9.10 Noise and Vibration Assessment

Acoustical Assessment
BNSF Ono Lead Track Extension Project
City of San Bernardino, California

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LIST OF ABBREVIATED TERMS

APN	Assessor's Parcel Number
ADT	average daily traffic
dBA	A-weighted sound level
CEQA	California Environmental Quality Act
CLSP	California Landings Specific Plan
CSMA	California Subdivision Map Act
CNEL	community equivalent noise level
L_{dn}	day-night noise level
dB	decibel
du/ac	dwelling units per acre
L_{eq}	equivalent noise level
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
HVAC	heating ventilation and air conditioning
Hz	hertz
HOA	homeowner's association
in/sec	inches per second
L_{max}	maximum noise level
µPa	micropascals
L_{min}	minimum noise level
PPV	peak particle velocity
RMS	root mean square
VdB	vibration velocity level

1 INTRODUCTION

This report documents the results of an Acoustical Assessment completed for the BNSF Ono Lead Track Extension Project ("Project" or "Proposed Project"). The purpose of this Acoustical Assessment is to evaluate the potential construction and operational noise and vibration levels associated with the Project and determine the level of impact the Project would have on the environment.

1.1 Project Location and Setting

The Project site is at the southwest corner of the County of San Bernardino (County), in the southern portion of the City of San Bernardino (City); see Exhibit 1: Regional Vicinity Map. The most northerly segment (approximately 0.25 linear mile), is separated by approximately 1.0 linear miles from the southerly segment. The Project extends approximately 4.1 linear miles along BNSF right-of-way (ROW) adjacent and west of Interstate 215 (I-215) between Milepost (MP)[1] 75.14 and MP 80.61. The Project limits are from the BNSF crossing at State Street and University Parkway on the north to the existing BNSF San Bernardino Intermodal Facility A Yard (A Yard) at West 5th Street on the south. The A Yard is immediately south of the Project's southern extent; see Exhibit 2: Local Vicinity Map.

The Project site is in a fully urbanized area comprised primarily of BNSF ROW, commercial, industrial, and residential land uses, vacant lots, and roadways. The Project site consists of existing BNSF ROW and adjacent properties where ground disturbances or property acquisitions would occur. The BNSF ROW consists of an existing three and four track railroad system with associated signal poles, electrical poles, and cabinets. The adjacent properties involve industrial, commercial, and single-family residential land uses, vacant lots, and City roadways. Underground and overhead utility lines are present throughout the Project area. The Project site is generally level, with onsite elevations ranging from approximately 1,080 to 1,200 feet above mean sea level.

1.2 Project Description

Project Characteristics

The Project proposes to install a fourth lead track extension from the existing A Yard to connect with two existing Ono Storage Sidings located near the State Street and University Parkway grade separation. The Project is intended to enhance the A Yard's train traffic efficiency by reducing congestion along the existing lead tracks servicing BNSF's east-west corridor.

The Project proposes to extend the existing approximately 0.18-mile A Yard lead track, which runs parallel to the existing three mainline tracks, by approximately 3.1 miles. The proposed fourth lead track extension would close the existing gaps between the two Ono Storage Sidings creating a continuous lead track. With the proposed improvements, the A Yard would have capacity to assemble and hold outbound trains and switch out the yard without fouling the mainline. The Project does not propose to increase line operations, instead it would increase the A Yard's operational efficiency. The Project involves storm drainage/water quality, circulation/roadway, signal, and utility improvements/modifications ancillary and related to the lead track extension. Partial and full property acquisitions would be required to implement the proposed improvements.

The Ono Lead Track Extension Project consists of the following main components:

[1] The Rail MP feature identifies a given point (i.e. MP) assigned by Caltrans along freight and passenger rail networks.

- A fourth lead track extension consisting of approximately 3.1 miles (16,368 feet) of new track, with associated roadbed improvements. Storm drainage/water quality, circulation/roadway, signal, and utility improvements/modifications ancillary and related to the lead track extension are necessary, as described below.
- Storm drainage/water quality improvements including swales are proposed at numerous locations along the Project route.
- Circulation/roadway improvements/modifications to multiple City roadways, including vacations, realignments, and cul-de-sacs.
- Railroad Signal improvements/modifications include relocating and upgrading as many as four cantilevered signals and relocating or removing seven signal bungalows.
- Utility improvements/modifications include relocating utility lines that are present within the Project area.
- Partial and full property acquisitions totaling up to approximately 30 acres, as needed to accommodate the lead track extension, and ancillary and related improvements/modifications.

Property Acquisitions

To accommodate the proposed rail improvements and ancillary storm drainage/water quality, circulation/roadway, and utility improvements/modifications, the Project would require acquisition of approximately 30 acres of adjacent properties where residential and non-residential land uses are located. Project implementation would require removal of as many as 43 dwelling units (DU) and approximately 63,000 square feet (SF) of non-residential (commercial and industrial) land uses, as follows:

- 36 single-family residential DU,
- 4 residential duplex DU,
- 3 residential triplex DU,
- 32,000 SF* of industrial uses (multi-tenant and auto wrecking), and
- 31,000 SF* of commercial uses (i.e., repair shop and self-storage).

*Approximate and rounded.

Because property acquisition would occur prior to commencement of construction, these properties would be unoccupied when construction begins. Partial acquisition of some properties would create remnant parcels that would not be required for the project. Concerning these remnant parcels, this analysis assumes they would not be redeveloped as part of the proposed Project. No zone change is proposed; thus, the underlying/existing zoning would be retained making remnant parcels available for reuse/redevelopment in the future consistent with the existing zoning.

Construction and Phasing

Project construction is proposed to begin the first quarter of 2022 and be completed by the first quarter of 2024. Construction phases and approximate durations are:

- Acquisitions/Demolition: 20 months,
- Utility Relocations: 15 months,

- Civil Construction (3 months overlap with utility relocations): 10 months, and
- BNSF Track/Signal Construction: 4 months.

Inclusive of acquisitions/demolition, Project construction would occur over approximately 29 months. However, demolition would occur upon property acquisition, prior to commencing Project construction (i.e., utility relocations, civil construction and BNSF track/signal construction). Exclusive of acquisitions/ demolition, Project construction would occur over approximately 19 months. Notwithstanding, to provide a conservative analysis, demolition-related activities are included in the construction emissions assumed and evaluated herein.

Project Design Features

To avoid/minimize construction noise and operational train noise impacts, the Project proposes the following design features:

- To maximize distances between sensitive receptors and construction areas, three strategically-placed construction staging areas are proposed; see Table 1: Construction Staging Areas.
- All construction equipment, fixed and mobile, would be equipped with properly operating and maintained noise mufflers, consistent with manufacturer's standards to reduce noise levels.

Table 1: Construction Staging Areas

Segment	Construction Staging Area	Location	Property ID
5	Construction Staging Area 1	Located on properties proposed for acquisition from 21st Street to Massachusetts Avenue	Numbers 4 – 13
7	Construction Staging Area 2	Located on properties proposed for acquisition from West 16th Street to Magnolia Avenue	Numbers 29, 29.1, 29.2, 30, 30.1, 30.2, 31, 31.5, 38, 32, 32.5, 33, 33.1, 33.2
8	Construction Staging Area 2	Located on properties proposed for acquisition from Magnolia Avenue to Baseline Street	Numbers 42,35, 35.5, 36, 37, 40,39, 38.5, 41, 43
9	Construction Staging Area 2	Located on properties proposed for acquisition from Baseline Street to 10th Street	Number 41
11	Construction Staging Area 3	Located on properties proposed for acquisition from approximately 165 feet south of 7th Street to 6th Street	Numbers 82, 83, 84, 85, 86, 87

Source: Kimley-Horn and Associates, Inc., 2021.

Project Study Area / Alignment

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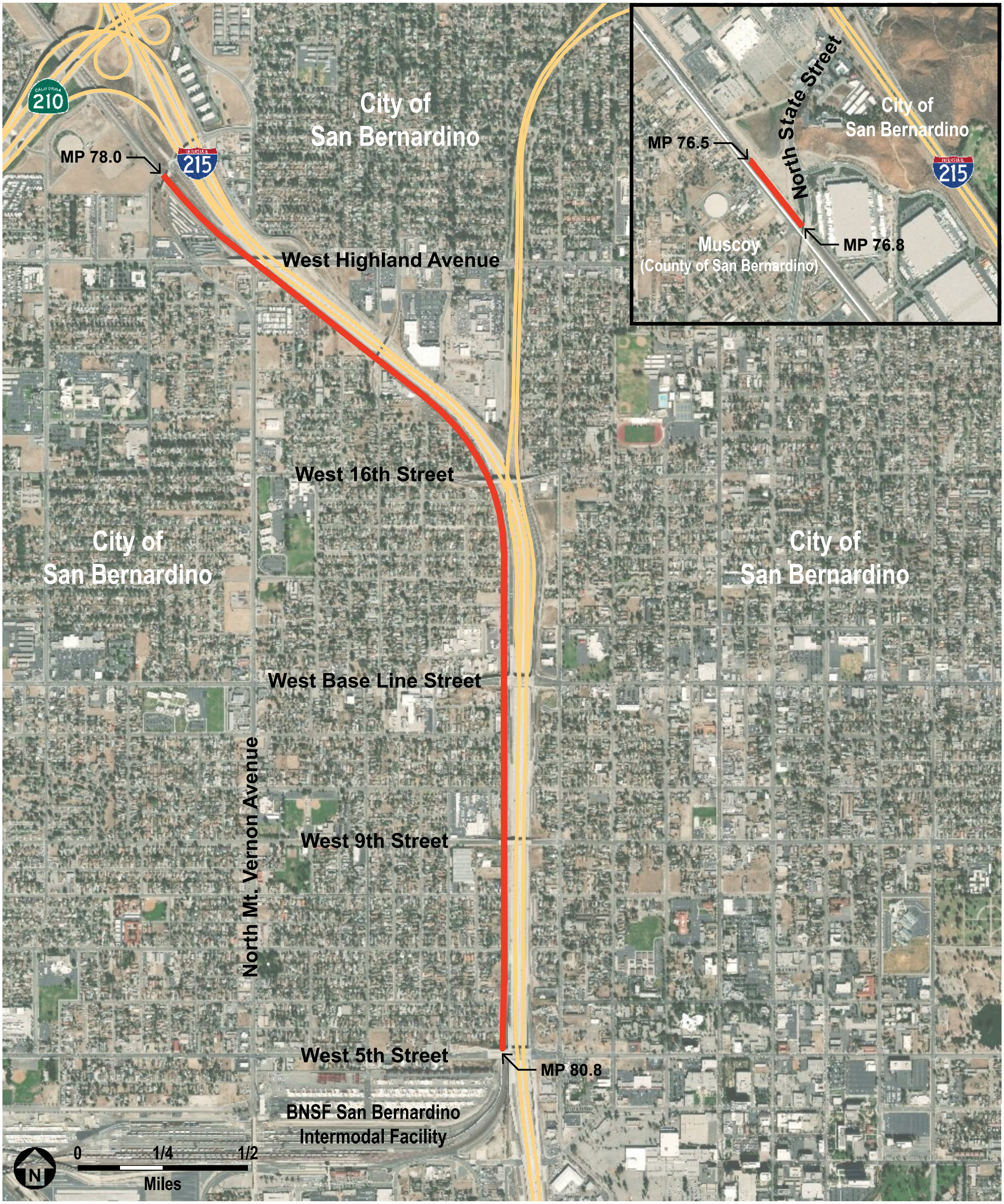
FEBRUARY 2021

BNSF Ono Lead Track Extension Project

Exhibit 1: Regional Vicinity Map



Project Study Area / Alignment

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BNSF Ono Lead Track Extension Project

Exhibit 2: Local Vicinity Map

2 ACOUSTIC FUNDAMENTALS

2.1 Sound and Environmental Noise

Acoustics is the science of sound. Sound can be described as the mechanical energy of a vibrating object transmitted by pressure waves through a medium (e.g. air) to human (or animal) ear. If the pressure variations occur frequently enough (at least 20 times per second), they can be heard and are called sound. The number of pressure variations per second is called the frequency of sound and is expressed as cycles per second, or hertz (Hz).

Noise is defined as loud, unexpected, or annoying sound. In acoustics, the fundamental model consists of a noise source, a receptor, and the propagation path between the two. The loudness of the noise source, obstructions, or atmospheric factors affecting the propagation path, determine the perceived sound level and noise characteristics at the receptor. Acoustics deal primarily with the propagation and control of sound. A typical noise environment consists of a base of steady background noise that is the sum of many distant and indistinguishable noise sources. Superimposed on this background noise is the sound from individual local sources. These sources can vary from an occasional aircraft or train passing by to continuous noise from traffic on a major highway. Perceptions of sound and noise are highly subjective from person to person.

Measuring sound directly in terms of pressure would require a large range of numbers. To avoid this, the decibel (dB) scale was devised. The dB scale uses the hearing threshold of 20 micropascals (µPa) 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 2: Typical Noise Levels provides typical noise levels.

Table 2: 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 miles per hour		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/recording studio
	– 10 –	
Lowest threshold of human hearing	**– 0 –**	Lowest threshold of human hearing

Source: California Department of Transportation, *Technical Noise Supplement to the Traffic Noise Analysis Protocol*, September 2013.

Noise Descriptors

The dB scale alone does not adequately characterize how humans perceive noise. The dominant frequencies of a sound have a substantial effect on the human response to that sound. Several rating scales have been developed to analyze the adverse effect of community noise on people. Because environmental noise fluctuates over time, these scales consider that the effect of noise on people is largely dependent on the total acoustical energy content of the noise, as well as the time of day when the noise occurs. The equivalent noise level (L_{eq}) represents the equivalent continuous sound pressure level over the measurement period, while the day-night noise level (L_{dn}) and Community Equivalent Noise Level (CNEL) are measures of energy average during a 24-hour period, with dB weighted sound levels from 7:00 p.m. to 7:00 a.m. Most commonly, environmental sounds are described in terms of L_{eq} that has the same acoustical energy as the summation of all the time-varying events. Each is applicable to this analysis and defined in Table 3: Definitions of Acoustical Terms.

Table 3: Definitions of Acoustical Terms

Term	Definitions
Decibel (dB)	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure. The reference pressure for air is 20.
Sound Pressure Level	Sound pressure is the sound force per unit area, usually expressed in μPa (or 20 micronewtons per square meter), where 1 pascals 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.
Frequency (Hz)	The number of complete pressure fluctuations per second above and below atmospheric pressure. Normal human hearing is between 20 Hz and 20,000 Hz. Infrasonic sound are below 20 Hz and ultrasonic sounds are above 20,000 Hz.
A-Weighted Sound Level (dBA)	The sound pressure level in dB 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 in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise.
Equivalent Noise Level (L_{eq})	The average acoustic energy content of noise for a stated period of time. Thus, the L_{eq} of a time-varying noise and that of a steady noise are the same if they deliver the same acoustic energy to the ear during exposure. For evaluating community impacts, this rating scale does not vary, regardless of whether the noise occurs during the day or the night.
Maximum Noise Level (L_{max}) Minimum Noise Level (L_{min})	The maximum and minimum dBA during the measurement period.
Exceeded Noise Levels (L_{01}, L_{10}, L_{50}, L_{90})	The dBA values that are exceeded 1%, 10%, 50%, and 90% of the time during the measurement period.
Day-Night Noise Level (L_{dn})	A 24-hour average L_{eq} with a 10 dBA weighting added to noise during the hours of 10:00 p.m. to 7:00 a.m. to account for noise sensitivity at nighttime. The logarithmic effect of these additions is that a 60 dBA 24-hour L_{eq} would result in a measurement of 66.4 dBA L_{dn}.
Community Noise Equivalent Level (CNEL)	A 24-hour average L_{eq} with a 5 dBA weighting during the hours of 7:00 a.m. to 10:00 a.m. and a 10 dBA weighting added to noise during the hours of 10:00 p.m. to 7:00 a.m. to account for noise sensitivity in the evening and nighttime, respectively. The logarithmic effect of these additions is that a 60 dBA 24-hour L_{eq} would result in a measurement of 66.7 dBA CNEL.
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Intrusive	That noise which intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends on its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.

The A-weighted decibel (dBA) sound level scale gives greater weight to the frequencies of sound to which the human ear is most sensitive. Because sound levels can vary markedly over a short period of time, a method for describing either the average character of the sound or the statistical behavior of the variations must be utilized. Most commonly, environmental sounds are described in terms of an average level that has the same acoustical energy as the summation of all the time-varying events.

The scientific instrument used to measure noise is the sound level meter. Sound level meters can accurately measure environmental noise levels to within about plus or minus 1 dBA. Various computer models are used to predict environmental noise levels from sources, such as roadways and airports. The accuracy of the predicted models depends on the distance between the receptor and the noise source.

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 of environmental noise assessment. All noise levels reported in this document 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.

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 may 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 way 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 human response to environmental noise is subjective and varies considerably from individual to individual. Noise in the community has often been cited as a health problem, not in terms of actual physiological damage, such as hearing impairment, but in terms of inhibiting general well-being and contributing to undue stress and annoyance. The health effects of noise in the community arise from interference with human activities, including sleep, speech, recreation, and tasks that demand concentration or coordination. Hearing loss can occur at the highest noise intensity levels.

Noise environments and consequences of human activities are usually well represented by median noise levels during the day or night or over a 24-hour period. Environmental noise levels are generally considered low when the CNEL is below 60 dBA, moderate in the 60 to 70 dBA range, and high above 70 dBA. Examples of low daytime levels are isolated, natural settings with noise levels as low as 20 dBA and quiet, suburban, residential streets with noise levels around 40 dBA. Noise levels above 45 dBA at night can disrupt sleep. Examples of moderate-level noise environments are urban residential or semi-commercial areas (typically 55 to 60 dBA) and commercial locations (typically 60 dBA). People may consider louder environments adverse, but most will accept the higher levels associated with noisier urban residential or residential-commercial areas (60 to 75 dBA) or dense urban or industrial areas (65 to 80 dBA). Regarding increases in dBA, the following relationships, as reported by Caltrans, should be noted:

- Except in carefully controlled laboratory experiments, a 1-dBA change cannot be perceived by humans.
- Outside of the laboratory, a 3-dBA change is considered a just-perceivable difference.
- A minimum 5-dBA change is required before any noticeable change in community response would be expected. A 5-dBA increase is typically considered substantial.
- A 10-dBA change is subjectively heard as an approximate doubling in loudness and would almost certainly cause an adverse change in community response.

