tilted, and Closed Windows</i>, 2018. 2. Hotels do not have operable windows, and therefore, interior noise levels would be within 45 dBA CNEL under a windows closed condition; see Table 5.12-57. 3. Hinkley Road would be vacated along this segment as part of BIG. 4. This roadway segment would not result in a substantial increase when No BIG noise levels already exceed City/County noise standards. See Appendix 5.12 BIG-1 Appendix A for impact screening analyses for all receptors. 5. There are no developed land uses or sensitive receptors along roadway segment.											
Source: Based on traffic data derived from the Traffic Impact Analysis (Kimley-Horn, 2024). Refer to Appendix 5.12 BIG-1: Noise and Vibration Technical Report - Appendix A for roadway traffic noise modeling assumptions and results.											

Table 5.12-59: Interim Year 2033 Plus BIG Conditions Roadway Traffic Interior Noise Levels – Windows Closed											
Roadway	Segment	Interim Year 2033 Interior Noise Level (dBA CNEL) ¹	Interim Year 2033 + BIG Interior Noise Level (dBA CNEL) ¹	Incremental Increase	Incremental Increase Threshold	Exceeds Threshold? ³	Nearest Receptor Land Use Type	Interim Year 2033 + BIG Interior Noise Level at Nearest Receptor (dBA CNEL)	Interior Noise Standard (dBA CNEL)	Exceeds Standard?	Impact?
Main Street	Hinkley Road to Country Club Drive	37.2	37.3	0.0	3.0	No	SF Residential	35.1	45	No	No
	Country Club Drive to Lenwood Road	36.4	38.1	1.7	3.0	No	SF Residential	37.5	45	No	No
	Lenwood Road to County/City Boundary	34.0	34.5	0.5	3.0	No	SF Residential	37.8	45	No	No
	County/City Boundary to SR-58 Eastbound Ramps	34.0	34.5	0.5	3.0	No	Commercial	22.3	45	No	No
	SR-58 Eastbound Off-Ramps to SR-58 Westbound Ramps	35.4	35.9	0.6	3.0	No	N/A ³		45	No	No
	SR-58 Westbound Ramps to L Street	34.5	34.6	0.1	5.0	No	SF Residential	38.5	45	No	No
	L Street to Avenue A	33.6	33.7	0.1	3.0	No	MF Residential	37.6	45	No	No
	Avenue A to Barstow Road	32.7	32.7	0.0	3.0	No	MF Residential	28.2	45	No	No
Barstow Road	Main Street to I-15 Southbound Ramps	35.8	35.8	0.1	3.0	No	SF Residential	42.7	45	No	No
	I-15 Southbound Ramps to I-15 Northbound Ramps	36.7	36.8	0.1	3.0	No	SF Residential	28.6	45	No	No
	I-15 Northbound Ramps to Rimrock Road	37.5	37.5	0.0	3.0	No	MF Residential	40.3	45	No	No
Lenwood Road	SR-58 Westbound Ramps to Community Boulevard	30.8	34.7	4.0	5.0	No	SF Residential	38.1	45	No	No
	Community Boulevard to Agate Road	29.2	33.8	4.6	5.0	No	SF Residential	24.0	45	No	No
	Agate Road to Jasper Road	35.4	37.1	1.8	5.0	No	SF Residential	38.6	45	No	No
	Jasper Road to Main Street	37.5	39.6	2.0	3.0	No	SF Residential	27.2	45	No	No
	Main Street to High Desert Road	38.6	39.5	0.9	5.0	No	SF Residential	41.8	45	No	No
	High Desert Road to I-15 SB Off-Ramp	41.8	42.5	0.7	1.5	No	Commercial	29.4	45	No	No
	I-15 SB Off-Ramp to I-15 NB Off-Ramp	37.6	38.1	0.6	1.5	No	Commercial	34.3	45	No	No
Hinkley Road	SR-58 Westbound Ramp to BIG Driveway	19.8	20.0	0.1	5.0	No	SF Residential	21.0	45	No	No
	BIG Driveway to Main Street ²	-	-	-	-	-	-	-	-	-	-
Notes: 1. Interior noise levels calculated using the modeled exterior noise levels and using an outdoor-to-indoor noise reduction of 28 dBA for windows closed per the International Journal of Environmental Research and Public Health, <i>Differences between Outdoor and Indoor Sound Levels for open, Tilted, and Closed Windows</i>, 2018. 2. Hinkley Road would be vacated along this segment as part of BIG. 3. There are no developed land uses or sensitive receptors along roadway segment.											
Source: Based on traffic data derived from the Traffic Impact Analysis (Kimley-Horn, 2024). Refer to Appendix 5.12 BIG-1: Noise and Vibration Technical Report - Appendix A for roadway traffic noise modeling assumptions and results.											

It is also noted that noise barriers BAR-2 and BAR-3 would not reduce roadway traffic noise levels at the impacted receptors Lenwood Road (from Jasper Road to Main Street) due to their location(s). Noise barriers BAR-2 and BAR-3 were strategically positioned to block the line of sight from on-site BIG operational activities (i.e., rail corridor activity along the existing mainline and at the block swap yard and intermodal facility, new south mainline, train switching and coupling activities at the block swap yard, intermodal facility operations, truck loading/unloading activity at the transload warehouse center, mechanical equipment, solar generation facility operations, and generators) would not block roadway traffic noise at the impacted receptors discussed above. Therefore, noise barriers BAR-2 and BAR-3 are not considered feasible mitigation to reduce roadway traffic noise impacts and are excluded from this analysis.

Horizon Year 2048

Table 5.12-60: Horizon Year 2048 Plus BIG Conditions Roadway Traffic Interior Noise Levels – Windows Open and **Table 5.12-61: Horizon Year 2048 Plus BIG Conditions Roadway Traffic Interior Noise Levels – Windows Closed** show interior roadway traffic noise levels along roadway segments for Horizon Year 2048 Plus BIG conditions. As indicated in **Table 5.12-60**, interior noise levels with windows open due to the addition of BIG roadway noise sources would range from 37.6 dBA to 62.9 dBA at 100 feet from the roadway centerline under Horizon Year 2048 Plus BIG conditions. Roadway traffic noise along one roadway segment (Lenwood Road from Community Boulevard to Agate Road) would result in an increase above the incremental standard under a windows open condition and exceed the interior noise standard of 45 dBA L_{dn} at the nearest sensitive receptors as a result of BIG.

As shown in **Table 5.12-60**, no roadway segments would also exceed the interior noise standard of 45 dBA L_{dn} at the nearest sensitive receptors as a result of BIG for a windows closed condition. However, one roadway segment (Lenwood Road from Community Boulevard to Agate Road) would result in an increase above the incremental standard under a windows closed condition and result in a potentially significant impact. However, as discussed above for exterior roadway traffic noise impacts, mitigation options to reduce incremental increase interior roadway traffic noise levels are limited and infeasible to implement. Therefore, a significant and unavoidable impact would occur in this regard.

It is also noted that noise barriers BAR-2 and BAR-3 would not reduce roadway traffic noise levels at the impacted receptors along Lenwood Road (from Jasper Road to Main Street) due to their location(s). Noise barriers BAR-2 and BAR-3 were strategically positioned to block the line of sight from on-site BIG operational activities (i.e., rail corridor activity along the existing mainline and at the block swap yard and intermodal facility, new south mainline, train switching and coupling activities at the block swap yard, intermodal facility operations, truck loading/unloading activity at the transload warehouse center, mechanical equipment, solar generation facility operations, and generators) would not block roadway traffic noise at the impacted receptors discussed above. Therefore, noise barriers BAR-2 and BAR-3 are not considered feasible mitigation to reduce roadway traffic noise impacts and are excluded from this analysis.