Effects of Noise on People

Hearing Loss

While physical damage to the ear from an intense noise impulse is rare, a degradation of auditory acuity can occur even within a community noise environment. 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. The Occupational Safety and Health Administration has a noise exposure standard that is set at the noise threshold where hearing loss may occur from long-term exposures. 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.[2]

[2] Federal Interagency Committee on Noise, *Federal Agency Review of Selected Airport Noise Analysis Issues*, August 1992.

2.2 Ground-borne Vibration

Sources of ground-borne vibrations include natural phenomena (earthquakes, volcanic eruptions, sea waves, landslides, etc.) or man-made causes (explosions, machinery, traffic, trains, construction equipment, etc.). Vibration sources may be continuous (e.g. factory machinery) or transient (e.g. explosions). Ground vibration consists of rapidly fluctuating motions or waves with an average motion of zero. Several different methods are typically used to quantify vibration amplitude. One is the peak particle velocity (PPV); another is the root mean square (RMS) velocity. The PPV is defined as the maximum instantaneous positive or negative peak of the vibration wave. The RMS velocity is defined as the average of the squared amplitude of the signal. The PPV and RMS vibration velocity amplitudes are used to evaluate human response to vibration.

The evaluation of vibration impacts can be divided into two categories, human annoyance and building damage. Table 4: Human Reaction and Damage to Buildings for Continuous or Frequent Intermittent Vibrations, displays the reactions of people and the effects on buildings produced by continuous vibration levels. The annoyance levels shown in the table should be interpreted with care since vibration may be found to be annoying at much lower levels than those listed, depending on the level of activity or the sensitivity of the individual. To sensitive individuals, vibrations approaching the threshold of perception can be annoying. Low-level vibrations frequently cause irritating secondary vibration, such as a slight rattling of windows, doors, or stacked dishes. The rattling sound can give rise to exaggerated vibration complaints, even though there is very little risk of actual structural damage. In high noise environments, which are more prevalent where ground-borne vibration approaches perceptible levels, this rattling phenomenon may also be produced by loud airborne environmental noise causing induced vibration in exterior doors and windows.

Table 4: Human Reaction and Damage to Buildings for Continuous or Frequent Intermittent Vibrations

Peak Particle Velocity (in/sec)	Approximate Vibration Velocity Level (VdB)	Human Reaction	Effect on Buildings
0.006-0.019	64-74	Range of threshold of perception	Vibrations unlikely to cause damage of any type
0.08	87	Vibrations readily perceptible	Recommended upper level to which ruins and ancient monuments should be subjected
0.1	92	Level at which continuous vibrations may begin to annoy people, particularly those involved in vibration sensitive activities	Virtually no risk of architectural damage to normal buildings
0.2	94	Vibrations may begin to annoy people in buildings	Threshold at which there is a risk of architectural damage to normal dwellings
0.4-0.6	98-104	Vibrations considered unpleasant by people subjected to continuous vibrations and unacceptable to some people walking on bridges	Architectural damage and possibly minor structural damage

Source: California Department of Transportation, *Transportation and Construction Vibration Guidance Manual*, 2013.

Ground vibration can be a concern in instances where buildings shake, and substantial rumblings occur. However, it is unusual for vibration from typical urban sources such as buses and heavy trucks to be perceptible. Common sources for ground-borne vibration are planes, trains, and construction activities such as earth-moving which requires the use of heavy-duty earth moving equipment. For the purposes of this analysis, a PPV descriptor with units of inches per second (in/sec) is used to evaluate construction-generated vibration for building damage and human complaints.

RYANXX The FTA guidelines provide ground-borne noise and vibration criteria as listed in Table 5: Ground-Borne Vibration and Noise Impact for Affected Communities Land Use Category. These levels represent an event's maximum vibration level. In addition, the guidelines provide criteria for special buildings that are sensitive to ground-borne noise and vibration. The impact criteria for these special buildings are shown in Table 5. There are no special buildings within the Project area.

Table 5: 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 Events[1]	Occasional Events[2]	Infrequent Events[3]	Frequent Events[1]	Occasional Events[2]	Infrequent Events[3]
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

µPa = micropascals; VdB = root mean square vibration velocity level; *decibels* dBA = A-weighted decibel; N/A = not applicable

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.

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

Table 5 differentiates 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 dividing lines were originally selected 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 fall into the "frequent" category. Sensitive receivers (e.g., residential dwellings, churches) fall under Land Use Categories 2 or 3. Based on the criteria specified above, the FTA criteria for "frequent events" are used as the Project involves 72 daily freight trains.

One factor not incorporated in the criteria presented in Table 5 is how to account for existing vibration. In most cases, except near railroad tracks, the existing environment does not include a substantial number of perceptible ground-borne vibration or noise events. However, freight rail projects commonly use parts of existing rail routes. The criteria given in Table 5 does not indicate how to account for existing vibration, a common situation for freight rail projects using existing rail rights-of-way. Methods of handling representative scenarios include the following:

- **Infrequently used rail route**—If the existing rail traffic consists of four or fewer trains per day, use the vibration criteria from Table 5.

- **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 FTA Guidelines Section 6.2 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 FRA guidelines Chapter 8; however, measuring vibration from existing train traffic is usually preferable.
- **Heavily used rail route**—If the existing rail 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 FTA Guidelines Section 6.2, would be higher than the existing vibration. In locations where the new trains would be operating at much higher speeds than the existing rail traffic, the high-speed trains would likely generate substantially higher levels of ground-borne 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 can be applied to the Project.
- **Moving Existing Tracks**—Another scenario where existing vibration can be substantial is a new freight 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 are based on experience with vibration from rail transit systems, the thresholds can be applied to freight train vibrations as well.[3] However, locomotive and railcar vibration should be considered separately. Because locomotive vibration only lasts for a few seconds, the infrequent-event limits are appropriate, but for a typical line haul freight train where the railcar vibration lasts for several minutes, the frequent-event limits are appropriate. Some judgment must be exercised to confirm 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.

Construction activities can result in varying degrees of ground vibration, depending on the equipment and method employed. The vibration associated with typical construction 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 PPV (in inches per second), as defined at the beginning of Section 2.2. Table 6: Construction Vibration Building Damage Criteria summarizes the FTA guidelines' construction vibration criteria.

[3] According to the FTA guidelines, there is no specific vibration impact criteria for freight railroads. Thus, the FTA recommends utilizing the Table 4 impact thresholds for freight railroad projects.

Table 6: 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
L_v = velocity level, decibels; *PPV = peak particle velocity; VdB = root mean square vibration*		
Note: 1. VdB re 1 micro-inch per second		
Source: FTA, Transit Noise and Vibration Impact Assessment Manual, 2018.		

3 REGULATORY SETTING

To limit population exposure to physically or psychologically damaging as well as intrusive noise levels, the Federal government, the State of California, various county governments, and most municipalities in the state have established standards and ordinances to control noise.

3.1 Federal

40 CFR Part 205

Federal regulations also establish noise limits for medium and heavy trucks (more than 4.5 tons, gross vehicle weight rating) under Code of Federal Regulations (40 CFR) Part 205, Subpart B, Title 40. 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. The Federal Highway Administration (FHWA) regulations for noise abatement must be considered for federal or federally funded projects involving the construction of a new highway or significant modification of an existing freeway when the project would result in a substantial noise increase or when the predicted noise levels approach or exceed the Noise Abatement Criteria (NAC).

Noise Abatement and Control, Title 24 Code of Federal Regulations, Part 51, Subpart B

The Department of Housing and Urban Development's (HUD) mission includes fostering "a decent, safe, and sanitary home and suitable living environment for every American." Accounting for acoustics is intrinsic to this mission, as an environment's safety and comfort can be compromised by excessive noise. In order to facilitate the creation of suitable living environments, HUD has developed a standard for noise criteria. The HUD noise program's basic foundation is set out in 24 CFR Part 51 Subpart B, Noise Abatement and Control noise regulations.

HUD's noise policy clearly requires that noise attenuation measures be provided when projects are proposed in high noise areas. Within the HUD Noise Assessment Guidelines, potential noise sources are examined for projects within 15 miles of a military or civilian airport, 1,000 feet from a road, or 3,000 feet from a railroad.

HUD exterior noise regulations state that 65 dBA DNL noise levels or less are acceptable for residential land uses and noise levels exceeding 75 dBA DNL are unacceptable. HUD's regulations do not contain standards for interior noise levels. Rather, a goal of 45 dBA is set forth, and the attenuation requirements are geared toward achieving that goal. It is assumed that, with standard construction, any building will provide sufficient attenuation so that if the exterior level is 65 dBA DNL or less, the interior level will be 45 dBA DNL or less.

Federal Railroad Administration Noise Standards

The U.S. Environmental Protection Agency (U.S. EPA) is charged with regulation of railroad noise under the Noise Control Act. Enforcement of the regulations shifted to the Federal Railroad Administration in 1982 when the U.S. EPA Office of Noise Abatement and Control was closed. Table 7: Summary of U.S. EPA/Federal Railroad Administration Railroad Noise Standards, summarizes the U.S. EPA railroad noise standards that set operating noise standards for railroad equipment and set noise limit standards for new equipment.

Table 7: Summary of U.S. EPA/Federal Railroad Administration Railroad Noise Standards

Noise Sources	Operating Conditions	Noise Metric	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
Rail cars	Speed < 45 mph	L_{max} (Fast)	100	88
	Speed> 45 mph	L_{max} (Fast)	100	93
	Coupling	Adj. Average Max.	50	92

Notes:
1. Slow and fast exponential-time-weighting is used.
2. Note that these values are in terms of the L_{max}, and can be considerably greater than the Leq typically used in the measurement of obtrusive noise.

Source: United States Environmental Protection Agency Railroad Noise Emission Standard (40 Code of Federal Regulations Part 201).

Federal Transit Administration Noise and Vibration Guidance

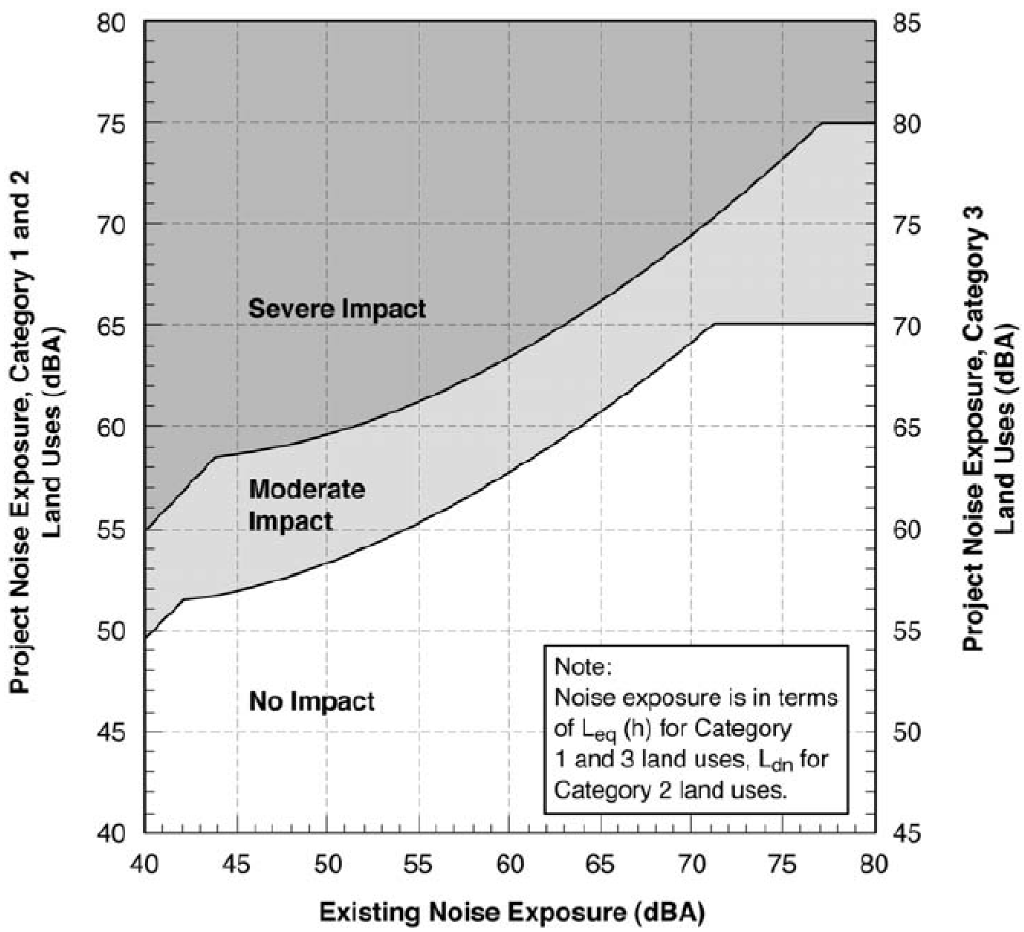
The FTA has published the *Transit Noise and Vibration Impact Assessment Manual* to provide guidance on procedures for assessing impacts at different stages of transit project development. The report covers both construction and operational noise impacts and describes a range of measures for controlling excessive noise and vibration. The specified noise criteria are an earlier version of the Federal Railroad Administration's High-Speed Ground Transportation Noise and Vibration Impact Assessment criteria. In general, the primary concern regarding vibration relates to potential damage from construction. The guidance document establishes criteria for evaluating the potential for damage for various structural categories from vibration.

The FTA guidance manual provides three levels of criteria for assessment of noise impact from rail projects: No Impact, Moderate Impact, and Severe Impact. Noise sensitive land-uses are grouped into three categories: Category 1, Category 2, and Category 3. The categories are described in Table 8: Land Use Categories and Metrics for Transit Noise Impact Criteria.

The FTA noise impact thresholds, as indicated in Exhibit 3: Noise Impact Criteria for Transit Projects, and Exhibit 4: Increase in Cumulative Noise Levels Allowed by Criteria (Land Use Categories 1 & 2), are based on the increase of existing ambient noise levels associated with Project operations or in combination with other new planned projects (i.e., cumulative impact). The FTA guidelines specify a particular noise metric to be used depending on the specific land-use. L_{dn} is typically used for residential uses, whereas L_{eq} is typically used for schools.

Table 8: Land Use Categories and Metrics for Transit Noise Impact Criteria		
Land Use Category	**Noise Metric (dBA)**	**Description of Land Use Category**
1	Outdoor L_{eq}(h)[1]	Tracts of land where quiet is an essential element in their intended purpose. This category includes lands set aside for serenity and quiet, and such land uses as outdoor amphitheaters and concert pavilions, as well as National Historic Landmarks with significant outdoor use.
2	Outdoor L_{dn}	Residences and buildings where people normally sleep. This category includes homes, hospitals, and hotels where a nighttime sensitivity to noise is assumed to be of utmost importance.
3	Outdoor L_{eq}(h) [1]	Institutional land uses with primarily daytime and evening use. This category includes schools, libraries, and churches where it is important to avoid interference with such activities as speech, meditation, and concentration on reading material. Buildings with interior spaces where quiet is important, such as medical offices, conference rooms, recording studios, and concert halls fall into this category. Places for meditation or study associated with cemeteries, monuments, and museums. Certain historical sites, parks, and recreational facilities are also included.
Note: 1. L_{eq} for the noisiest hour of rail-related activity during hours of noise sensitivity.		
Source: Federal Transit Administration, *Transit Noise and Vibration Impact Assessment*, May 2006.		

Exhibit 3: Noise Impact Criteria for Transit Projects

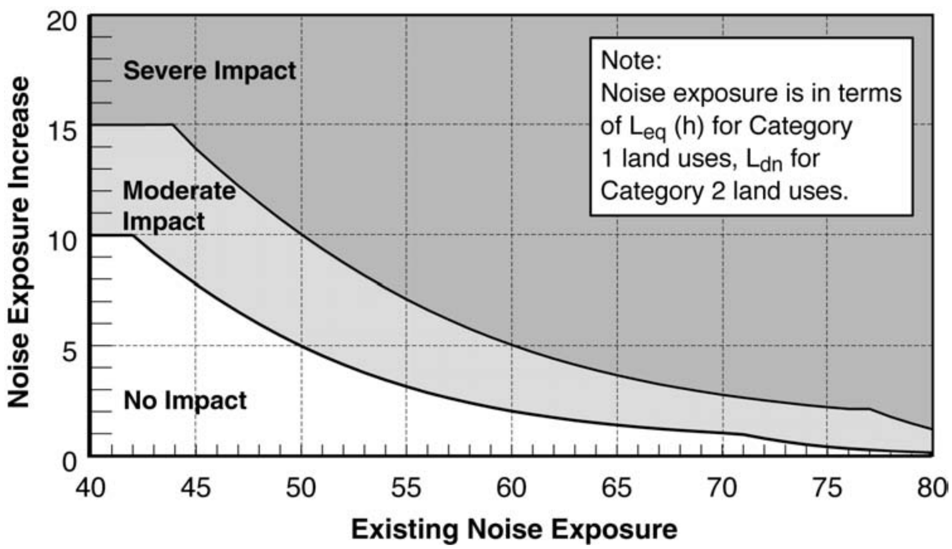


Source: Federal Transit Administration, *Transit Noise and Vibration Impact Assessment*, May 2006.

As referenced above, Moderate and Severe are used as criteria to assess rail-related noise impacts. The interpretations of these two levels of impact are summarized as follows:

- Moderate Impact: The change in the cumulative noise level is noticeable to most people, but it may not be sufficient to cause strong, adverse reactions from the community. In this transitional area, other project specific factors must be considered to determine the magnitude of the impact and the need for mitigation, such as the existing level, predicted level of increase over existing noise levels, and the types and numbers of noise-sensitive land uses affected.
- Severe Impact: Project noise above the upper curve is considered to cause a Severe Impact since a significant percentage of people would be highly annoyed by the new noise. This curve flattens out at 75 dB for Category 1 and 2 land uses, a level associated with an unacceptable living environment. Noise mitigation will normally be specified for Severe Impact areas unless there is no practical method of mitigating the noise.

Exhibit 4: Increase in Cumulative Noise Levels Allowed by Criteria (LAND USE CATEGORIES 1 & 2)



Source: Federal Transit Administration, *Transit Noise and Vibration Impact Assessment*, May 2006.

Although the curves in Exhibits 3 and 4 are defined in terms of project noise exposure and existing noise exposure, it is important to emphasize that the increase in the cumulative noise (i.e., when the project noise is added to the existing noise) is the basis for the criteria.

Exhibit 4 shows that the criterion for impact allows a noise exposure increase of 10 dBA if the existing noise exposure is 42 dBA or less but only a 1 dBA increase when the existing noise exposure is 70 dBA. As the existing level of ambient noise increases, the allowable absolute level of project noise increases, but the total allowable increase in community noise exposure is reduced.

For residential land use, the noise criteria are to be applied outside the building locations at noise sensitive areas with frequent human use, including outdoor patios, decks, pools, and play areas. If there are none, the criteria should be applied near building doors and windows. For parks or other outdoor Category 3 land uses, the criteria are to be applied at the property line. However, for locations where land use activities are solely indoors, noise impact may be less significant if the outdoor-to-indoor reduction is greater than for typical buildings (approximately 25 dB with windows closed). Therefore, if it can be demonstrated that there will only be indoor activities, mitigation may not be needed.

3.2 State of California

California Government Code

Federal California Government Code Section 65302(f) mandates that the legislative body of each county and city adopt a noise element as part of its comprehensive general plan. The local noise element must recognize the land use compatibility guidelines established by the State Department of Health Services.

The guidelines rank noise land use compatibility in terms of “normally acceptable,” “conditionally acceptable,” “normally unacceptable,” and “clearly unacceptable” noise levels for various land use types. Single-family homes are “normally acceptable” in exterior noise environments up to 60 dBA Community Noise Equivalent Level (CNEL) and “conditionally acceptable” up to 70 dBA CNEL. Multiple-family residential uses are “normally acceptable” up to 65 dBA CNEL and “conditionally acceptable” up to 70 CNEL. Schools, libraries, and churches are “normally acceptable” up to 70 dBA CNEL, as are office buildings and business, commercial, and professional uses.

California Noise Control Act of 1973

The California Noise Control Act (California Health and Safety Code, Division 28, Section 46000 et seq), declares that excessive noise is a serious hazard to public health and welfare, and establishes the Office of Noise Control with responsibility to set standards for noise exposure in cooperation with local governments or the state legislature.

Noise Insulation Standards

California Code of Regulations Title 24 California Noise Insulation Standards and California Health and Safety Code Section 17922.6 set requirements for new multi-family residential units, hotels, and motels that may be subject to relatively high levels of transportation-related noise. For exterior noise, the noise insulation standard is DNL 45 dB in any habitable room and requires an acoustical analysis demonstrating how dwelling units (DU) have been designed to meet this interior standard where such units are proposed in areas subject to noise levels greater than DNL 60 dB.

California Streets and Highways Code

The State of California establishes noise limits for vehicles licensed to operate on public roads. For heavy trucks, the state pass-by standard is consistent with the federal limit of 80 dB. The state pass-by standard for light trucks and passenger cars (less than 4.5 tons gross vehicle rating) is also 80 dB at 15 meters from the centerline. For new roadway projects, Caltrans employs the NAC, promulgated by 40 CFR, as administered by the FHWA (California Vehicle Code, Sections 23130,23130.5,27150 et seq., 27204, and 27206).

California Department of Transportation

The California Department of Transportation (Caltrans) Technical Noise Supplement to the Traffic Noise Analysis Protocol (September 2013) 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 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.

Human annoyance from ground-borne vibration occurs when vibration levels rise above the threshold of human perception for extended periods of time. According to the Caltrans Transportation and Construction Vibration Guidance Manual (September 2013), a ground-borne vibration level of 0.11 in/sec PPV is considered strongly perceptible and is the level at which human annoyance occurs.

3.3 Local

City of San Bernardino General Plan Noise Element

The City of San Bernardino General Plan (SBGP) Noise Element identifies several policies to minimize the impacts of excessive noise levels throughout the community. The Noise Element provides policy guidance which addresses the generation, mitigation, avoidance, and the control of excessive noise. The noise policies specified in the General Plan Noise Element provide the guidelines necessary to satisfy these goals. To ensure that residents are not exposed to excessive noise levels, the noise Element policies provide exterior standards of 65 dBA Ldn and 45 dBA Ldn for sensitive land uses. Policies 14.2.1 to 14.2.19 outline the transportation related guidelines and mitigation strategies the City uses to satisfy Goal 14.2. The following policies apply to railroads:

Goal 14.1 Ensure that residents are protected from excessive noise through careful land planning.

Policy 14.1.1: Minimize, reduce, or prohibit, as may be required, the new development of housing, health care facilities, schools, libraries, religious facilities, and other noise sensitive uses in areas where existing or future noise levels exceed an Ldn of 65 dB(A) exterior and an Ldn of 45 dB(A) interior if the noise cannot be reduced to these levels. (LU-1)

Goal 14.2 Encourage the reduction of noise from transportation-related noise sources such as motor vehicles, aircraft operations, and railroad movements.

Policy 14.2.5: Require sound walls, berms, and landscaping along existing and future highways and railroad right-of-ways to beautify the landscape and reduce noise. (N-1)

Policy 14.2.15: Work with all railroad operators in the City to properly maintain lines and establish operational restrictions during the early morning and late evening hours to reduce impacts in residential areas and other noise sensitive areas.

Policy 14.2.16: Work with all railroad operators to install noise mitigation features where operations impact existing adjacent residential or other noise-sensitive uses.

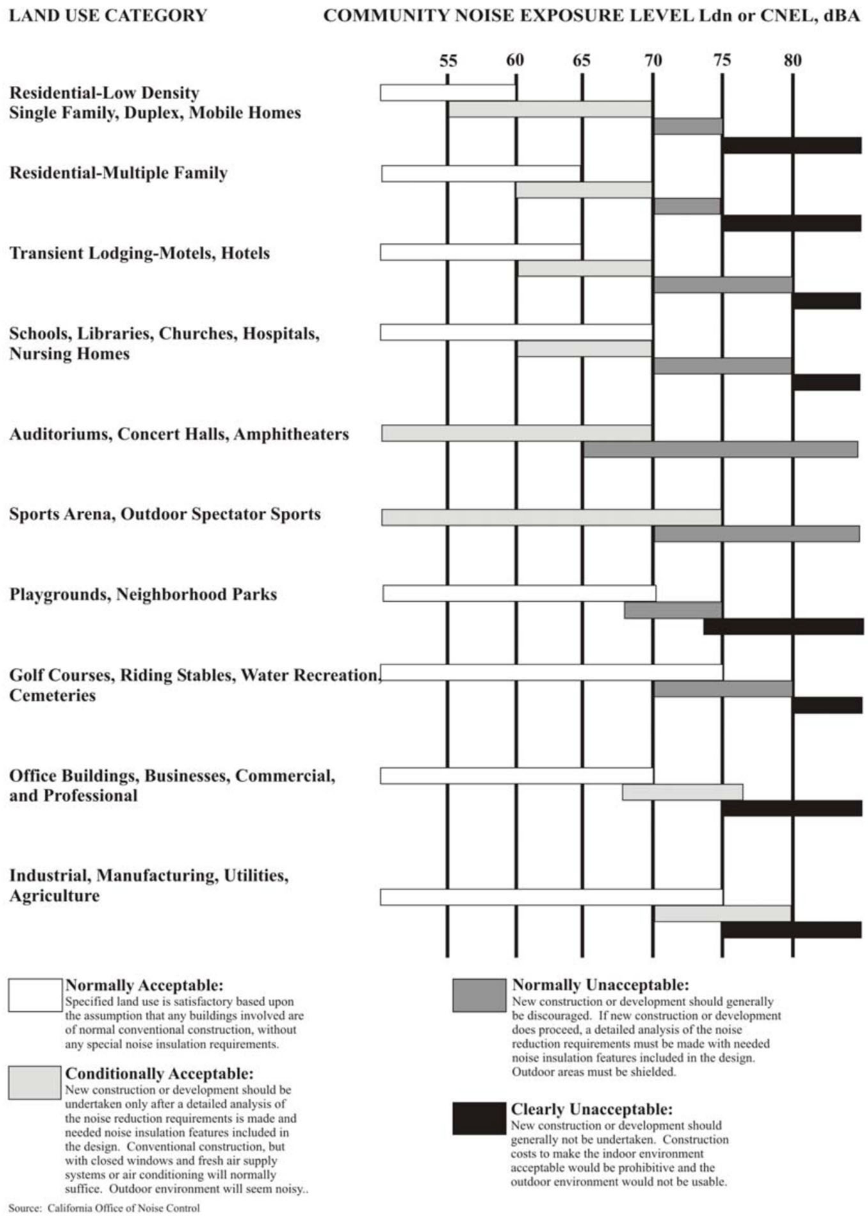
Goal 14.3 Protect residents from the negative effects of "spill over" or nuisance noise.

Policy 14.3.1: Require that construction activities adjacent to residential units be limited as necessary to prevent adverse noise impacts. (LU-1)

To protect residents from sources of operational and construction noise (Goal 14.3), the Noise Element includes Policies 14.3.1 to 14.3.8 to adopt a Noise Ordinance and ensure noise issues between land uses are reduced. These policies generally require the prevention of adverse impacts to residential units from construction, stationary equipment, and truck deliveries.

City of San Bernardino Noise Element Figure N-1 provides noise criteria to evaluate the land use compatibility of transportation-related noise; see Exhibit 5: Land Use Compatibility for Community Noise Exposure. The compatibility criteria indicate that residential land uses are considered normally acceptable with noise levels below 60 dBA L_{dn} and conditionally acceptable with noise levels of less than 70 dBA L_{dn}.

Exhibit 5: Land Use Compatibility for Community Noise Exposure



Source: City of San Bernardino, *General Plan Noise Element*, Figure N-1, 2005.

City of San Bernardino General Plan Noise Element Table N-3 identifies a maximum allowable exterior noise level of 65 dBA CNEL and an interior noise level limit of 45 dBA CNEL for new residential developments; see Table 9, Interior and Exterior Noise Standards. While the City specifically identifies an exterior noise level limit for noise-sensitive residential land uses such as hotels, hospitals, schools, and parks, the City does not maintain exterior noise standards for non-noise sensitive land uses such as office, retail, manufacturing, utilities, agriculture, and industrial.

Table 9: Interior and Exterior Noise Standards

Land Use		CNEL (dBA)	
Categories	**Uses**	**Interior[1]**	**Exterior[2]**
Residential	Single and multi-family, duplex	45[3]	65
	Mobile homes	----	65[4]
Commercial	Hotel, motel, transient housing	45	----
	Commercial retail, bank, restaurant	55	----
	Office building, research and development, professional offices	50	----
	Amphitheater, concert hall, auditorium, movie theater	45	----
	Gymnasium (Multipurpose)	50	----
	Sports Club	55	----
	Manufacturing, warehouse, wholesale, utilities	65	----
	Movie Theaters	45	----
Institutional/Public	Hospital, school classrooms/playgrounds	45	65
	Church, library	45	----
Open Space	Parks	---	65

Notes:
1. Indoor environment excluding: bathrooms, kitchens, toilets, closets, and corridors
2. Outdoor environment limited to:
    - Private yard of single-family dwelling units
    - Multi-family private patios or balconies accessed from within the dwelling units (balconies 6.0 feet deep or less are exempt)
    - Mobile home parks
    - Park picnic areas
    - School playgrounds
    - Hospital patios
3. Noise level requirement with closed windows, mechanical ventilation or other means of natural ventilation shall be provided as per Uniform Building Code Chapter 12, Section 1205.
4. Exterior noise levels should be such that interior noise levels will not exceed 45 dBA CNEL.

Source: City of San Bernardino, *City of San Bernardino General Plan Noise Element*, Table N-3, 2005.

City of San Bernardino Municipal Code

The City of San Bernardino Municipal Code (SBMC) Noise Control Ordinance (SBMC Chapter 8.54) includes regulations to control the negative effects of nuisance noise, but it does not identify specific exterior noise level limits. However, SBMC Chapter 19.20 contains the exterior and interior noise level standards for residential land uses.

SBMC Section 8.54.060 states when: such noises are an accompaniment and effect of a lawful business, commercial or industrial enterprise carried on in an area zoned for that purpose…these activities shall be exempt (SBMC Section 8.54.060(B)). However, due to the Project site's proximity to residential land uses, SBMC Section 19.20.030.15(A) limits the operational stationary-source noise from the proposed project to an exterior noise level of 65 dBA L_{eq}(1-hr) for residential land uses.

SBMC Section 8.54.070 states that no person shall be engaged or employed, or cause any person to be engaged or employed, in any work of construction, erection, alteration, repair, addition, movement, demolition, or improvement to any building or structure except within the hours of 7:00 a.m. and 8:00 p.m. While the City establishes limits to the hours during which construction activity may take place, it does not identify specific noise level limits for construction noise levels.

4.0 EXISTING CONDITIONS

4.1 Existing Noise Sources

Stationary Noise Sources

The Project site is at the City of San Bernardino's (City) southwest portion. The City is highly urbanized and comprised of a mix of residential and non-residential land uses (i.e., commercial and industrial) served by a grid system of arterial and collector streets. The Project area's primary stationary noise sources are urban-related activities (i.e., mechanical equipment, parking areas, and commercial and industrial areas). Stationary noise sources at the BNSF San Bernardino Intermodal Facility A Yard (A Yard) also contribute to the noise environment at the Project's southern portion. The noise associated with these stationary sources may represent a single-event noise occurrence, short-term or long-term/continuous noise.

Mobile Sources

Mobile noise sources in the Project vicinity consist of vehicular traffic along the area's roadways and train traffic along the BNSF Railway Company ("BNSF") corridor.

Vehicular Noise. Most of the Project area's existing mobile noise is generated from vehicles along Interstate 215 Freeway (I-215) immediately adjacent/east of the Project site and various arterial roadways such as 9th Street, Base Line Road, 16th Street, Massachusetts Avenue, Highland Avenue, Vernon Avenue, and University Parkway. I Street and side streets within and west of the Project site also contribute to the noise environment. SBGP Figure N-2 (Future Roadway Noise Contours) shows that the Project area's noise is dominated by traffic noise from I-215 and is approximately 70 dBA CNEL throughout the Project site. Traffic-related mobile source noise is a function of the roadways' traffic volumes and vehicle speeds. It is noted, existing conditions mobile noise sources were not modeled, given the Project would not generate an increase in vehicular traffic.

Train Noise. Rail operations have set schedules for weekdays and weekends that are mostly consistent monthly. Freight rail operations similar to the proposed Project can vary daily, monthly, and annually. Train operational noise involves many parameters, including type of train (e.g., freight), travel speed, number of locomotives and cars per train, number of trains per day, use of train horns, and rail car coupling. Existing train traffic along the BNSF corridor consists of 72 freight trains per day (60 trains during the daytime and 12 at night). Each train consists of four locomotives with up to 60 cars traveling at up to 55 miles per hour (mph).

Noise modeling was calculated for the nearest receivers west and southwest of the Project alignment. Train noise creates instantaneous noise from each individual train pass-by and contributes to the 24-hour L_{dn} level. Table 10: Railroad Noise Levels – Existing Conditions identifies the modeling results under existing conditions and indicates noise levels range from 56 dBA to 78 dBA. It is noted that Table 10 identifies L_{dn} noise levels (i.e., 24-hour energy average noise levels) instead of hourly noise (i.e., L_{eq}[h]). However, L_{dn} levels are typically louder than L_{eq} due to the 10-dB penalty applied to A-weighted sound levels occurring during nighttime hours between 10 PM and 7 AM. Therefore, L_{eq} noise levels would be lower than what is identified in Table 10.

Table 10: Railroad Noise Levels – Existing Conditions

Segment	Location	Distance to Closest Receptors (feet)	Modeled Noise Level (L_{dn})
1	First Row	130	69
3	First Row	976	56
4	First Row	77	67
5	First Row	125	70
6	First Row	58	75
7 (North of West Evans)	First Row[1]	35	78
7 (South of West Evans)	First Row	90	72
8	First Row[1]	74	73
9	First Row[1]	40	77
10	First Row[1]	40	77
11	First Row[1]	40	77
12	First Row	63	74

Notes:
1. A full take is required for these locations.

Noise Monitoring

To determine the Project area's ambient noise levels, eight 15-minute noise measurements were taken between 10:40 AM and 3:32 PM on September 11, 2018 using a Type 1 Sound Level Meter. Two long-term measurements were taken September 26 to 27, 2018 to document the noise environment over a longer time period. Exhibit 6: Noise Measurement Locations, shows the noise measurement locations and Table 11: Noise Monitoring Results, identifies the ambient noise levels (L_{eq}) measured at these locations.

Table 11: Noise Monitoring Results

Measurement Location	Time of day	L_{eq} [15] (dBA)	L_{max} (dBA)	L_{min} (dBA)	Ldn (dBA)
1	10:14 AM	76.2	83.9	69.1	n/a
2	10:32 AM	60.2	74.1	96	n/a
3	10:53 AM	58.5	101.6	71.9	n/a
4	11:15 AM	71.8	92.4	63.7	n/a
5	11:46 AM	71.2	86.8	54.3	n/a
6	12:02 PM	73.9	90.4	64.5	n/a
7	12:19 PM	64.1	70.5	57.1	n/a
8	12:45 PM	60.7	68.6	57.3	n/a
9 (Long Term)	11:52 AM-11:52 AM	76.0	105.4	53.8	82.3
10 (Long Term)	12:19 PM-12:19 PM	71.9	102.7	49.7	77.9

Notes: The equivalent noise level (L_{eq}) is defined as the single steady A-weighted level that is equivalent to the same amount of energy as that contained in the actual fluctuating levels over a period of time (essentially, the average noise level). For this measurement, the L_{eq} was over a 15-minute period (L_{eq}[15]).