Table 5.12-60: Horizon Year 2048 Plus BIG Conditions Roadway Traffic Interior Noise Levels – Windows Open											
Roadway	Segment	Horizon Year 2048 Interior Noise Level (dBA CNEL) ¹	Horizon Year 2048 + BIG Interior Noise Level (dBA CNEL) ¹	Incremental Increase	Incremental Increase Threshold	Exceeds Threshold? ⁴	Nearest Receptor Land Use Type	Horizon Year 2048 + BIG Interior Noise Level at Nearest Receptor (dBA CNEL)	Interior Noise Standard (dBA CNEL)	Exceeds Standard?	Impact?
Main Street	Hinkley Road to Country Club Drive	58.7	58.7	0.0	3.0	No	SF Residential	56.5	45	Yes	No ⁴
	Country Club Drive to Lenwood Road	57.7	58.7	1.0	3.0	No	SF Residential	58.1	45	Yes	No ⁴
	Lenwood Road to County/City Boundary	52.5	53.0	0.5	3.0	No	SF Residential	56.4	45	Yes	No ⁴
	County/City Boundary to SR-58 Eastbound Ramps	52.5	53.0	0.5	3.0	No	Commercial	40.8	45	No	No
	SR-58 Eastbound Off-Ramps to SR-58 Westbound Ramps	54.1	54.7	0.6	3.0	No	N/A ⁵	-	45	No	No
	SR-58 Westbound Ramps to L Street	53.9	53.9	0.1	5.0	No	SF Residential	57.8	45	Yes	No ⁴
	L Street to Avenue A	51.9	52.0	0.1	3.0	No	MF Residential	55.9	45	Yes	No ⁴
	Avenue A to Barstow Road	50.8	50.8	0.0	3.0	No	MF Residential	46.3	45	Yes	No ⁴
Barstow Road	Main Street to I-15 Southbound Ramps	54.2	54.3	0.1	3.0	No	SF Residential	61.1	45	Yes	No ⁴
	I-15 Southbound Ramps to I-15 Northbound Ramps	55.6	55.7	0.1	3.0	No	SF Residential	47.5	45	Yes	No ⁴
	I-15 Northbound Ramps to Rimrock Road	56.8	56.8	0.0	3.0	No	MF Residential	59.6	45	Yes	No ⁴
Lenwood Road	SR-58 Westbound Ramps to Community Boulevard	46.7	50.6	3.9	5.0	No	SF Residential	54.0	45	Yes	No ⁴
	Community Boulevard to Agate Road	44.5	50.0	5.5	5.0	Yes	SF Residential	40.2	45	No	No
	Agate Road to Jasper Road	55.3	56.8	1.4	5.0	No	SF Residential	58.2	45	Yes	No ⁴
	Jasper Road to Main Street	57.7	59.3	1.6	3.0	No	SF Residential	46.9	45	Yes	No ⁴
	Main Street to High Desert Road	59.9	60.4	0.5	5.0	No	SF Residential	62.8	45	Yes	No ⁴
	High Desert Road to I-15 SB Off-Ramp	62.5	62.9	0.5	1.5	No	Commercial	49.8	50	Yes	No ^{2,4}
	I-15 SB Off-Ramp to I-15 NB Off-Ramp	58.2	58.5	0.4	1.5	No	Commercial	54.7	50	Yes	No ^{2,4}
Hinkley Road	SR-58 Westbound Ramp to BIG Driveway	37.5	37.6	0.1	5.0	No	SF Residential	38.7	45	No	No
	BIG Driveway to Main Street ³	-	-	-	-	-	-	-	-	-	-
Notes: 1. Interior noise levels calculated using the modeled exterior noise levels and using an outdoor-to-indoor noise reduction of 10 dBA for windows open per the International Journal of Environmental Research and Public Health, <i>Differences between Outdoor and Indoor Sound Levels for open, Tilted, and Closed Windows</i>, 2018. 2. Hotels do not have operable windows, and therefore, interior noise levels would be within 45 dBA CNEL under a windows closed condition; see Table 5.12-61. 3. Hinkley Road would be vacated along this segment as part of BIG. 4. This roadway segment would not result in a substantial increase when No BIG noise levels already exceed City/County noise standards. See Appendix 5.12 BIG-1 - Appendix A for impact screening analyses for all receptors. 5. There are no developed land uses or sensitive receptors along roadway segment.											
Source: Based on traffic data derived from the Traffic Impact Analysis (Kimley-Horn, 2024). Refer to Appendix 5.12 BIG-1: Noise and Vibration Technical Report - Appendix A for roadway traffic noise modeling assumptions and results.											