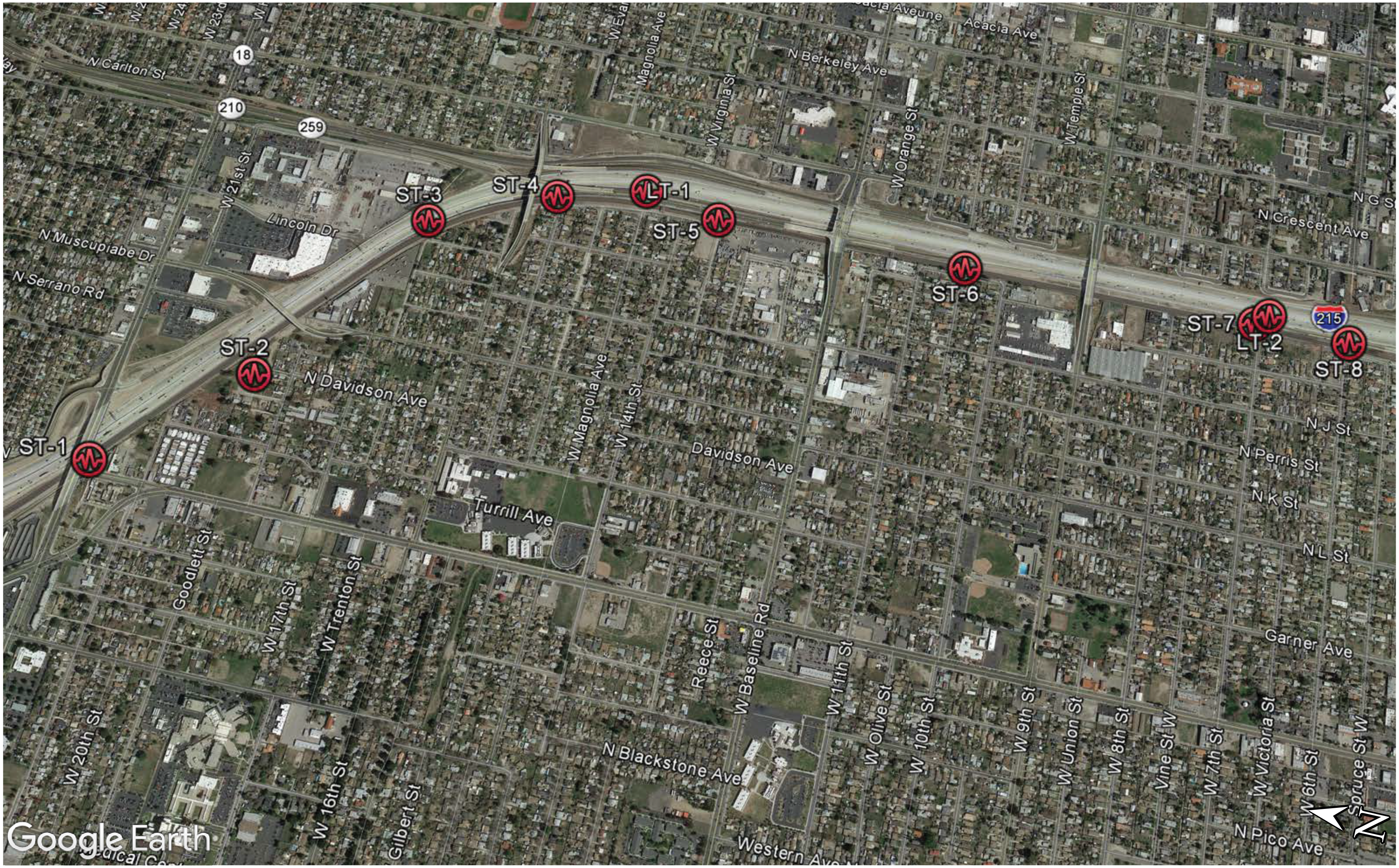


Exhibit 6: Noise Measurement Locations

- Measurement 1 was located along the west side of Cajon Boulevard, approximately 380 feet north of West 21st Street and adjacent to the West Highland Avenue overpass. Dominant noise sources include I-215 freeway traffic and a train passing by. The noise level monitored at Location 1 was 76.2 dBA L_{eq}.
- Measurement 2 was located at the northern terminus of Garner Avenue, approximately 250 feet north of West 19th Street. Freeway traffic was the dominant noise source during the measurement. The noise level monitored at Location 2 was 60.2 dBA L_{eq}.
- Measurement 3 was located at the southeast corner of West 17th Street and North J Street. Freeway traffic and a train pass-by were the dominant noise sources during the measurement. The noise level monitored at Location 3 was 58.5 dBA L_{eq}.
- Measurement 4 was located at the northeast corner of West Evans Street and North I Street. Freeway traffic and a train idling were the dominant noise sources during the measurement. The noise level monitored at Location 4 was 71.8 dBA L_{eq}.
- Measurement 5 was located at the northwest corner of Home Avenue West and North I Street. Freeway traffic and a train pass-by were the dominant noise sources during the measurement. The noise level monitored at Location 5 was 71.2 dBA L_{eq}.
- Measurement 6 was located at the northwest corner of Olive Street and North I Street. Freeway traffic and a train pass-by were the dominant noise sources during the measurement. The noise level monitored at Location 6 was 73.9 dBA L_{eq}.
- Measurement 7 was located along the north side of West 7th, approximately 100 feet west of North I Street. Freeway traffic was the dominant noise source during the measurement. The noise level monitored at Location 7 was 64.1 dBA L_{eq}.
- Measurement 8 was located at the southwest corner of West 6th Street and North I Street. Freeway traffic and a slow-moving train were the dominant noise sources during the measurement. The noise level monitored at Location 8 was 60.7 dBA L_{eq}.
- Measurement 9 was located along the east side of North I Street at West Magnolia Street. Freeway traffic and trains were the dominant noise sources during the measurement. The noise level monitored at Location 9 was 76.0 dBA L_{eq} and 82.3 dBA Ldn.

Measurement 10 was located approximately 50 feet southeast of the West 7th Street and North I Street intersection. Freeway traffic and trains were the dominant noise sources during the measurement. The noise level monitored at Location 10 was 71.9 dBA L_{eq} and 77.9 dBA Ldn.

4.2 Sensitive Receptors

Human response to noise varies widely depending on the type of noise, time of day, and receptor 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 areas are also considered noise-sensitive, especially during the nighttime hours. Additionally, San Bernardino has a number of public and private educational facilities, churches, a hospital, a library, senior housing, and park and recreation facilities that are considered noise sensitive. It is noted that residential uses are the closest sensitive receptors to the Project. Additionally, the FTA noise standards described above are lower for Category 1 and 2 land uses (i.e., residences, hospitals, hotels) than for Category 3 land uses (e.g., schools, libraries, and churches). As such, this analysis conservatively evaluates impacts based on the closest receptors (residences), which have a lower threshold.

5.0 ACOUSTICAL ANALYSIS

5.1 Construction Noise

The proposed Project has several construction phases with varying heavy-duty construction equipment. Project construction is anticipated to begin the first quarter of 2022 and be completed by the first quarter of 2024. Inclusive of property demolitions, Project construction would occur over approximately 42 months. However, demolition would occur upon property acquisition, prior to commencing Project construction. Exclusive of property demolitions and accounting for the three-month overlap, Project construction would occur over approximately 23 months. Notwithstanding, to provide a conservative analysis, demolition-related activities are included in the assumed construction activities and evaluated herein. The Project's demolition phase would start as soon as properties are acquired. The Project's site preparation phase would occur simultaneous with demolition and prior to grading. The Project is anticipated to involve approximately 184,300 cubic yards (CY) of exported cut soil and 33,400 CY of imported fill soil. Upon completion of property acquisitions and grading, municipal improvements (i.e., utility relocation and paving) would commence simultaneous with rail construction. Train trips are anticipated to deliver rail construction materials (i.e., rail, ties, and ballasts) during the Project's rail construction phase. Railroad ties are anticipated to be pre-cast concrete; therefore, a concrete batch plant would not be required.

Construction equipment reference noise levels published by the FTA were used to evaluate construction noise associated with the proposed Project. Construction noise level estimates do not account for the presence of intervening structures or topography, which may reduce noise levels at receptor locations. Therefore, the noise levels presented herein represent a conservative, reasonable worst-case estimate of actual temporary construction noise. Construction activities are required to comply with the standards and allowable construction hours (7:00 AM and 8:00 PM) set forth in SBMC § 8.54.070. However, as the City of San Bernardino does not identify specific noise level limits for construction noise, this analysis uses the FTA Transit Noise and Vibration Impact Assessment Manual (2018) criteria. The FTA's daytime construction noise criteria is 90 dBA Leq for residential uses and 100 dBA Leq for commercial and industrial uses.

5.2 Construction Noise – Updates to Modeling Assumptions

The minor Project refinements discussed below occurred subsequent to completion of the noise modeling.

<u>Basin Construction</u>. The current Project design for stormwater runoff and water quality assumes seven potential basin sites (totaling approximately 5.3 acres and providing a storage volume of approximately 13 acre-feet) would be constructed. The noise modeling assumed nine basins would be constructed, when likely less than one-half of the soils/materials import/export quantities assumed in the modeling would occur. Therefore, the noise modeling concerning basin construction is considered conservative.

<u>Displaced Commercial Uses</u>. Construction noise modeling assumed 31,000 square feet (SF) of displaced (i.e., demolished) commercial land uses, and not 46,000 SF, as proposed under the current Project design. This change in demolition assumptions is attributed to full acquisition (as opposed to partial acquisition) of an additional property. This additional property is bounded by 10^{th} Street and residential uses to the north, vacant land to the south, the BNSF corridor and Interstate-15 freeway to the east, and Montgomery Street and commercial and light industrial uses to the west. The residential uses would be 100 feet from

construction activities associated with the full acquisition of the additional property but are already adjacent to the previously-assumed construction footprint. Therefore, the residential uses would not be closer to construction activities. Because the construction noise modeling conservatively assumed that all nine basin sites would be constructed, any additional construction noise associated with demolition of the additional 15,000 SF of commercial floor area is considered nominal and would be more than offset by the already conservative construction emissions. Even if the construction emissions associated with an additional 15,000 SF of demolished floor area were added, the analysis conclusions based on modeling would not change because construction activities were already assumed to occur adjacent to the nearest receptor.

5.3 Ground-Borne Vibration During Construction

The proposed Project would result in significant impacts if it were to generate vibration levels substantial enough to damage nearby structures or buildings, or result in vibration levels that are commonly accepted as an annoyance to sensitive land uses.

The Caltrans Transportation and Construction Vibration Guidance Manual (September 2013) 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.” The analysis uses the “strongly perceptible” threshold of 0.1 in/sec PPV from the Caltrans Transportation and Construction Vibration Guidance Manual to determine human annoyance impacts during construction.

For structural damage, the analysis uses FTA guidelines. The FTA has published standard vibration velocities for construction equipment operations. For example, for a building that is constructed with reinforced concrete with no plaster, the FTA guidelines show that a vibration level of up to 0.20 in/sec is considered safe and would not result in any construction vibration damage.

5.4 Permanent Increases in Ambient Noise Levels

For the analysis of long-term operational impacts on the existing ambient noise environment, impacts are considered significant if Project operation would result in a substantial increase in noise levels in the project area. This evaluation uses the FTA’s moderate or severe noise impact criteria shown in **Exhibit 3** and **Exhibit 4** to evaluate train noise impacts. As the existing ambient noise level increases, the allowable noise level increases, but the total amount that community noise exposure is allowed to increase is reduced. This accounts for the unexpected result that a project noise exposure that is less than the existing noise exposure can still cause an impact. As noted above, residential uses are the closest sensitive receptors to the Project. The FTA noise standards are more stringent for Category 1 and 2 land uses (i.e., residences, hospitals, hotels) than Category 3 land uses (e.g., schools, libraries, and churches). As such, this analysis conservatively evaluates impacts based on the closest receptors (residences), which have a lower threshold.

5.5 Acoustical Analysis Parameters

The methodology used in assessing operational impacts from Project implementation is based on the FTA *Transit Noise and Vibration Impact Assessment* (2006) guidance manual. Locomotive and rail car noise was modeled using the FTA Train Noise Impact Assessment Model (July 3, 2007). Modeling was conducted for freight trains to determine the noise levels resulting from the types of trains currently using the railroad. The following assumptions were utilized in the analysis of rail operations:

- Model results are calculated for the closest receivers west/southwest of the Project alignment.
- Fixed guideway source type.
- 72 freight trains per day (assumed 60 during the daytime and 12 at night).
- Each train includes five locomotives with up to 60 cars traveling at up to 55 miles per hour (mph).
- Warning horns would not be used as the Project involves no crossings (all crossings are grade separated).

5.6 Operational Train Noise

The Project is proposed to enhance the BNSF Intermodal A Yard's efficiency by reducing train congestion along the existing lead tracks. Project implementation would not increase the number of permanent employees or A Yard traffic. Along certain portions of the rail corridor, Project implementation would encroach train traffic to the east, closer to sensitive receptors. Noise modeling was calculated for the nearest receivers west and southwest of the Project alignment for existing plus Project conditions. Existing plus Project conditions modeling results are identified in Table 12, *Railroad Noise Levels – Existing Plus Project Conditions*. The results indicate that train noise levels under Existing Conditions and Existing Plus Project conditions would exceed the applicable FTA Noise Impact Criteria for Transit Project thresholds, as well as the City's normally acceptable threshold of 60 dBA and conditionally acceptable threshold of 70 dBA for residential land uses. As described above, SBGP Figure N-2 shows that the 70 dBA CNEL contour would extend approximately 800 feet west, the 65 dBA CNEL contour would extend approximately 1,700 feet west and the 60 dBA CNEL contour would extend approximately 3,400 feet west of the freeway centerline. As such, the areas affected by the railroad noise depicted in Table 12 are also within the I-215 70 dBA CNEL contour. Railroad noise levels under existing conditions already exceed the City's noise standards for residential uses generally within 250 feet. Project implementation would potentially increase levels by up to 6 dBA in some locations. It is noted that Table 12 identifies L_{dn} noise levels (i.e., 24-hour energy average noise levels) instead of hourly noise (i.e., L_{eq}[h]). However, L_{dn} levels are typically louder than L_{eq} due to the 10-dB penalty applied to A-weighted sound levels occurring during nighttime hours between 10 PM and 7 AM. Therefore, L_{eq} noise levels would be lower than what is identified in Table 12.

As shown in Table 12, a Moderate Impact would occur along Segments 4 and 7 (south of West Evans). As described above, a Moderate Impact is a noticeable change that may not be sufficient to cause strong adverse reactions from the community. Several nearby sensitive receptors are already exposed to noise levels exceeding the City's thresholds under existing conditions. Removal of structures and building row barriers would expose the second row of receptors to increased train noise levels. The Project's property acquisitions would also occur at locations where residences are nearest the railroad corridor. A Severe Impact would occur along Segments 6, 7 (north of West Evans), 8, 9, 10, and 11; see Table 12. Severe Impacts would cause annoyance to a significant percentage of people.

Construction of sound barriers (i.e., sound walls) at various locations along the Project site would be required to further attenuate rail noise impacts on sensitive receptors. To be effective, a noise enclosure/ barrier must physically fit in the available space, must completely break the line-of-sight between the noise source and the receptors, must be free of degrading holes or gaps, and must not be flanked by nearby reflective surfaces. Noise barriers must be sizable enough to cover the entire noise source and extend length-wise and vertically as far as feasibly possible to be most effective. The limiting factor for a noise barrier is not the component of noise transmitted through the material, but rather the amount of noise flanking around and over the barrier. Generally, any material with a density of 4 lbs/ft^2 (20 kg/m^2) or more has a transmission loss of at least 20 dBA. Masonry walls have a minimum density of 31 lbs/ft^2 and a berm barrier will typically provide approximately 3 dBA of attenuation more than masonry walls.[4]

Sound walls would be required along portions of Segments 6 through 11. Based on the noise levels modeled in Table 12, masonry walls at the locations identified above would sufficiently reduce noise levels at the second-row receptors to comply with FTA criteria resulting in a less than significant impact. The proposed noise barriers would be required to conform to FTA standards.

[4] Federal Highway Administration, *Noise Barrier Design Handbook*, https://www.fhwa.dot.gov/Environment/noise/noise_barriers/design_construction/design/design03.cfm, accessed July 24, 2018.

Table 12: Railroad Noise Levels – Existing Plus Project Conditions

Segment	Location	Existing Conditions		Existing + Project Conditions		Project Change	Impact Type[3, 4]	Mitigated Noise Level[5]
		Distance to Closest Receptors (feet)	Modeled Noise Level (L_{dn})	Distance to Closest Receptors (feet)	Modeled Noise Level (L_{dn})			
1	First Row	130	69	112	70	1	No Impact	n/a
3	First Row	976	56	976	56	0	No Impact	n/a
4	First Row	77	67	65	69	2	No Impact	n/a
5	First Row	125	70	110	70	0	No Impact	n/a
6	First Row	58	75	47	77	2	Moderate	**67**
7 (North of West Evans)	First Row[1]	35	78	n/a	n/a	n/a	n/a	n/a
	Second Row	85	68	70	73	5	**Severe**	**63**
7 (South of West Evans)	First Row	90	72	75	76	1	Moderate	n/a
	Second Row	128	65	110	66	1	No Impact	n/a
8	First Row[1]	74	73	n/a	n/a	n/a	n/a	n/a
	Second Row	115	66	95	71	5	**Severe**	**61**
9	First Row[1]	40	77	n/a	n/a	n/a	n/a	n/a
	Second Row	95	67	95	71	4	**Severe**	**61**
10	First Row[1]	40	77	n/a	n/a	n/a	n/a	n/a
	Second Row	80	68	65	74	6	**Severe**	**64**
11	First Row[1]	40	77	n/a	n/a	n/a	n/a	n/a
	Second Row	80	68	65	74	6	**Severe**	**64**
12	First Row	63	74	63	74	0	No Impact	n/a

Notes:
1. A full take is required for these locations.
2. Second row receivers would have an intervening building row during existing conditions that would be removed under proposed conditions.
3. Moderate Impact: The change in the cumulative noise level is noticeable to most people, but it may not be sufficient to cause strong, adverse reactions from the community. In this transitional area, other project specific factors must be considered to determine the impact's magnitude and the need for mitigation, such as the existing level, predicted level of increase over existing noise levels, and the types and numbers of noise-sensitive land uses affected.
4. Severe Impact: Project noise above the upper curve is considered to cause a Severe Impact since a significant percentage of people would be highly annoyed by the new noise. This curve flattens out at 75 dB for Category 1 and 2 land uses, a level associated with an unacceptable living environment. Noise mitigation will normally be specified for Severe Impact areas unless there is no practical method of mitigating the noise.
5. Calculated using the FTA's barrier insertion loss methodology described in Section 4.5 (pages 88-90) of the *Transit Noise and Vibration Impact Assessment Manual*, 2018.

5.7 Operational Vehicular Noise

The Project is proposed to enhance the BNSF Intermodal A Yard's efficiency by reducing train congestion along the existing lead tracks. Project implementation would not increase the number of permanent employees or A Yard traffic. To accommodate the proposed rail and ancillary improvements, the Project requires acquisition of approximately 29 acres of adjacent properties where residential and non-residential land uses are located. As many as 43 DU (36 single-family, seven multi-family), six commercial buildings (approximately 46,000 SF), and three industrial buildings (approximately 32,000 SF) would be acquired. Because the Project would remove these existing land uses, the Project is forecast to decrease traffic by 672 trips per day (-58 AM peak hour trips and -70 PM peak hour trips), thus, a proportionate decrease in vehicular noise would also occur. Partial acquisition of some properties would create remnant parcels not required for the Project. The Project does not propose any General Plan land use designation or zone change on these remnant parcel and their underlying/existing land use designations/zoning would be retained. These remnant parcels would not be redeveloped as part of the proposed Project but would be available for future development consistent with their underlying/existing land use designations and zoning. However, there is no known proposal for reuse of these parcels as of this writing. Therefore, analysis of long-term operational impacts resulting from their redevelopment would be speculative and no further analysis has been conducted.

Additionally, reassignment of vehicle trips resulting from the proposed circulation/roadway improvements/modifications to multiple City roadways (i.e., vacations, realignments, and cul-de-sacs) would be nominal and localized. In general, a traffic noise increase of 3 dBA is barely perceptible to people, while a 5-dBA increase is readily noticeable. Generally, traffic volumes on Project area roadways would have to approximately double for the resulting traffic noise levels to increase by 3 dBA.[5] The Project would not create additional operational vehicle trips that would result in a noticeable change in traffic noise levels. Therefore, the Project's operational vehicular trips would result in a less than significant offsite traffic noise impact.

[5] According to the California Department of Transportation, *Technical Noise Supplement to Traffic Noise Analysis Protocol* (September 2013), it takes a doubling of traffic to create a noticeable (i.e. 3 dBA) noise increase.

6.0 VIBRATION ANALYSIS

Operational vibration in the Project vicinity would be generated by train movements within the Project area. The proposed Project improvements would not increase the number of train trips. Since the Project does not increase the number of train trips, operational vibrations would not increase in frequency and vibration levels from train movements would be similar to current existing conditions. Additionally, Table 13: Railroad Vibration Levels – Existing Plus Project Conditions compares vibration levels without the Project to vibration levels with the Project. As the Project would locate tracks closer to sensitive receptors, new effects would occur only if the relocation would result in more than a 3 VdB increase in vibration level, per FRA standards. Table 13 shows that the calculated increases would be less than 3 VdB. Sensitive receptors near the Project site would continue to experience similar level of vibrations during Project operations, as under existing conditions. Therefore, impacts would be less than significant.

Table 13: Railroad Vibration Levels – Existing Plus Project Conditions

Segment	Location	Existing Conditions		Existing + Project Conditions		Project Change[3]	Threshold Exceeded?
		Distance to Closest Receptors (feet)	L_v (VdB)[2]	Distance to Closest Receptors (feet)	L_v (VdB)[2]		
1	First Row	130	76	112	77	1	No
3	First Row	976	54	976	54	0	No
4	First Row	77	81	65	82	2	No
5	First Row	125	76	110	77	1	No
6	First Row	58	83	47	85	2	No
7 (North of West Evans)	First Row[1]	35	n/a	n/a	n/a	n/a	n/a
	Second Row	85	80	70	82	2	No
7 (South of West Evans)	First Row	90	79	75	81	2	No
	Second Row	128	76	110	77	1	No
8	First Row[1]	74	n/a	n/a	n/a	n/a	n/a
	Second Row	115	77	95	79	2	No
9	First Row[1]	40	n/a	n/a	n/a	n/a	n/a
	Second Row	95	79	95	79	0	No
10	First Row[1]	40	n/a	n/a	n/a	n/a	n/a
	Second Row	80	81	65	82	2	No
11	First Row[1]	40	n/a	n/a	n/a	n/a	n/a
	Second Row	80	81	65	82	2	No
12	First Row	63	83	63	83	0	No

Notes:
1. A full take is required for these locations.
2. Vibration level is calculated with the following formula: L_v = 92.28+ + 14.81log(D) - 14.17log $(D)^2$ + 1.65 log$(D)^3$, where: L_v = velocity level in VdB, and D = distance per the Federal Transit Administration, Transit Noise and Vibration Impact Assessment Manual, 2018.
3. As described in the Regulatory Setting above, FRA guidelines note that 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.

7.0 CONCLUSION

Railroad noise levels under existing conditions already exceed City noise standards for residential uses generally within 250 feet. Implementation of the Ono Lead Track Extension Project would potentially increase levels by up to 6 dBA in some locations. Masonry walls would sufficiently reduce noise levels to comply with FTA criteria.

8.0 REFERENCES

1. BNSF Railway, *Ono Lead Extension Presentation Booklet*, June 14, 2018.

2. California Department of Transportation, *Technical Noise Supplement to the Traffic Noise Analysis Protocol*, September 2013.

3. City of San Bernardino, *San Bernardino Municipal Code*, June 2018.

4. City of San Bernardino, *San Bernardino General Plan Chapter 14, Noise*, November 2015.

5. Cyril M. Harris, *Handbook of Noise Control*, 1979.

6. Federal Transit Administration, *Transit Noise and Vibration Impact Assessment*, May 2006.

7. Federal Highway Administration, *Noise Barrier Design Handbook*, https://www.fhwa.dot.gov/Environment/noise/noise_barriers/design_construction/design/design03.cfm, accessed July 24, 2018.

8. James P. Cowan, *Handbook of Environmental Acoustics*, 1994.

9. U.S. Environmental Protection Agency, *Protective Noise Levels (EPA 550/9-79-100)*, November 1979.

Appendix A

NOISE DATA

Noise Measurement Field Data

Project:	BNSF Ono	**Job Number:**	195015001
Site No.:	1	**Date:**	9/11/2018
Analyst:	Josh Cortez	**Time:**	10:14 - 10:24 am
Location:	SW corner of Historic Route 66, under W. Highland Ave. overpass		
Noise Sources:	Freeway traffic, Route 66 traffic, train passing		
Comments:			

Results (dBA):

Leq:	Lmin:	Lmax:	Peak:
76.2	69.1	83.9	105.8

Equipment	
Sound Level Meter:	LD SoundExpert LxT
Calibrator:	CAL200
Response Time:	Slow
Weighting:	A
Microphone Height:	5 feet

Weather	
Temp. (degrees F):	75° F
Wind (mph):	< 5
Sky:	Clear
Bar. Pressure:	
Humidity:	50%

Photo:

Kimley»Horn

Summary

File Name on Meter	BNSF.001
File Name on PC	SLM_0005586_BNSF_001.00.ldbin
Serial Number	0005586
Model	SoundExpert® LxT
Firmware Version	2.302
User	josh.cortez
Location	San Bernardino
Job Description	BNSF
Note	

Measurement

Description	
Start	2018-09-11 10:14:22
Stop	2018-09-11 10:24:22
Duration	00:10:00.0
Run Time	00:10:00.0
Pause	00:00:00.0
Pre Calibration	2018-09-10 14:28:18
Post Calibration	None
Calibration Deviation	---

Overall Settings

RMS Weight	A Weighting	
Peak Weight	Z Weighting	
Detector	Slow	
Preamp	PRMLxT1L	
Microphone Correction	Off	
Integration Method	Linear	
OBA Range	Normal	
OBA Bandwidth	1/1 and 1/3	
OBA Freq. Weighting	Z Weighting	
OBA Max Spectrum	At LMax	
Overload	122.0 dB	
	A	**C**
Under Range Peak	78.2	75.2
Under Range Limit	**27.2**	25.9
Noise Floor	16.8	16.8

Results

LAeq	76.2 dB	
LAE	104.0 dB	
EA	2.780 mPa²h	
LZpeak (max)	2018-09-11 10:19:03	105.8
LASmax	2018-09-11 10:19:05	83.9
LASmin	2018-09-11 10:18:19	69.1

SEA	-99.9 dB	
LAS > 85.0 dB (Exceedance Counts / Duration)	0	0.0
LAS > 115.0 dB (Exceedance Counts / Duration)	0	0.0
LZpeak > 135.0 dB (Exceedance Counts / Duration)	0	0.0
LZpeak > 137.0 dB (Exceedance Counts / Duration)	0	0.0
LZpeak > 140.0 dB (Exceedance Counts / Duration)	0	0.0
Community Noise	**Ldn**	**LDay 07:00-22:00**
	76.2	76.2
LCeq	81.6 dB	
LAeq	76.2 dB	
LCeq - LAeq	5.4 dB	
LAIeq	77.1 dB	
LAeq	76.2 dB	
LAIeq - LAeq	0.9 dB	

	A	
	dB	**Time Stamp**
Leq	76.2	
LS(max)	83.9	2018/09/11 10:19:05
LS(min)	69.1	2018/09/11 10:18:19
LPeak(max)		

# Overloads	0
Overload Duration	0.0 s
# OBA Overloads	0
OBA Overload Duration	0.0 s

Statistics

LAS5.00	79.0 dB
LAS10.00	78.4 dB
LAS33.30	76.4 dB
LAS50.00	75.6 dB
LAS66.60	74.7 dB
LAS90.00	72.9 dB

Calibration History

Preamp	**Date**	**dB re. 1V/Pa**
PRMLxT1L	2018-09-10 14:28:15	-28.2
PRMLxT1L	2018-09-07 08:01:19	-28.4
PRMLxT1L	2018-09-05 15:54:56	-28.2
PRMLxT1L	2018-08-30 13:50:21	-28.3
PRMLxT1L	2018-08-30 10:00:22	-28.2
PRMLxT1L	2018-08-30 09:34:30	-28.2
PRMLxT1L	2018-08-30 08:58:36	-28.2
PRMLxT1L	2018-08-29 16:09:47	-28.2

Noise Measurement Field Data

Project:	BNSF Ono	**Job Number:**	195015001
Site No.:	2	**Date:**	9/11/2018
Analyst:	Josh Cortez	**Time:**	10:32 - 10:42 am
Location:	North dead-end of Garner Ave.		
Noise Sources:	Freeway traffic, dogs occasionally barking		
Comments:			

Results (dBA):

Leq:	Lmin:	Lmax:	Peak:
60.2	52.3	74.1	96.0

Equipment	
Sound Level Meter:	LD SoundExpert LxT
Calibrator:	CAL200
Response Time:	Slow
Weighting:	A
Microphone Height:	5 feet

Weather	
Temp. (degrees F):	76° F
Wind (mph):	< 5
Sky:	Clear
Bar. Pressure:	
Humidity:	50%

Photo:

Kimley»Horn

Summary

File Name on Meter	BNSF.002	
File Name on PC	SLM_0005586_BNSF_002.00.ldbin	
Serial Number	0005586	
Model	SoundExpert® LxT	
Firmware Version	2.302	
User	josh.cortez	
Location	San Bernardino	
Job Description	BNSF	
Note		

Measurement

Description		
Start	2018-09-11 10:32:11	
Stop	2018-09-11 10:42:11	
Duration	00:10:00.0	
Run Time	00:10:00.0	
Pause	00:00:00.0	
Pre Calibration	2018-09-10 14:28:15	
Post Calibration	None	
Calibration Deviation	---	

Overall Settings

RMS Weight	A Weighting	
Peak Weight	Z Weighting	
Detector	Slow	
Preamp	PRMLxT1L	
Microphone Correction	Off	
Integration Method	Linear	
OBA Range	Normal	
OBA Bandwidth	1/1 and 1/3	
OBA Freq. Weighting	Z Weighting	
OBA Max Spectrum	At LMax	
Overload	122.0 dB	
	A	**C**
Under Range Peak	78.2	75.2
Under Range Limit	**27.2**	25.9
Noise Floor	16.8	16.8

Results

LA_{eq}	60.2 dB	
LAE	87.9 dB	
EA	69.151 µPa²h	
$LZ_{peak\ (max)}$	2018-09-11 10:32:50	96.0
LAS_{max}	2018-09-11 10:32:50	74.1
LAS_{min}	2018-09-11 10:34:05	52.3

SEA	-99.9 dB	
LAS > 85.0 dB (Exceedance Counts / Duration)	0	0.0
LAS > 115.0 dB (Exceedance Counts / Duration)	0	0.0
LZpeak > 135.0 dB (Exceedance Counts / Duration)	0	0.0
LZpeak > 137.0 dB (Exceedance Counts / Duration)	0	0.0
LZpeak > 140.0 dB (Exceedance Counts / Duration)	0	0.0
Community Noise	**Ldn**	**LDay 07:00-22:00**
	60.2	60.2
LCeq	70.6 dB	
LAeq	60.2 dB	
LCeq - LAeq	10.4 dB	
LAIeq	67.9 dB	
LAeq	60.2 dB	
LAIeq - LAeq	7.8 dB	

	A	
	dB	**Time Stamp**
Leq	60.2	
LS(max)	74.1	2018/09/11 10:32:50
LS(min)	52.3	2018/09/11 10:34:05
LPeak(max)		

# Overloads	0
Overload Duration	0.0 s
# OBA Overloads	0
OBA Overload Duration	0.0 s

Statistics

LAS5.00	67.3 dB
LAS10.00	62.4 dB
LAS33.30	56.5 dB
LAS50.00	56.0 dB
LAS66.60	55.4 dB
LAS90.00	54.1 dB

Calibration History

Preamp	Date	dB re. 1V/Pa
PRMLxT1L	2018-09-10 14:28:15	-28.2
PRMLxT1L	2018-09-07 08:01:19	-28.4
PRMLxT1L	2018-09-05 15:54:56	-28.2
PRMLxT1L	2018-08-30 13:50:21	-28.3
PRMLxT1L	2018-08-30 10:00:22	-28.2
PRMLxT1L	2018-08-30 09:34:30	-28.2
PRMLxT1L	2018-08-30 08:58:36	-28.2
PRMLxT1L	2018-08-29 16:09:47	-28.2

Noise Measurement Field Data

Project:	BNSF Ono	**Job Number:**	195015001
Site No.:	3	**Date:**	9/11/2018
Analyst:	Josh Cortez	**Time:**	10:53 - 11:03 am
Location:	End of sidewalk on SE corner of W. 17th St. and N. J St.		

Noise Sources:	Freeway traffic, train
Comments:	

Results (dBA):

Leq:	Lmin:	Lmax:	Peak:
58.5	53.2	71.9	101.6

Equipment	
Sound Level Meter:	LD SoundExpert LxT
Calibrator:	CAL200
Response Time:	Slow
Weighting:	A
Microphone Height:	5 feet

Weather	
Temp. (degrees F):	78° F
Wind (mph):	< 5
Sky:	Clear
Bar. Pressure:	29.74"
Humidity:	41%

Photo:

Kimley»Horn

Summary

File Name on Meter	BNSF.003	
File Name on PC	SLM_0005586_BNSF_003.00.ldbin	
Serial Number	0005586	
Model	SoundExpert® LxT	
Firmware Version	2.302	
User	josh.cortez	
Location	San Bernardino	
Job Description	BNSF	
Note		

Measurement

Description		
Start	2018-09-11 10:53:30	
Stop	2018-09-11 11:03:30	
Duration	00:10:00.0	
Run Time	00:10:00.0	
Pause	00:00:00.0	
Pre Calibration	2018-09-10 14:28:15	
Post Calibration	None	
Calibration Deviation	---	

Overall Settings

RMS Weight	A Weighting	
Peak Weight	Z Weighting	
Detector	Slow	
Preamp	PRMLxT1L	
Microphone Correction	Off	
Integration Method	Linear	
OBA Range	Normal	
OBA Bandwidth	1/1 and 1/3	
OBA Freq. Weighting	Z Weighting	
OBA Max Spectrum	At LMax	
Overload	122.0 dB	
	A	**C**
Under Range Peak	78.2	75.2
Under Range Limit	**27.2**	25.9
Noise Floor	16.8	16.8

Results

LA_{eq}	58.5 dB	
LAE	86.3 dB	
EA	47.267 µPa²h	
$LZ_{peak\ (max)}$	2018-09-11 10:59:11	101.6
LAS_{max}	2018-09-11 10:59:12	71.9
LAS_{min}	2018-09-11 10:56:09	53.2

SEA	-99.9 dB	
LAS > 85.0 dB (Exceedance Counts / Duration)	0	0.0
LAS > 115.0 dB (Exceedance Counts / Duration)	0	0.0
LZpeak > 135.0 dB (Exceedance Counts / Duration)	0	0.0
LZpeak > 137.0 dB (Exceedance Counts / Duration)	0	0.0
LZpeak > 140.0 dB (Exceedance Counts / Duration)	0	0.0
Community Noise	**Ldn**	**LDay 07:00-22:00**
	58.5	58.5
LCeq	74.8 dB	
LAeq	58.5 dB	
LCeq - LAeq	16.3 dB	
LAIeq	60.1 dB	
LAeq	58.5 dB	
LAIeq - LAeq	1.6 dB	

	A	
	dB	**Time Stamp**
Leq	58.5	
LS(max)	71.9	2018/09/11 10:59:12
LS(min)	53.2	2018/09/11 10:56:09
LPeak(max)		

# Overloads	0	
Overload Duration	0.0 s	
# OBA Overloads	0	
OBA Overload Duration	0.0 s	

Statistics

LAS5.00	62.2 dB
LAS10.00	59.8 dB
LAS33.30	57.6 dB
LAS50.00	56.9 dB
LAS66.60	56.2 dB
LAS90.00	55.1 dB

Calibration History

Preamp	**Date**	**dB re. 1V/Pa**
PRMLxT1L	2018-09-10 14:28:15	-28.2
PRMLxT1L	2018-09-07 08:01:19	-28.4
PRMLxT1L	2018-09-05 15:54:56	-28.2
PRMLxT1L	2018-08-30 13:50:21	-28.3
PRMLxT1L	2018-08-30 10:00:22	-28.2
PRMLxT1L	2018-08-30 09:34:30	-28.2
PRMLxT1L	2018-08-30 08:58:36	-28.2
PRMLxT1L	2018-08-29 16:09:47	-28.2

Noise Measurement Field Data

Project:	BNSF Ono	**Job Number:**	195015001
Site No.:	4	**Date:**	9/11/2018
Analyst:	Josh Cortez	**Time:**	11:15 - 11:25 am
Location:	NE corner of W. Evans St. and N. I St.		
Noise Sources:	Freeway traffic, idling train		
Comments:			

Results (dBA):

Leq:	Lmin:	Lmax:	Peak:
71.8	63.7	92.4	111.8

Equipment	
Sound Level Meter:	LD SoundExpert LxT
Calibrator:	CAL200
Response Time:	Slow
Weighting:	A
Microphone Height:	5 feet

Weather	
Temp. (degrees F):	80° F
Wind (mph):	< 5
Sky:	Clear
Bar. Pressure:	29.74"
Humidity:	41%

Photo:

Kimley»Horn

Summary

File Name on Meter	BNSF.004	
File Name on PC	SLM_0005586_BNSF_004.00.ldbin	
Serial Number	0005586	
Model	SoundExpert® LxT	
Firmware Version	2.302	
User	josh.cortez	
Location	San Bernardino	
Job Description	BNSF	
Note		

Measurement

Description		
Start	2018-09-11 11:15:27	
Stop	2018-09-11 11:25:27	
Duration	00:10:00.0	
Run Time	00:10:00.0	
Pause	00:00:00.0	
Pre Calibration	2018-09-10 14:28:15	
Post Calibration	None	
Calibration Deviation	---	