Table 5.12-61: Horizon Year 2048 Plus BIG Conditions Roadway Traffic Interior Noise Levels – Windows Closed											
Roadway	Segment	Horizon Year 2048 Interior Noise Level (dBA CNEL) ¹	Horizon Year 2048 + BIG Interior Noise Level (dBA CNEL) ¹	Incremental Increase	Incremental Increase Threshold	Exceeds Threshold? ³	Nearest Receptor Land Use Type	Horizon Year 2048 + BIG Interior Noise Level at Nearest Receptor (dBA CNEL)	Interior Noise Standard (dBA CNEL)	Exceeds Standard?	Impact?
Main Street	Hinkley Road to Country Club Drive	40.7	40.7	0.0	3.0	No	SF Residential	38.5	45	No	No
	Country Club Drive to Lenwood Road	39.7	40.7	1.0	3.0	No	SF Residential	40.1	45	No	No
	Lenwood Road to County/City Boundary	34.5	35.0	0.5	3.0	No	SF Residential	38.4	45	No	No
	County/City Boundary to SR-58 Eastbound Ramps	34.5	35.0	0.5	3.0	No	Commercial	22.8	45	No	
	SR-58 Eastbound Off-Ramps to SR-58 Westbound Ramps	36.1	36.7	0.6	3.0	No	N/A	-	45	No	No
	SR-58 Westbound Ramps to L Street	35.9	35.9	0.1	5.0	No	SF Residential	39.8	45	No	No
	L Street to Avenue A	33.9	34.0	0.1	3.0	No	MF Residential	37.9	45	No	No
	Avenue A to Barstow Road	32.8	32.8	0.0	3.0	No	MF Residential	28.3	45	No	No
Barstow Road	Main Street to I-15 Southbound Ramps	36.2	36.3	0.1	3.0	No	SF Residential	43.1	45	No	No
	I-15 Southbound Ramps to I-15 Northbound Ramps	37.6	37.7	0.1	3.0	No	SF Residential	29.5	45	No	No
	I-15 Northbound Ramps to Rimrock Road	38.8	38.8	0.0	3.0	No	MF Residential	41.6	45	No	No
Lenwood Road	SR-58 Westbound Ramps to Community Boulevard	28.7	32.6	3.9	5.0	No	SF Residential	36.0	45	No	No
	Community Boulevard to Agate Road	26.5	32.0	5.5	5.0	Yes	SF Residential	22.2	45	No	No
	Agate Road to Jasper Road	37.3	38.8	1.4	5.0	No	SF Residential	40.2	45	No	No
	Jasper Road to Main Street	39.7	41.3	1.6	3.0	No	SF Residential	28.9	45	No	No
	Main Street to High Desert Road	41.9	42.4	0.5	5.0	No	SF Residential	44.8	45	Yes	No
	High Desert Road to I-15 SB Off-Ramp	44.5	44.9	0.5	1.5	No	Commercial	31.8	45	No	No
	I-15 SB Off-Ramp to I-15 NB Off-Ramp	40.2	40.5	0.4	1.5	No	Commercial	36.7	45	No	No
Hinkley Road	SR-58 Westbound Ramp to BIG Driveway	19.5	19.6	0.1	5.0	No	SF Residential	20.7	45	No	No
	BIG Driveway to Main Street ²	-	-	-	-	-	-	-	-	-	-
Notes: 1. Interior noise levels calculated using the modeled exterior noise levels and using an outdoor-to-indoor noise reduction of 28 dBA for windows closed per the International Journal of Environmental Research and Public Health, <i>Differences between Outdoor and Indoor Sound Levels for open, Tilted, and Closed Windows</i>, 2018. 2. Hinkley Road would be vacated along this segment as part of BIG. 3. This roadway segment would not result in a substantial increase when No BIG noise levels already exceed City/County noise standards (see Section 4.2 for noise impact thresholds). See Appendix 5.12 BIG-1: Appendix A for impact screening analyses for all receptors. Source: Based on traffic data derived from the Traffic Impact Analysis (Kimley-Horn, 2024). Refer to Appendix 5.12 BIG-1: Noise and Vibration Technical Report - Appendix A for roadway traffic noise modeling assumptions and results.											

Impact 5.12-1: BIG: Level of Significance Before Mitigation: Potentially Significant Impact.

Mitigation Measures

- MM BIG NOI-1** **Construction Noise Logistics Plan.** Prior to construction, the implementing entity shall demonstrate to the satisfaction of the City of Barstow Director of Public Works or City Engineer that BIG includes a Nighttime Construction Noise Logistics Plan. The Construction Noise Logistics Plan shall identify the specific construction activity areas, list of construction equipment to be used during nighttime construction and include noise reduction measures to minimize nighttime construction noise levels at nearby residences to the extent feasible. Noise reduction measures may include, but are not limited to, the following:
- Install a temporary construction site sound barrier near the noise source.
 - Prohibit unnecessary idling of internal combustion engines. Post signs at gates and other places where vehicles may congregate reminding operators of the State’s Airborne Toxic Control Measure (ATCM) limiting idling to no more than 5 minutes.
 - Utilize “quiet” air compressors and other stationary noise sources where technology exists.
 - Construction contracts specify that all construction equipment, fixed or mobile, shall be equipped with properly operating and maintained mufflers and other State-required noise attenuation devices.
 - Property owners and occupants located within 300 feet of the BIG footprint shall be sent a notice, at least 15 days prior to the commencement of nighttime construction activities, regarding the construction schedule of BIG. A sign, legible at 50 feet shall also be posted at BIG’s construction site. All notices and signs shall be reviewed and approved by the Director of Planning, Building and Code Enforcement or Director’s designee, prior to mailing or posting and shall indicate the dates and duration of construction activities, as well as provide a contact name and a telephone number for the Noise Disturbance Coordinator where residents can inquire about the construction process and register complaints.
 - Prior to construction, the implementing entity’s contractor shall provide evidence that at all times during construction activities an on-site construction staff member will be designated as a Noise Disturbance Coordinator. The Noise Disturbance Coordinator is responsible for responding to complaints about construction noise. When a complaint is received, the Noise Disturbance Coordinator shall determine the cause (e.g., starting too early, bad muffler, etc.), implement reasonable measures to resolve the complaint, and document actions taken. All notices sent to residential units within 300 feet of the construction site and all signs posted at the construction site, shall include the contact name and the telephone number for the Noise Disturbance Coordinator.

MM BIG NOI-2 Noise Barriers. The implementing entity shall construct three noise barriers as listed below to mitigate BIG’s noise impacts:

- A 10-foot high, approximately 700-foot-long absorptive noise barrier surrounding the BESS equipment in the northeastern portion of the solar farm (BAR-2);
- A 10-foot-high, approximately 470-foot-long absorptive noise barrier surrounding the substation in the northeastern portion of the solar farm (BAR-3); and
- A 14-foot-high, approximately 150-foot-long absorptive noise barrier along the eastern and southern boundary of the emergency generators in the northeastern portion of the intermodal facility (BAR-5).

To be effective, the barriers shall be constructed with a solid material with no gaps in the face of the wall or at the base. Openings or gaps between sound wall materials or the ground substantially reduce the effectiveness of the noise barrier. All noise control barrier walls shall be designed to preclude structural failure due to such factors as winds, shear, shallow soil failure, earthquakes, and erosion. The City Building Official shall review and approve all proposed designs prior to the issuance of a building permit.

The approximate locations of the noise barriers are provided in **Figure 5.12-14** and **Figure 5.12-15**.

Impact 5.12-1: BIG: Level of Significance After Mitigation: Significant and Unavoidable Impact.

Impact 5.12-2	<i>Would the Project result in generation of excessive groundborne vibration or groundborne noise levels?</i>
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Proposed General Plan

Construction

Construction activities at project sites within the City would generate varying degrees of ground vibration, depending on the construction procedures and equipment. Operation of construction equipment generates vibrations that spread through the ground and diminish with distance from the source. The effect on buildings in the vicinity of the construction site varies depending on soil type, ground strata, and receptor-building construction. The results from vibration can range from no perceptible effects at the lowest vibration levels, to low rumbling sounds and perceptible vibrations at moderate levels, to slight structural damage at the highest levels. Vibration from construction activities rarely reaches the levels that can damage structures but can achieve the audible and perceptible ranges in buildings close to the construction site. **Table 5.12-62: Vibration Levels for Construction Equipment**, lists reference vibration levels for construction equipment at 50 feet.

Table 5.12-62: Vibration Levels for Construction Equipment	
Equipment	Approximate PPV Vibration Level at 50 Feet (inches per second)
Pile Driver, Impact (Upper Range)	0.537
Pile Driver, Impact (Typical)	0.228
Pile Driver, Sonic (Upper Range)	0.260
Pile Driver, Sonic (Typical)	0.060
Vibratory Roller	0.074
Large Bulldozer	0.031
Caisson Drilling	0.031
Loaded Trucks	0.027
Jackhammer	0.012
Small Bulldozer	0.001
Note: PPV is the peak rate of speed at which soil particles move (e.g., inches per second or in/sec) due to ground vibration	
Sources: FTA. 2018. <i>Transit Noise and Vibration Impact Assessment Manual</i> .	

As shown in **Table 5.12-62**, vibration generated by construction equipment has the potential to be substantial, since it has the potential to exceed the City's Strategy 2.B-2 vibration standard of 0.2 in/sec PPV and the FTA criteria for architectural damage—e.g., 0.12 inches per second PPV for fragile or historical resources, 0.2 in/sec PPV for nonengineered timber and masonry buildings, and 0.3 in/sec PPV for engineered concrete and masonry. Construction details and equipment for future project-level developments under the proposed General Plan are not known at this time but may cause vibration impacts. As such, impacts would be potentially significant.

Operations

Commercial and industrial operations in the City would generate varying degrees of ground vibration, depending on the operational procedures and equipment. Such equipment-generated vibrations would spread through the ground and diminish with distance from the source. The effect on buildings in the vicinity of the vibration source varies depending on soil type, ground strata, and receptor-building construction. The results from vibration can range from no perceptible effects at the lowest vibration levels, to low rumbling sounds and perceptible vibrations at moderate levels, to slight structural damage at the highest levels.

Proposed General Plan Strategy 2.B-2 would require new development to generate operation and/or construction vibration levels no greater than 0.2 in/sec PPV at the property line of a sensitive receptor. However, because specific project-level information is not available at this time, it is not possible to quantify future vibration levels at vibration-sensitive receptors that may be near future vibration sources. Therefore, due to the potential for sensitive uses within the City to be exposed to annoying and/or interfering levels of vibration from commercial or industrial operations, operations-related vibration impacts associated with implementation of the proposed General Plan are considered potentially significant.

Impact 5.12-2: General Plan: Level of Significance Before Mitigation: Potentially Significant Impact.

Mitigation Measures

MM GP NOI-3 Construction Vibration Analysis. Prior to issuance of a building permit for a project requiring pile driving during construction within 135 feet of fragile structures, such as historical resources, within 100 feet of nonengineered timber and masonry buildings (e.g., most residential buildings), or within 75 feet of engineered concrete and masonry (no plaster); or a vibratory roller within 25 feet of any structure, the project applicant shall prepare a noise and vibration analysis to assess and mitigate potential noise and vibration impacts related to these activities. This vibration analysis shall be conducted by a qualified and experienced acoustical consultant or engineer. The vibration levels shall not exceed the City's or FTA's architectural damage thresholds shown in **Table 5.12-5**. If vibration levels would exceed these thresholds, alternative methods shall be used, such as drilling piles instead of pile driving and static rollers instead of vibratory rollers. If necessary, construction vibration monitoring shall be conducted to ensure vibration thresholds are not exceeded.