Overall Settings

RMS Weight	A Weighting	
Peak Weight	Z Weighting	
Detector	Slow	
Preamp	PRMLxT1L	
Microphone Correction	Off	
Integration Method	Linear	
OBA Range	Normal	
OBA Bandwidth	1/1 and 1/3	
OBA Freq. Weighting	Z Weighting	
OBA Max Spectrum	At LMax	
Overload	122.0 dB	
	A	**C**
Under Range Peak	78.2	75.2
Under Range Limit	**27.2**	25.9
Noise Floor	16.8	16.8

Results

LA_{eq}	71.8 dB	
LAE	99.5 dB	
EA	1.001 mPa²h	
$LZ_{peak\ (max)}$	2018-09-11 11:21:56	111.8
LAS_{max}	2018-09-11 11:21:56	92.4
LAS_{min}	2018-09-11 11:16:22	63.7

SEA	-99.9 dB	
LAS > 85.0 dB (Exceedance Counts / Duration)	2	4.6
LAS > 115.0 dB (Exceedance Counts / Duration)	0	0.0
LZpeak > 135.0 dB (Exceedance Counts / Duration)	0	0.0
LZpeak > 137.0 dB (Exceedance Counts / Duration)	0	0.0
LZpeak > 140.0 dB (Exceedance Counts / Duration)	0	0.0
Community Noise	**Ldn**	**LDay 07:00-22:00**
	71.8	71.8
LCeq	83.6 dB	
LAeq	71.8 dB	
LCeq - LAeq	11.9 dB	
LAIeq	76.6 dB	
LAeq	71.8 dB	
LAIeq - LAeq	4.8 dB	

	A	
	dB	**Time Stamp**
Leq	71.8	
LS(max)	92.4	2018/09/11 11:21:56
LS(min)	63.7	2018/09/11 11:16:22
LPeak(max)		

# Overloads	0
Overload Duration	0.0 s
# OBA Overloads	0
OBA Overload Duration	0.0 s

Statistics

LAS5.00	72.2 dB
LAS10.00	71.4 dB
LAS33.30	70.1 dB
LAS50.00	69.6 dB
LAS66.60	68.9 dB
LAS90.00	67.3 dB

Calibration History

Preamp	Date	dB re. 1V/Pa
PRMLxT1L	2018-09-10 14:28:15	-28.2
PRMLxT1L	2018-09-07 08:01:19	-28.4
PRMLxT1L	2018-09-05 15:54:56	-28.2
PRMLxT1L	2018-08-30 13:50:21	-28.3
PRMLxT1L	2018-08-30 10:00:22	-28.2
PRMLxT1L	2018-08-30 09:34:30	-28.2
PRMLxT1L	2018-08-30 08:58:36	-28.2
PRMLxT1L	2018-08-29 16:09:47	-28.2

Noise Measurement Field Data

Project:	BNSF Ono	**Job Number:**	195015001
Site No.:	5	**Date:**	9/11/2018
Analyst:	Josh Cortez	**Time:**	11:46 - 11:56 am
Location:	NW corner of Home Ave. W. and N. I St.		
Noise Sources:	Freeway traffic, train		
Comments:			

Results (dBA):

Leq:	Lmin:	Lmax:	Peak:
71.2	54.3	86.8	110.0

Equipment	
Sound Level Meter:	LD SoundExpert LxT
Calibrator:	CAL200
Response Time:	Slow
Weighting:	A
Microphone Height:	5 feet

Weather	
Temp. (degrees F):	82° F
Wind (mph):	< 5
Sky:	Clear
Bar. Pressure:	29.74"
Humidity:	34%

Photo:

Kimley»Horn

Summary

File Name on Meter	BNSF.006	
File Name on PC	SLM_0005586_BNSF_006.00.ldbin	
Serial Number	0005586	
Model	SoundExpert® LxT	
Firmware Version	2.302	
User	josh.cortez	
Location	San Bernardino	
Job Description	BNSF	
Note		

Measurement

Description		
Start	2018-09-11 11:46:13	
Stop	2018-09-11 11:56:13	
Duration	00:10:00.0	
Run Time	00:10:00.0	
Pause	00:00:00.0	
Pre Calibration	2018-09-10 14:28:15	
Post Calibration	None	
Calibration Deviation	---	

Overall Settings

RMS Weight	A Weighting	
Peak Weight	Z Weighting	
Detector	Slow	
Preamp	PRMLxT1L	
Microphone Correction	Off	
Integration Method	Linear	
OBA Range	Normal	
OBA Bandwidth	1/1 and 1/3	
OBA Freq. Weighting	Z Weighting	
OBA Max Spectrum	At LMax	
Overload	122.0 dB	
	A	**C**
Under Range Peak	78.2	75.2
Under Range Limit	**27.2**	25.9
Noise Floor	16.8	16.8

Results

LAeq	71.2 dB	
LAE	99.0 dB	
EA	886.774 µPa²h	
LZpeak (max)	2018-09-11 11:51:34	110.0
LASmax	2018-09-11 11:51:47	86.8
LASmin	2018-09-11 11:49:46	54.3

SEA	-99.9 dB	
LAS > 85.0 dB (Exceedance Counts / Duration)	1	2.2
LAS > 115.0 dB (Exceedance Counts / Duration)	0	0.0
LZpeak > 135.0 dB (Exceedance Counts / Duration)	0	0.0
LZpeak > 137.0 dB (Exceedance Counts / Duration)	0	0.0
LZpeak > 140.0 dB (Exceedance Counts / Duration)	0	0.0
Community Noise	**Ldn**	**LDay 07:00-22:00**
	71.2	71.2
LCeq	84.9 dB	
LAeq	71.2 dB	
LCeq - LAeq	13.7 dB	
LAIeq	74.4 dB	
LAeq	71.2 dB	
LAIeq - LAeq	3.1 dB	

	A	
	dB	**Time Stamp**
Leq	71.2	
LS(max)	86.8	2018/09/11 11:51:47
LS(min)	54.3	2018/09/11 11:49:46
LPeak(max)		

# Overloads	0
Overload Duration	0.0 s
# OBA Overloads	0
OBA Overload Duration	0.0 s

Statistics

LAS5.00	77.5 dB
LAS10.00	75.4 dB
LAS33.30	63.6 dB
LAS50.00	58.1 dB
LAS66.60	57.2 dB
LAS90.00	56.1 dB

Calibration History

Preamp	**Date**	**dB re. 1V/Pa**
PRMLxT1L	2018-09-10 14:28:15	-28.2
PRMLxT1L	2018-09-07 08:01:19	-28.4
PRMLxT1L	2018-09-05 15:54:56	-28.2
PRMLxT1L	2018-08-30 13:50:21	-28.3
PRMLxT1L	2018-08-30 10:00:22	-28.2
PRMLxT1L	2018-08-30 09:34:30	-28.2
PRMLxT1L	2018-08-30 08:58:36	-28.2
PRMLxT1L	2018-08-29 16:09:47	-28.2

Noise Measurement Field Data

Project:	BNSF Ono	**Job Number:**	195015001
Site No.:	6	**Date:**	9/11/2018
Analyst:	Josh Cortez	**Time:**	12:02 - 12:12 pm
Location:	NW corner of Olive St. and N. I St.		

Noise Sources:	Freeway traffic, train
Comments:	Spoke with resident: (1) trains idle every day next to the neighhorhood, they change locat

Results (dBA):

Leq:	Lmin:	Lmax:	Peak:
73.9	64.5	90.4	118.1

Equipment	
Sound Level Meter:	LD SoundExpert LxT
Calibrator:	CAL200
Response Time:	Slow
Weighting:	A
Microphone Height:	5 feet

Weather	
Temp. (degrees F):	82° F
Wind (mph):	< 5
Sky:	Clear
Bar. Pressure:	29.74"
Humidity:	34%

Photo:

Kimley»Horn

Summary

File Name on Meter	BNSF.007	
File Name on PC	SLM_0005586_BNSF_007.00.ldbin	
Serial Number	0005586	
Model	SoundExpert® LxT	
Firmware Version	2.302	
User	josh.cortez	
Location	San Bernardino	
Job Description	BNSF	
Note		

Measurement

Description		
Start	2018-09-11 12:02:10	
Stop	2018-09-11 12:12:10	
Duration	00:10:00.0	
Run Time	00:10:00.0	
Pause	00:00:00.0	
Pre Calibration	2018-09-10 14:28:15	
Post Calibration	None	
Calibration Deviation	---	

Overall Settings

RMS Weight	A Weighting	
Peak Weight	Z Weighting	
Detector	Slow	
Preamp	PRMLxT1L	
Microphone Correction	Off	
Integration Method	Linear	
OBA Range	Normal	
OBA Bandwidth	1/1 and 1/3	
OBA Freq. Weighting	Z Weighting	
OBA Max Spectrum	At LMax	
Overload	122.0 dB	
	A	**C**
Under Range Peak	78.2	75.2
Under Range Limit	**27.2**	25.9
Noise Floor	16.8	16.8

Results

LA_{eq}	73.9 dB	
LAE	101.6 dB	
EA	1.621 mPa^2h	
$LZ_{peak\ (max)}$	2018-09-11 12:03:33	118.1
LAS_{max}	2018-09-11 12:03:34	90.4
LAS_{min}	2018-09-11 12:09:58	64.5

SEA	-99.9 dB	
LAS > 85.0 dB (Exceedance Counts / Duration)	1	13.3
LAS > 115.0 dB (Exceedance Counts / Duration)	0	0.0
LZpeak > 135.0 dB (Exceedance Counts / Duration)	0	0.0
LZpeak > 137.0 dB (Exceedance Counts / Duration)	0	0.0
LZpeak > 140.0 dB (Exceedance Counts / Duration)	0	0.0
Community Noise	**Ldn**	**LDay 07:00-22:00**
	73.9	73.9
LCeq	88.7 dB	
LAeq	73.9 dB	
LCeq - LAeq	14.8 dB	
LAIeq	75.0 dB	
LAeq	73.9 dB	
LAIeq - LAeq	1.1 dB	

	A	
	dB	**Time Stamp**
Leq	73.9	
LS(max)	90.4	2018/09/11 12:03:34
LS(min)	64.5	2018/09/11 12:09:58
LPeak(max)		

# Overloads	0
Overload Duration	0.0 s
# OBA Overloads	0
OBA Overload Duration	0.0 s

Statistics

LAS5.00	73.2 dB
LAS10.00	71.0 dB
LAS33.30	68.8 dB
LAS50.00	67.8 dB
LAS66.60	67.1 dB
LAS90.00	66.2 dB

Calibration History

Preamp	Date	dB re. 1V/Pa
PRMLxT1L	2018-09-10 14:28:15	-28.2
PRMLxT1L	2018-09-07 08:01:19	-28.4
PRMLxT1L	2018-09-05 15:54:56	-28.2
PRMLxT1L	2018-08-30 13:50:21	-28.3
PRMLxT1L	2018-08-30 10:00:22	-28.2
PRMLxT1L	2018-08-30 09:34:30	-28.2
PRMLxT1L	2018-08-30 08:58:36	-28.2
PRMLxT1L	2018-08-29 16:09:47	-28.2

Noise Measurement Field Data

Project:	BNSF Ono	**Job Number:**	195015001
Site No.:	7	**Date:**	9/11/2018
Analyst:	Josh Cortez	**Time:**	12:19 - 12:29 pm
Location:	Next to mailbox of 918 W. 7th St.		
Noise Sources:	Freeway traffic, FedEx truck		
Comments:			

Results (dBA):

Leq:	Lmin:	Lmax:	Peak:
64.1	57.1	70.5	99.0

Equipment	
Sound Level Meter:	LD SoundExpert LxT
Calibrator:	CAL200
Response Time:	Slow
Weighting:	A
Microphone Height:	5 feet

Weather	
Temp. (degrees F):	83° F
Wind (mph):	< 5
Sky:	Clear
Bar. Pressure:	29.74"
Humidity:	34%

Photo:

Kimley»Horn

Summary

File Name on Meter	BNSF.008	
File Name on PC	SLM_0005586_BNSF_008.00.ldbin	
Serial Number	0005586	
Model	SoundExpert® LxT	
Firmware Version	2.302	
User	josh.cortez	
Location	San Bernardino	
Job Description	BNSF	
Note		

Measurement

Description		
Start	2018-09-11 12:19:05	
Stop	2018-09-11 12:29:05	
Duration	00:10:00.0	
Run Time	00:10:00.0	
Pause	00:00:00.0	
Pre Calibration	2018-09-10 14:28:15	
Post Calibration	None	
Calibration Deviation	---	

Overall Settings

RMS Weight	A Weighting	
Peak Weight	Z Weighting	
Detector	Slow	
Preamp	PRMLxT1L	
Microphone Correction	Off	
Integration Method	Linear	
OBA Range	Normal	
OBA Bandwidth	1/1 and 1/3	
OBA Freq. Weighting	Z Weighting	
OBA Max Spectrum	At LMax	
Overload	122.0 dB	
	A	**C**
Under Range Peak	78.2	75.2
Under Range Limit	**27.2**	25.9
Noise Floor	16.8	16.8

Results

LAeq	64.1 dB	
LAE	91.8 dB	
EA	170.107 µPa²h	
LZpeak (max)	2018-09-11 12:25:51	99.0
LASmax	2018-09-11 12:19:44	70.5
LASmin	2018-09-11 12:27:08	57.1

SEA	-99.9 dB	
LAS > 85.0 dB (Exceedance Counts / Duration)	0	0.0
LAS > 115.0 dB (Exceedance Counts / Duration)	0	0.0
LZpeak > 135.0 dB (Exceedance Counts / Duration)	0	0.0
LZpeak > 137.0 dB (Exceedance Counts / Duration)	0	0.0
LZpeak > 140.0 dB (Exceedance Counts / Duration)	0	0.0
Community Noise	**Ldn**	**LDay 07:00-22:00**
	64.1	64.1
LCeq	74.7 dB	
LAeq	64.1 dB	
LCeq - LAeq	10.7 dB	
LAIeq	64.9 dB	
LAeq	64.1 dB	
LAIeq - LAeq	0.9 dB	

	A	
	dB	**Time Stamp**
Leq	64.1	
LS(max)	70.5	2018/09/11 12:19:44
LS(min)	57.1	2018/09/11 12:27:08
LPeak(max)		

# Overloads	0
Overload Duration	0.0 s
# OBA Overloads	0
OBA Overload Duration	0.0 s

Statistics

LAS5.00	67.2 dB
LAS10.00	66.3 dB
LAS33.30	64.6 dB
LAS50.00	63.6 dB
LAS66.60	62.4 dB
LAS90.00	60.6 dB

Calibration History

Preamp	**Date**	**dB re. 1V/Pa**
PRMLxT1L	2018-09-10 14:28:15	-28.2
PRMLxT1L	2018-09-07 08:01:19	-28.4
PRMLxT1L	2018-09-05 15:54:56	-28.2
PRMLxT1L	2018-08-30 13:50:21	-28.3
PRMLxT1L	2018-08-30 10:00:22	-28.2
PRMLxT1L	2018-08-30 09:34:30	-28.2
PRMLxT1L	2018-08-30 08:58:36	-28.2
PRMLxT1L	2018-08-29 16:09:47	-28.2

Noise Measurement Field Data

Project:	BNSF Ono	**Job Number:**	195015001
Site No.:	8	**Date:**	9/11/2018
Analyst:	Josh Cortez	**Time:**	12:45 - 12:55 pm
Location:	SW corner of W. 6th St. and N. I St.		
Noise Sources:	Freeway traffic and off-ramp, slow moving train		
Comments:			

Results (dBA):

Leq:	Lmin:	Lmax:	Peak:
60.7	57.3	68.6	94.6

Equipment	
Sound Level Meter:	LD SoundExpert LxT
Calibrator:	CAL200
Response Time:	Slow
Weighting:	A
Microphone Height:	5 feet

Weather	
Temp. (degrees F):	85° F
Wind (mph):	< 5
Sky:	Clear
Bar. Pressure:	29.74"
Humidity:	28%

Photo:

Kimley»Horn

Summary

File Name on Meter	BNSF.010	
File Name on PC	SLM_0005586_BNSF_010.00.ldbin	
Serial Number	0005586	
Model	SoundExpert® LxT	
Firmware Version	2.302	
User	josh.cortez	
Location	San Bernardino	
Job Description	BNSF	
Note		

Measurement

Description		
Start	2018-09-11 12:45:17	
Stop	2018-09-11 12:55:17	
Duration	00:10:00.0	
Run Time	00:10:00.0	
Pause	00:00:00.0	
Pre Calibration	2018-09-10 14:28:15	
Post Calibration	None	
Calibration Deviation	---	

Overall Settings

RMS Weight	A Weighting	
Peak Weight	Z Weighting	
Detector	Slow	
Preamp	PRMLxT1L	
Microphone Correction	Off	
Integration Method	Linear	
OBA Range	Normal	
OBA Bandwidth	1/1 and 1/3	
OBA Freq. Weighting	Z Weighting	
OBA Max Spectrum	At LMax	
Overload	122.0 dB	
	A	**C**
Under Range Peak	78.2	75.2
Under Range Limit	**27.2**	25.9
Noise Floor	16.8	16.8

Results

LA_{eq}	60.7 dB	
LAE	88.5 dB	
EA	78.578 µPa²h	
$LZ_{peak\ (max)}$	2018-09-11 12:53:49	94.6
LAS_{max}	2018-09-11 12:46:32	68.6
LAS_{min}	2018-09-11 12:45:33	57.3

SEA	-99.9 dB	
LAS > 85.0 dB (Exceedance Counts / Duration)	0	0.0
LAS > 115.0 dB (Exceedance Counts / Duration)	0	0.0
LZpeak > 135.0 dB (Exceedance Counts / Duration)	0	0.0
LZpeak > 137.0 dB (Exceedance Counts / Duration)	0	0.0
LZpeak > 140.0 dB (Exceedance Counts / Duration)	0	0.0
Community Noise	**Ldn**	**LDay 07:00-22:00**
	60.7	60.7
LCeq	74.3 dB	
LAeq	60.7 dB	
LCeq - LAeq	13.6 dB	
LAIeq	61.8 dB	
LAeq	60.7 dB	
LAIeq - LAeq	1.1 dB	

	A	
	dB	**Time Stamp**
Leq	60.7	
LS(max)	68.6	2018/09/11 12:46:32
LS(min)	57.3	2018/09/11 12:45:33
LPeak(max)		

# Overloads	0
Overload Duration	0.0 s
# OBA Overloads	0
OBA Overload Duration	0.0 s

Statistics

LAS5.00	62.6 dB
LAS10.00	62.2 dB
LAS33.30	61.2 dB
LAS50.00	60.2 dB
LAS66.60	59.7 dB
LAS90.00	58.7 dB

Calibration History

Preamp	Date	dB re. 1V/Pa
PRMLxT1L	2018-09-10 14:28:15	-28.2
PRMLxT1L	2018-09-07 08:01:19	-28.4
PRMLxT1L	2018-09-05 15:54:56	-28.2
PRMLxT1L	2018-08-30 13:50:21	-28.3
PRMLxT1L	2018-08-30 10:00:22	-28.2
PRMLxT1L	2018-08-30 09:34:30	-28.2
PRMLxT1L	2018-08-30 08:58:36	-28.2
PRMLxT1L	2018-08-29 16:09:47	-28.2

Noise Measurement Field Data

Project:	BNSF Ono	**Job Number:**	195015001
Site No.:	LT-1	**Date:**	9/26/2018
Analyst:	Ace Malisos	**Time:**	11:52 am - 11:52 am
Location:	West of W. Magnolia St. and N. I St. intersection		
Noise Sources:	Freeway traffic, train, vehicles passing		
Comments:			

Results (dBA):

Leq:	Lmin:	Lmax:	Peak:
76.0	53.8	105.4	122.4

Equipment	
Sound Level Meter:	LD SoundExpert LxT
Calibrator:	CAL200
Response Time:	Slow
Weighting:	A
Microphone Height:	5 feet

Weather	
Temp. (degrees F):	87° F
Wind (mph):	< 5
Sky:	Clear
Bar. Pressure:	29.84"
Humidity:	34%

Photo:

Kimley»Horn

Summary		
File Name on Meter	BNSF.011	
File Name on PC	SLM_0005586_BNSF_011.00.ldbin	
Serial Number	0005586	
Model	SoundExpert® LxT	
Firmware Version	2.302	
User	Malisos	
Location	BNSF Site 1	
Job Description		
Note		

Measurement		
Description		
Start	2018-09-25 11:52:18	
Stop	2018-09-26 11:52:27	
Duration	24:00:08.898	
Run Time	24:00:08.898	
Pause	00:00:00.0	
Pre Calibration	2018-09-25 11:38:49	
Post Calibration	None	
Calibration Deviation	---	

Overall Settings		
RMS Weight	A Weighting	
Peak Weight	Z Weighting	
Detector	Slow	
Preamp	PRMLxT1L	
Microphone Correction	Off	
Integration Method	Linear	
OBA Range	Normal	
OBA Bandwidth	1/1 and 1/3	
OBA Freq. Weighting	Z Weighting	
OBA Max Spectrum	At LMax	
Overload	121.9 dB	
	A	**C**
Under Range Peak	78.1	75.1
Under Range Limit	**27.1**	25.9
Noise Floor	16.8	16.7

Results		
LA_{eq}	76.0 dB	
LAE	125.4 dB	
EA	385.792 mPa²h	
$LZ_{peak\ (max)}$	2018-09-26 02:35:30	122.4
LAS_{max}	2018-09-26 09:34:11	105.4
LAS_{min}	2018-09-26 02:37:40	53.8
SEA	148.2 dB	

LAS > 85.0 dB (Exceedance Counts / Duration)	237	1975.0
LAS > 115.0 dB (Exceedance Counts / Duration)	0	0.0
LZpeak > 135.0 dB (Exceedance Counts / Duration)	0	0.0
LZpeak > 137.0 dB (Exceedance Counts / Duration)	0	0.0
LZpeak > 140.0 dB (Exceedance Counts / Duration)	0	0.0

Community Noise	**Ldn**	**LDay 07:00-22:00**
	82.3	76.1

LCeq	86.1 dB
LAeq	76.0 dB
LCeq - LAeq	10.0 dB
LAIeq	78.0 dB
LAeq	76.0 dB
LAIeq - LAeq	2.0 dB

	A	
	dB	**Time Stamp**
Leq	76.0	
LS(max)	105.4	2018/09/26 9:34:11
LS(min)	53.8	2018/09/26 2:37:40
LPeak(max)		

# Overloads	10.0
Overload Duration	23.0 s
# OBA Overloads	10.0
OBA Overload Duration	23.0 s

Statistics

LAS5.00	79.7 dB
LAS10.00	75.4 dB
LAS33.30	70.8 dB
LAS50.00	69.4 dB
LAS66.60	68.1 dB
LAS90.00	64.6 dB

Calibration History

Preamp	**Date**	**dB re. 1V/Pa**
PRMLxT1L	2018-09-25 11:38:46	-28.2
PRMLxT1L	2018-09-19 15:56:09	-28.2
PRMLxT1L	2018-09-19 08:15:07	-28.3
PRMLxT1L	2018-09-14 08:35:45	-28.2
PRMLxT1L	2018-09-12 16:50:02	-28.3
PRMLxT1L	2018-09-11 16:00:29	-28.2
PRMLxT1L	2018-09-10 14:28:15	-28.2
PRMLxT1L	2018-09-07 08:01:19	-28.4
PRMLxT1L	2018-09-05 15:54:56	-28.2

Noise Measurement Field Data

Project:	BNSF Ono	**Job Number:**	195015001
Site No.:	LT-2	**Date:**	9/27/2018
Analyst:	Ace Malisos	**Time:**	12:19 pm - 12:19 pm
Location:	SE area of W. 7th St. and N. I St. (between trees and electical box)		
Noise Sources:	Trains, freeway traffic, dogs barking		
Comments:			

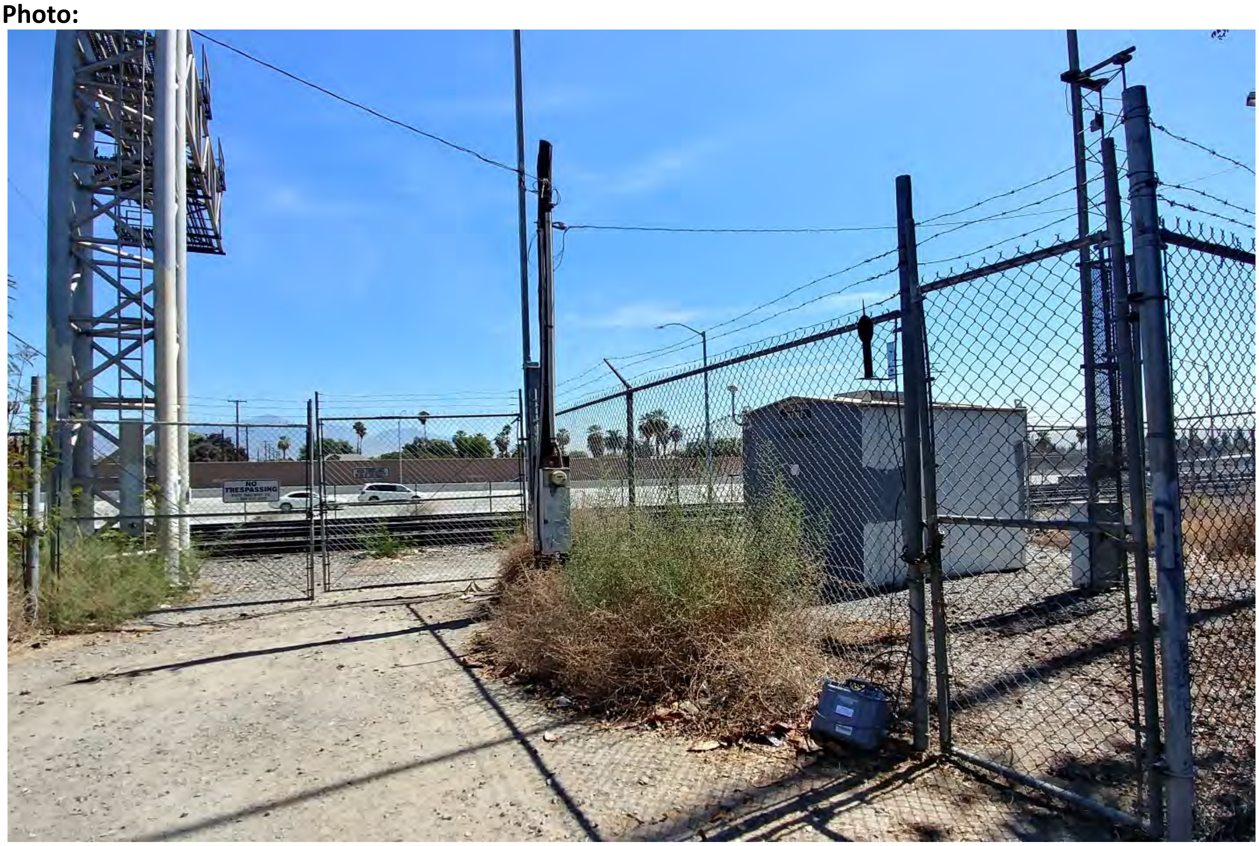
Results (dBA):

Leq:	Lmin:	Lmax:	Peak:
71.9	49.7	102.7	120.5

Equipment	
Sound Level Meter:	LD SoundExpert LxT
Calibrator:	CAL200
Response Time:	Slow
Weighting:	A
Microphone Height:	5 feet

Weather	
Temp. (degrees F):	90° F
Wind (mph):	< 5
Sky:	Clear
Bar. Pressure:	29.77"
Humidity:	25%

Photo:



Kimley»Horn

Summary

File Name on Meter	BNSF.012	
File Name on PC	SLM_0005586_BNSF_012.00.ldbin	
Serial Number	0005586	
Model	SoundExpert® LxT	
Firmware Version	2.302	
User	Malisos	
Location	BNSF Site 2	
Job Description		
Note		

Measurement

Description		
Start	2018-09-26 12:19:43	
Stop	2018-09-27 13:19:51	
Duration	25:00:07.500	
Run Time	25:00:07.500	
Pause	00:00:00.0	
Pre Calibration	2018-09-25 11:38:46	
Post Calibration	None	
Calibration Deviation	---	

Overall Settings

RMS Weight	A Weighting	
Peak Weight	Z Weighting	
Detector	Slow	
Preamp	PRMLxT1L	
Microphone Correction	Off	
Integration Method	Linear	
OBA Range	Normal	
OBA Bandwidth	1/1 and 1/3	
OBA Freq. Weighting	Z Weighting	
OBA Max Spectrum	At LMax	
Overload	121.9 dB	
	A	**C**
Under Range Peak	78.1	75.1
Under Range Limit	**27.1**	25.9
Noise Floor	16.8	16.7

Results

LAeq	71.9 dB	
LAE	121.5 dB	
EA	156.352 mPa²h	
LZpeak (max)	2018-09-26 18:09:08	120.5
LASmax	2018-09-26 15:00:51	102.7
LASmin	2018-09-27 01:47:04	49.7
SEA	133.5 dB	

LAS > 85.0 dB (Exceedance Counts / Duration)	60	244.5
LAS > 115.0 dB (Exceedance Counts / Duration)	0	0.0
LZpeak > 135.0 dB (Exceedance Counts / Duration)	0	0.0
LZpeak > 137.0 dB (Exceedance Counts / Duration)	0	0.0
LZpeak > 140.0 dB (Exceedance Counts / Duration)	0	0.0

Community Noise	**Ldn**	**LDay 07:00-22:00**
	77.9	72.2

LCeq	82.4 dB
LAeq	71.9 dB
LCeq - LAeq	10.4 dB
LAIeq	74.1 dB
LAeq	71.9 dB
LAIeq - LAeq	2.1 dB

	A	
	dB	**Time Stamp**
Leq	71.9	
LS(max)	102.7	2018/09/26 15:00:51
LS(min)	49.7	2018/09/27 1:47:04
LPeak(max)		

# Overloads	0
Overload Duration	0.0 s
# OBA Overloads	0
OBA Overload Duration	0.0 s

Statistics

LAS5.00	75.8 dB
LAS10.00	74.5 dB
LAS33.30	71.2 dB
LAS50.00	69.6 dB
LAS66.60	67.8 dB
LAS90.00	63.4 dB

Calibration History

Preamp	**Date**	**dB re. 1V/Pa**
PRMLxT1L	2018-09-25 11:38:46	-28.2
PRMLxT1L	2018-09-19 15:56:09	-28.2
PRMLxT1L	2018-09-19 08:15:07	-28.3
PRMLxT1L	2018-09-14 08:35:45	-28.2
PRMLxT1L	2018-09-12 16:50:02	-28.3
PRMLxT1L	2018-09-11 16:00:29	-28.2
PRMLxT1L	2018-09-10 14:28:15	-28.2
PRMLxT1L	2018-09-07 08:01:19	-28.4
PRMLxT1L	2018-09-05 15:54:56	-28.2

Federal Transit Administration
Noise Impact Assessment Spreadsheet

version: 1/29/2019

Project:	**BNSF Ono - R100**

Receiver Parameters	
Receiver:	**Receiver 1**
Land Use Category:	**2. Residential**
Existing Noise (Measured or Generic Value):	**60 dBA**

Noise Source Parameters	
Number of Noise Sources:	**2**

Noise Source Parameters		Source 1
	Source Type:	Fixed Guideway
	Specific Source:	Diesel Electric Locomotive
Daytime hrs	**Avg. Number of Locos/train**	4
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	**Avg. Number of Locos/train**	4
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	**Distance from Source to Receiver (ft)**	130
	Number of Intervening Rows of Buildings	0
Adjustments		

Noise Source Parameters		Source 2
	Source Type:	Fixed Guideway
	Specific Source:	Rail Car
Daytime hrs	**Avg. Number of Rail Cars/train**	60
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	**Avg. Number of Rail Cars/train**	60
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	**Distance from Source to Receiver (ft)**	130
	Number of Intervening Rows of Buildings	0
Adjustments	**Noise Barrier?**	No
	Joint Track/Crossover?	No
	Embedded Track?	No
	Aerial Structure?	No

Project Results Summary

Existing Ldn:	60 dBA
Total Project Ldn:	69 dBA
Total Noise Exposure:	70 dBA
Increase:	10 dB
Impact?:	**Severe**

Distance to Impact Contours

Dist to Mod. Impact Contour (Sources 1+2):	760 ft
Dist to Sev. Impact Contour (Sources 1+2):	321 ft

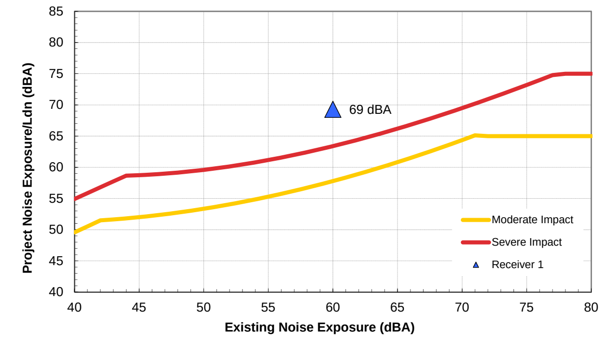
Source 1 Results

Leq(day):	61.8 dBA
Leq(night):	57.0 dBA
Ldn:	64.5 dBA

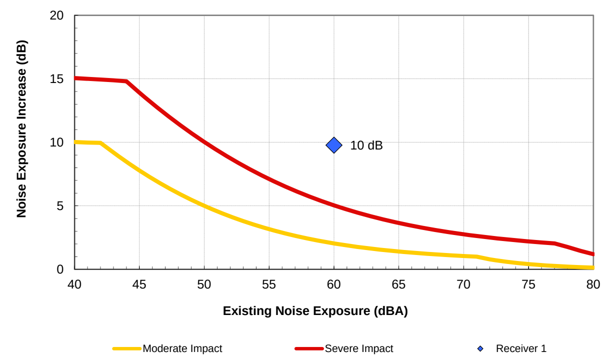
Source 2 Results

Leq(day):	64.8 dBA
Leq(night):	60.0 dBA
Ldn:	67.5 dBA
Incremental Ldn (Src 1-2):	69.3 dBA

Noise Impact Criteria
(FTA Manual, Fig 4-2)



Increase in Cumulative Noise Levels Allowed
(FTA Manual, Figs 4-3 and 4-4)



Federal Transit Administration
Noise Impact Assessment Spreadsheet

version: 1/29/2019

Project:	**BNSF Ono - R101**

Receiver Parameters	
Receiver:	**Receiver 1**
Land Use Category:	**2. Residential**
Existing Noise (Measured or Generic Value):	**60 dBA**

Noise Source Parameters	
Number of Noise Sources:	**2**

Noise Source Parameters		Source 1
	Source Type:	Fixed Guideway
	Specific Source:	Diesel Electric Locomotive
Daytime hrs	**Avg. Number of Locos/train**	4
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	**Avg. Number of Locos/train**	4
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	**Distance from Source to Receiver (ft)**	976
	Number of Intervening Rows of Buildings	0
Adjustments		

Noise Source Parameters		Source 2
	Source Type:	Fixed Guideway
	Specific Source:	Rail Car
Daytime hrs	**Avg. Number of Rail Cars/train**	60
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	**Avg. Number of Rail Cars/train**	60
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	**Distance from Source to Receiver (ft)**	976
	Number of Intervening Rows of Buildings	0
Adjustments	**Noise Barrier?**	No
	Embedded Track?	No
	Aerial Structure?	No

Project Results Summary

Existing Ldn:	60 dBA
Total Project Ldn:	56 dBA
Total Noise Exposure:	62 dBA
Increase:	2 dB
Impact?:	None

Distance to Impact Contours

Dist to Mod. Impact Contour (Sources 1+2):	760 ft
Dist to Sev. Impact Contour (Sources 1+2):	321 ft

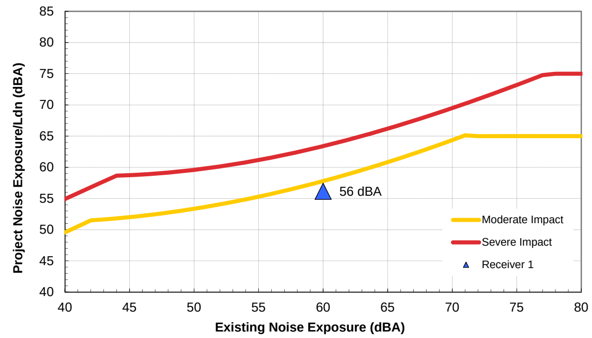
Source 1 Results

Leq(day):	48.7 dBA
Leq(night):	43.9 dBA
Ldn:	51.4 dBA

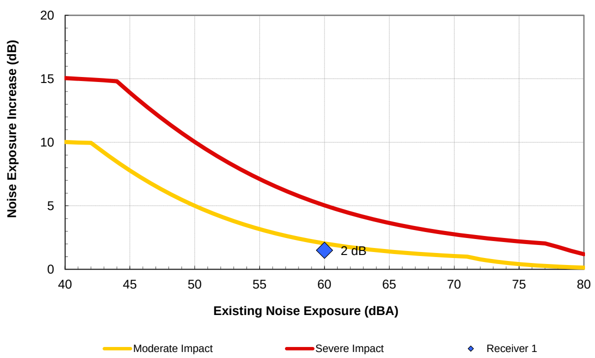
Source 2 Results

Leq(day):	51.7 dBA
Leq(night):	46.9 dBA
Ldn:	54.4 dBA
Incremental Ldn (Src 1-2):	56.2 dBA