MM GP NOI-4 Operation Vibration Analysis. Prior to issuance of a building permit for equipment that has the potential to result in significant vibration, a vibration analysis shall be conducted to assess and mitigate potential vibration impacts. This vibration analysis shall be conducted by a qualified and experienced acoustical consultant or engineer and shall follow the latest practices, and precedents to show compliance with Strategy 2.B-2 vibration standard of 0.2 in/sec PPV.

Impact 5.12-2: General Plan: Level of Significance After Mitigation: Less than Significant With Mitigation Incorporated.

Barstow International Gateway

Construction

Construction vibration could result in human annoyance and building damage. Human annoyance occurs when construction vibration rises above the threshold of human perception for extended periods of time. The ground-borne vibration effect criteria during construction activities for different building categories are presented in **Table 5.12-5**. Building damage occurs when construction activities produce waves in the ground that are strong enough to cause cosmetic or structural damage.

BIG construction has the potential to result in varying degrees of temporary ground-borne vibration, depending on the equipment used and the operations involved. In general, the FTA architectural damage criterion for continuous vibrations (0.2 in/sec) is considered conservative.

Table 5.12-63: Typical Construction Equipment Vibration Levels lists vibration levels at 50 feet for typical construction equipment. Ground-borne vibration generated by construction equipment spreads through the ground and diminishes in magnitude with increases in distance. No construction activities generating ground-borne vibration would be conducted closer than 50 feet from sensitive receptors. As indicated in **Table 5.12-63**, at 50 feet, construction equipment PPV and approximate vibration velocities would not

exceed 0.074 in/sec PPV and 85 VdB, respectively, which would be below the FTA's 0.2 in/sec PPV threshold for structural damage, Caltrans' 0.1 in/sec PPV threshold for human annoyance, and FTA's most stringent construction building damage criterion of 90 VdB for extremely sensitive buildings (see **Table 5.12-5**).

Table 5.12-63: Typical Construction Equipment Vibration Levels		
Equipment	Peak Particle Velocity at 50 Feet (inches/second)¹	Approximate Velocity Level at 50 Feet (VdB)²
Large bulldozer	0.032	78
Caisson drilling	0.032	78
Loaded trucks	0.027	77
Vibratory roller	0.074	85
Jackhammer	0.012	70
Small bulldozer/tractors	0.001	49
Notes: ¹ Calculated using the following formula: $PPV_{equip} = PPV_{ref} \times (25/D)^{1.5}$, where: PPV_{equip} = the peak particle velocity in in/sec of the equipment adjusted for the distance; PPV_{ref} = the reference vibration level in in/sec from Table 7-4 of the Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual, September 2018; D = the distance from the equipment to the receptor. ² Calculated using the following formula: $Lv(D) = Lv_{ref} - 30\log(D/25 \text{ feet})$, where: $Lv(D)$ = the RMS velocity level adjusted for distance; Lv_{ref} = the source reference vibration level at 25 feet (VdB); and D = distance from the equipment to the receptor (feet) from Equation 7-3 of the Federal Transit Administration, <i>Transit Noise and Vibration Impact Assessment Manual</i> , September 2018. ³ VdB = vibration velocity level, decibels		
Sources: FTA. 2018. Transit Noise and Vibration Impact Assessment Manual.		

Pile-driving for Bridge 6.5 and 10.98 would occur at distances of 2,500 feet from the nearest sensitive receptors. As shown in **Table 5.12-64: Pile-Driving Vibration Levels**, at 2,500 feet, pile-driving vibration velocities would be approximately 0.002 in/sec PPV and 52 VdB, which would not exceed the FTA's 0.2 PPV threshold for structural damage, Caltrans' 0.1 in/sec PPV threshold for human annoyance, or FTA's most stringent construction building damage criterion of 90 VdB for extremely sensitive buildings. Construction vibration levels from BIG would not exceed any applicable thresholds or standards, and a less than significant impact would occur.

Table 5.12-64: Pile-Driving Vibration Levels		
Equipment	PPV at 2,500 Feet (inches/second)	Approximate Velocity Level at 2,500 Feet (VdB)¹
Pile-driver (impact)	0.002	52
Note: 1. VdB = vibration velocity level, decibels		
Sources: FTA. 2018. <i>Transit Noise and Vibration Impact Assessment Manual</i> .		

Operations

Ground-borne Vibration Analysis

The nearest off-site structure (a single-family dwelling) to the BIG footprint is approximately 165 feet from the center of the mainline tracks along the west lead track alignment. At this distance and conservatively

assuming a maximum speed of 50 mph,² vibration levels from BIG train pass-bys would be approximately 73.44 VdB, which would be below the FTA's 80 VdB ground-borne vibration impact level for Land Use Category 2 uses for infrequent events during Opening Year 2028 and Interim Year 2033 with BIG conditions. In addition, vibration levels (73.44 VdB) be below the FTA's 75 VdB ground-borne vibration impact level for Land Use Category 2 for infrequent events under Horizon Year 2048 with BIG conditions. The expected vibration levels would also be substantially below the building damage criterion of 94 VdB as established in **Table 5.12-5**.

In addition, the nearest Land Use Category 3 structure (Lenwood Elementary School) is approximately 600 feet from the proposed east lead track alignment. At this distance and a maximum speed of 40 mph, vibration levels from BIG would be approximately 57.54 VdB, which would be below the FTA's 83 VdB ground-borne vibration impact level for Land Use Category 3 for infrequent events during Opening Year 2028 and Interim Year 2033 with BIG conditions and 78 VdB threshold for occasional events during Horizon Year 2048 with BIG conditions. As a result, vibration levels from BIG operational train pass-bys would not cause structural damage at off-site structures or create human annoyance.

BIG would also include heavy truck movement activity in and around BIG. These movements would generally be low-speed and would occur over new, smooth surfaces. For perspective, Caltrans has studied the effects of propagation of vehicle vibration on sensitive land uses and notes that "heavy trucks, and quite frequently buses, generate the highest earthborn [groundborne] vibrations of normal traffic." Caltrans further notes that the highest traffic-generated vibrations are along freeways and State routes. Their study finds that "vibrations measured on freeway shoulders (five meters from the centerline of the nearest lane) have never exceeded 0.08 inches per second, with the worst combinations of heavy trucks and poor roadway conditions (while such trucks were moving at freeway speeds). This level coincides with the maximum recommended safe level for ruins and ancient monuments (and historic buildings)." Since BIG's truck movements would be at low speed (not at freeway speeds) and would be over smooth surfaces (not under poor roadway conditions), BIG-related vibration associated with truck activity would not result in excessive ground-borne vibrations; no vehicle-generated vibration impacts would occur.

As discussed above, BIG operations would not create or cause significant vibration impacts. A less than significant impact would occur in this regard.

Ground-borne Noise Analysis

Ground-borne noise is audible noise caused by the low-frequency vibration of room surfaces. In simpler terms, ground-borne noise is caused by ground vibrations, and estimated by looking at how much a building floor shakes. The FTA measures how loud a sound is by adding the ground-borne vibration speed (VdB) to adjustments for the type of room due to absorption and diffusion from the building material and the sound frequency. For typical rooms, the adjustment is -5 decibels (dB), and for heavier structures like storage sheds, it is 0 dB. This means that the noise from ground vibrations would be less than the actual vibrations themselves.

² According to BNSF, trains are likely to be traveling at speeds lower than 40 mph as they enter/exit the BIG footprint. However, 50 mph is conservatively used to evaluate worst-case operational vibration effects.

According to the FTA, airborne noise levels would be higher than ground-borne noise levels; therefore, if a project's airborne noise levels would not result in significant effects, then it is assumed that ground-borne noise would similarly not result in significant effects. Unless indoor receptors have substantial sound insulation (e.g., recording studio) and would be exposed to vibration velocities great enough to cause substantial levels of ground-borne noise, ground-borne noise does not need to be assessed. Ground-borne noise is typically assessed for locations where subway or tunnel operations, where there is no airborne noise path, are present. BIG would not include a subway or tunnel, and all rail operations would occur at-grade. In addition, there are no substantially insulated indoor noise receptors located within 100 feet of the BIG site. Therefore, the effects of airborne noise would be greater than ground-borne noise levels.

Ground-borne A-weighted noise levels can be estimated utilizing the average vibration velocity level. For low frequency ground vibration such as that generated by at-grade or surface rail operations, the ground-borne noise level is estimated by subtracting 50 dB from the vibration velocities (VdB). As discussed above, the estimated ground-borne vibration levels from BIG trains would reach approximately 73.44 VdB, which would result in a ground-borne noise level of approximately 23.44 VdB and would not exceed the FTA's most stringent standard of 35 dBA at Category 2 Buildings (residences and buildings where people normally sleep) for frequent vibration events. Therefore, ground-borne noise impacts from BIG would be less than significant.

Impact 5.12-2: BIG: Level of Significance Before Mitigation: Less than Significant Impact.

Impact 5.12-2: BIG Mitigation Measures: No mitigation required.

Impact 5.12-2: BIG Level of Significance After Mitigation: No significant impact would occur.

Impact 5.12-3 *For a Project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the Project expose people residing or working in the Project area to excessive noise levels?*

Proposed General Plan

The nearest public airport, Barstow-Daggett Airport, is approximately 8.5 miles east of the nearest Barstow jurisdictional boundary line. The airport noise contours do not extend into the City's boundaries and airport noise would not significantly affect nearby sensitive receptors (i.e., all residences in Barstow's boundaries and SOI are outside of the 60 dBA L_{dn} noise contours) (San Bernardino County Land Use Commission, 1992).

There are two recognized helicopter pads within the City: Barstow Community Hospital and Barstow Service Center Heliport, the latter owned by Southern California Edison (SCE). Caltrans Division of Aeronautics regulates and permits the Community Hospital Heliports. SCE uses the Service Center landing site sporadically to inspect lines and during emergencies. Because these landing sites are used on an

occasional basis, there are no noise contours assigned to the landing pads. Due to the low usage of these sites, there would not be regular exposure of residents or workers to helicopter noise.

Because the proposed General Plan would not cause a direct increase in flights and all residences are outside of the 60 dBA L_{dn} noise contours, impacts of airport-related noise on future residents and workers in the City would not occur.

Impact 5.12-3: General Plan: Level of Significance Before Mitigation: No Impact.

Impact 5.12-3: General Plan: Mitigation Measures: No mitigation required.

Impact 5.12-3: General Plan: Level of Significance After Mitigation: No impact would occur.

Barstow International Gateway

Construction and Operations

There are no airport land use plans for properties within the study area. The nearest public airport to BIG is Barstow-Daggett Airport, approximately 17 miles from BIG footprint. Further, as discussed in **Section 5.9: Hazards, Hazardous Materials and Wildfire**, a private airstrip is currently located with BIG footprint. However, BIG would remove the airstrip as part of the proposed solar farm resulting in the next nearest private airstrip being over two miles away. There are no other private airports in the vicinity of BIG. Therefore, BIG would not expose people residing or working in BIG footprint to excessive airport- or airstrip-related noise levels and a less than significant impact would occur.

Impact 5.12-3: BIG: Level of Significance Before Mitigation: Less Than Significant Impact.

Impact 5.12-3: BIG: Mitigation Measures: No mitigation required.

Impact 5.12-3: BIG: Level of Significance After Mitigation: No significant impact would occur.

5.12.7 SIGNIFICANT UNAVOIDABLE IMPACTS

Proposed General Plan

Implementation of **MM GP NOI-1** would reduce potential noise impacts during construction to the extent feasible. However, due to the potential for proximity of construction activities to sensitive uses, the number of construction projects occurring simultaneously, and the potential duration of construction activities, **Impact NOI-1** (construction noise) could result in a temporary substantial increase in noise levels above ambient conditions. Not all projects can limit construction hours to between 7:00 AM and 7:00 PM Monday through Sunday as required by **MM GP NOI-1**; therefore, some projects may exceed the noise standards (e.g., large concrete pours, or roadway construction due to weather or a need to avoid peak traffic). Therefore, impacts would remain significant and unavoidable. It should be noted that the identification of this program-level impact does not preclude the finding of less than significant impacts for subsequent projects analyzed at the project level.

Transportation noise from roadways will increase significantly during the planning period. While new projects can integrate design features that will reduce noise impacts from traffic, existing developments are limited in their ability to reduce noise impacts from traffic. Barrier walls would prevent access to/from individual properties and would be infeasible because to be effective the barrier needs to break the line of sight of the receptor (home) from the noise source (road) which would mean blocking the driveway. Noise walls, building setbacks, and physical barriers between the traffic noise source and the sensitive receptor are effective, but not always feasible. Implementation of **MM GP NOI-2** could reduce the impact of future traffic noise on new and existing development; however, they may not be feasible or practical mitigation measures to reduce project-generated traffic noise to less-than-significant levels for existing residences along the affected roadways. No individual measure and no set of feasible or practical mitigation measures are available to reduce proposed General Plan -generated traffic noise to less than significant levels in all cases. Traffic noise would remain a significant and unavoidable impact in the proposed General Plan area.

Barstow International Gateway

Temporary noise barriers for construction of the 33 kV transmission line would be considered infeasible mitigation, and a significant and unavoidable impact would occur during these activities. Additionally, nighttime construction would exceed nighttime noise standards at nearby sensitive receptors, despite implementation of **MM BIG NOI-1**. Further, BIG operational noise could result in a significant and unavoidable impact as the feasible noise barriers included in **MM BIG NOI-2** would not reduce long-term BIG noise levels at all sensitive receptors below applicable exterior/interior noise standards and/or would result in a substantial noise increase compared to No BIG conditions. Therefore, BIG would result in a significant and unavoidable impact concerning noise during construction and operations.

5.12.8 REFERENCES

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