Noise Impact Criteria
(FTA Manual, Fig 4-2)



Increase in Cumulative Noise Levels Allowed
(FTA Manual, Figs 4-3 and 4-4)



Federal Transit Administration
Noise Impact Assessment Spreadsheet

version: 1/29/2019

Project:	**BNSF Ono - R102**

Receiver Parameters	
Receiver:	**Receiver 1**
Land Use Category:	**2. Residential**
Existing Noise (Measured or Generic Value):	**60 dBA**

Noise Source Parameters	
Number of Noise Sources:	**2**

Noise Source Parameters		Source 1
	Source Type:	Fixed Guideway
	Specific Source:	Diesel Electric Locomotive
Daytime hrs	**Avg. Number of Locos/train**	4
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	**Avg. Number of Locos/train**	4
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	**Distance from Source to Receiver (ft)**	77
	Number of Intervening Rows of Buildings	1
Adjustments		

Noise Source Parameters		Source 2
	Source Type:	Fixed Guideway
	Specific Source:	Rail Car
Daytime hrs	**Avg. Number of Rail Cars/train**	60
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	**Avg. Number of Rail Cars/train**	60
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	**Distance from Source to Receiver (ft)**	77
	Number of Intervening Rows of Buildings	1
Adjustments	**Noise Barrier?**	No
	Joint Track/Crossover?	No
	Embedded Track?	No
	Aerial Structure?	No

Project Results Summary

Existing Ldn:	60 dBA
Total Project Ldn:	68 dBA
Total Noise Exposure:	69 dBA
Increase:	9 dB
Impact?:	**Severe**

Distance to Impact Contours

Dist to Mod. Impact Contour (Sources 1+2):	760 ft
Dist to Sev. Impact Contour (Sources 1+2):	321 ft

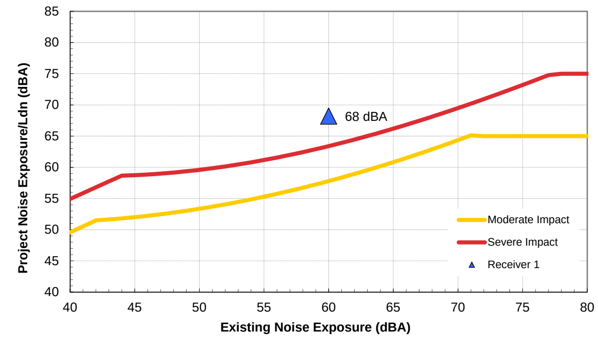
Source 1 Results

Leq(day):	60.7 dBA
Leq(night):	55.9 dBA
Ldn:	63.4 dBA

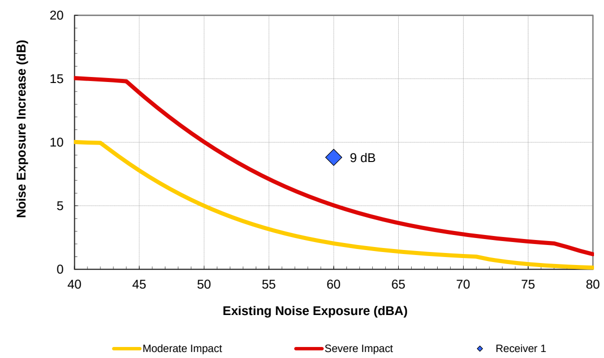
Source 2 Results

Leq(day):	63.7 dBA
Leq(night):	58.9 dBA
Ldn:	66.4 dBA
Incremental Ldn (Src 1-2):	68.2 dBA

Noise Impact Criteria
(FTA Manual, Fig 4-2)



Increase in Cumulative Noise Levels Allowed
(FTA Manual, Figs 4-3 and 4-4)



Federal Transit Administration
Noise Impact Assessment Spreadsheet

version: 1/29/2019

Project:	BNSF Ono - R103

Receiver Parameters	
Receiver:	Receiver 1
Land Use Category:	2. Residential
Existing Noise (Measured or Generic Value):	60 dBA

Noise Source Parameters	
Number of Noise Sources:	2

Noise Source Parameters		Source 1
	Source Type:	Fixed Guideway
	Specific Source:	Diesel Electric Locomotive
Daytime hrs	Avg. Number of Locos/train	4
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	Avg. Number of Locos/train	4
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	Distance from Source to Receiver (ft)	125
	Number of Intervening Rows of Buildings	0
Adjustments		

Noise Source Parameters		Source 2
	Source Type:	Fixed Guideway
	Specific Source:	Rail Car
Daytime hrs	Avg. Number of Rail Cars/train	60
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	Avg. Number of Rail Cars/train	60
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	Distance from Source to Receiver (ft)	125
	Number of Intervening Rows of Buildings	0
Adjustments	Noise Barrier?	No
	Joint Track/Crossover?	No
	Embedded Track?	No
	Aerial Structure?	No

Project Results Summary

Existing Ldn:	60 dBA
Total Project Ldn:	70 dBA
Total Noise Exposure:	70 dBA
Increase:	10 dB
Impact?:	Severe

Distance to Impact Contours

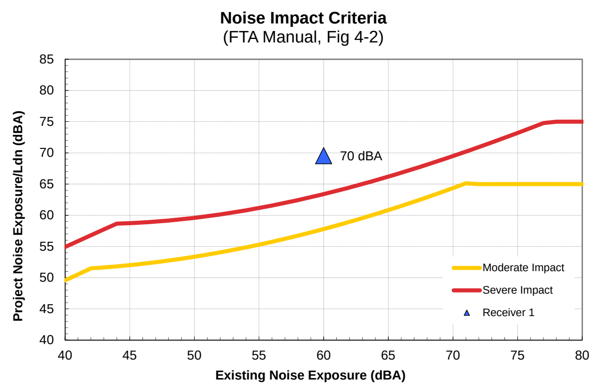
Dist to Mod. Impact Contour (Sources 1+2):	760 ft
Dist to Sev. Impact Contour (Sources 1+2):	321 ft

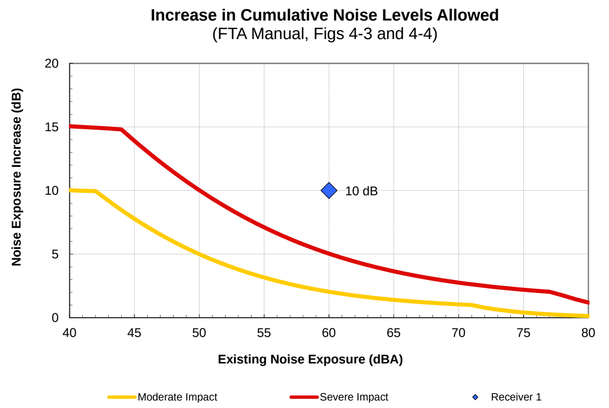
Source 1 Results

Leq(day):	62.1 dBA
Leq(night):	57.3 dBA
Ldn:	64.8 dBA

Source 2 Results

Leq(day):	65.1 dBA
Leq(night):	60.3 dBA
Ldn:	67.8 dBA
Incremental Ldn (Src 1-2):	69.5 dBA





Federal Transit Administration
Noise Impact Assessment Spreadsheet

version: 1/29/2019

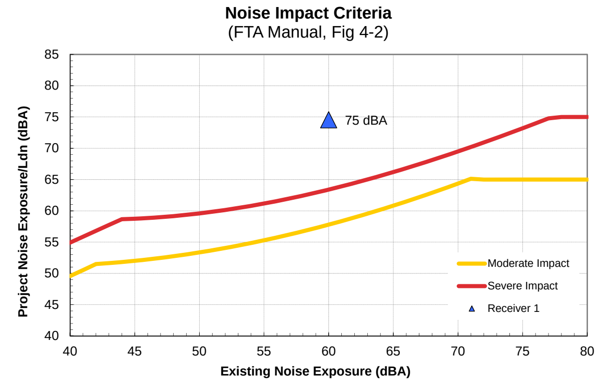
Project:	**BNSF Ono 104**

Project Results Summary

Existing Ldn:	60 dBA
Total Project Ldn:	75 dBA
Total Noise Exposure:	75 dBA
Increase:	15 dB
Impact?:	**Severe**

Distance to Impact Contours

Dist to Mod. Impact Contour (Sources 1+2):	760 ft
Dist to Sev. Impact Contour (Sources 1+2):	321 ft



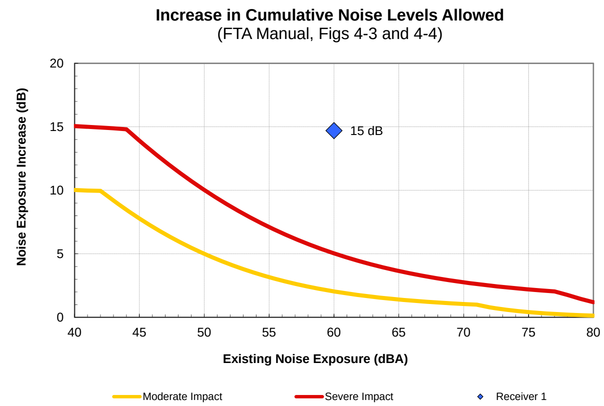
Receiver Parameters	
Receiver:	**Receiver 1**
Land Use Category:	**2. Residential**
Existing Noise (Measured or Generic Value):	**60 dBA**

Noise Source Parameters	
Number of Noise Sources:	**2**

Noise Source Parameters		Source 1
	Source Type:	Fixed Guideway
	Specific Source:	Diesel Electric Locomotive
Daytime hrs	**Avg. Number of Locos/train**	4
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	**Avg. Number of Locos/train**	4
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	**Distance from Source to Receiver (ft)**	58
	Number of Intervening Rows of Buildings	0
Adjustments		

Source 1 Results

Leq(day):	67.1 dBA
Leq(night):	62.3 dBA
Ldn:	69.8 dBA



Noise Source Parameters		Source 2
	Source Type:	Fixed Guideway
	Specific Source:	Rail Car
Daytime hrs	**Avg. Number of Rail Cars/train**	60
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	**Avg. Number of Rail Cars/train**	60
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	**Distance from Source to Receiver (ft)**	58
	Number of Intervening Rows of Buildings	0
Adjustments	**Noise Barrier?**	No
	Joint Track/Crossover?	No
	Embedded Track?	No
	Aerial Structure?	No

Source 2 Results

Leq(day):	70.1 dBA
Leq(night):	65.3 dBA
Ldn:	72.8 dBA
Incremental Ldn (Src 1-2):	74.6 dBA

Federal Transit Administration
Noise Impact Assessment Spreadsheet

version: 1/29/2019

Project:	BNSF Ono - R105

Receiver Parameters	
Receiver:	Receiver 1
Land Use Category:	2. Residential
Existing Noise (Measured or Generic Value):	60 dBA

Noise Source Parameters	
Number of Noise Sources:	2

Noise Source Parameters		Source 1
	Source Type:	Fixed Guideway
	Specific Source:	Diesel Electric Locomotive
Daytime hrs	Avg. Number of Locos/train	4
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	Avg. Number of Locos/train	4
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	Distance from Source to Receiver (ft)	35
	Number of Intervening Rows of Buildings	0
Adjustments		

Noise Source Parameters		Source 2
	Source Type:	Fixed Guideway
	Specific Source:	Rail Car
Daytime hrs	Avg. Number of Rail Cars/train	60
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	Avg. Number of Rail Cars/train	60
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	Distance from Source to Receiver (ft)	35
	Number of Intervening Rows of Buildings	0
Adjustments	Noise Barrier?	No
	Joint Track/Crossover?	No
	Embedded Track?	No
	Aerial Structure?	No

Project Results Summary

Existing Ldn:	60 dBA
Total Project Ldn:	78 dBA
Total Noise Exposure:	78 dBA
Increase:	18 dB
Impact?:	Severe

Distance to Impact Contours

Dist to Mod. Impact Contour (Sources 1+2):	760 ft
Dist to Sev. Impact Contour (Sources 1+2):	321 ft

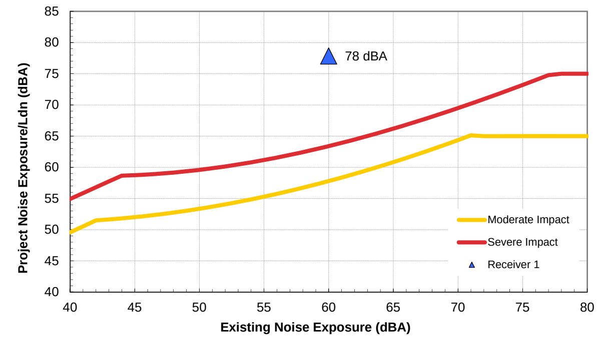
Source 1 Results

Leq(day):	70.4 dBA
Leq(night):	65.6 dBA
Ldn:	73.1 dBA

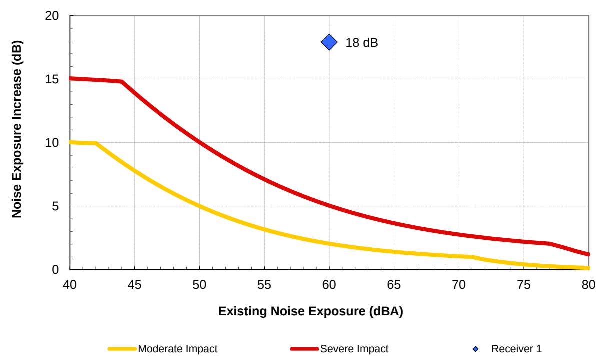
Source 2 Results

Leq(day):	73.4 dBA
Leq(night):	68.6 dBA
Ldn:	76.1 dBA
Incremental Ldn (Src 1-2):	77.8 dBA

Noise Impact Criteria
(FTA Manual, Fig 4-2)



Increase in Cumulative Noise Levels Allowed
(FTA Manual, Figs 4-3 and 4-4)



Federal Transit Administration
Noise Impact Assessment Spreadsheet

version: 1/29/2019

Project:	BNSF Ono - R105

Receiver Parameters	
Receiver:	Receiver 1
Land Use Category:	2. Residential
Existing Noise (Measured or Generic Value):	60 dBA

Noise Source Parameters	
Number of Noise Sources:	2

Noise Source Parameters		Source 1
	Source Type:	Fixed Guideway
	Specific Source:	Diesel Electric Locomotive
Daytime hrs	Avg. Number of Locos/train	4
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	Avg. Number of Locos/train	4
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	Distance from Source to Receiver (ft)	85
	Number of Intervening Rows of Buildings	1
Adjustments		

Noise Source Parameters		Source 2
	Source Type:	Fixed Guideway
	Specific Source:	Rail Car
Daytime hrs	Avg. Number of Rail Cars/train	60
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	Avg. Number of Rail Cars/train	60
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	Distance from Source to Receiver (ft)	85
	Number of Intervening Rows of Buildings	1
Adjustments	Noise Barrier?	No
	Joint Track/Crossover?	No
	Embedded Track?	No
	Aerial Structure?	No

Project Results Summary

Existing Ldn:	60 dBA
Total Project Ldn:	68 dBA
Total Noise Exposure:	68 dBA
Increase:	8 dB
Impact?:	Severe

Distance to Impact Contours

Dist to Mod. Impact Contour (Sources 1+2):	760 ft
Dist to Sev. Impact Contour (Sources 1+2):	321 ft

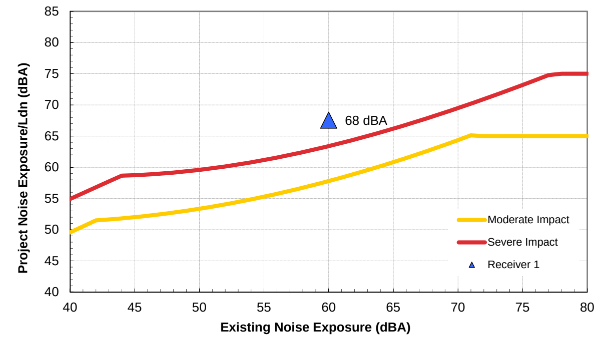
Source 1 Results

Leq(day):	60.1 dBA
Leq(night):	55.3 dBA
Ldn:	62.8 dBA

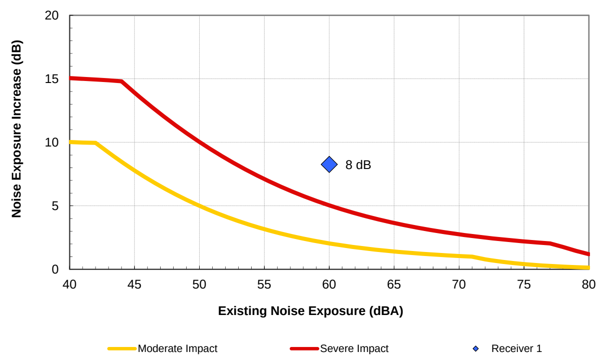
Source 2 Results

Leq(day):	63.1 dBA
Leq(night):	58.3 dBA
Ldn:	65.8 dBA
Incremental Ldn (Src 1-2):	67.6 dBA

Noise Impact Criteria
(FTA Manual, Fig 4-2)



Increase in Cumulative Noise Levels Allowed
(FTA Manual, Figs 4-3 and 4-4)



Federal Transit Administration
Noise Impact Assessment Spreadsheet

version: 1/29/2019

Project:	**BNSF Ono - R105**

Receiver Parameters	
Receiver:	**Receiver 1**
Land Use Category:	**2. Residential**
Existing Noise (Measured or Generic Value):	**60 dBA**

Noise Source Parameters	
Number of Noise Sources:	**2**

Noise Source Parameters		Source 1
	Source Type:	Fixed Guideway
	Specific Source:	Diesel Electric Locomotive
Daytime hrs	**Avg. Number of Locos/train**	4
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	**Avg. Number of Locos/train**	4
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	**Distance from Source to Receiver (ft)**	90
	Number of Intervening Rows of Buildings	0
Adjustments		

Noise Source Parameters		Source 2
	Source Type:	Fixed Guideway
	Specific Source:	Rail Car
Daytime hrs	**Avg. Number of Rail Cars/train**	60
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	**Avg. Number of Rail Cars/train**	60
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	**Distance from Source to Receiver (ft)**	90
	Number of Intervening Rows of Buildings	0
Adjustments	**Noise Barrier?**	No
	Joint Track/Crossover?	No
	Embedded Track?	No
	Aerial Structure?	No

Project Results Summary

Existing Ldn:	60 dBA
Total Project Ldn:	72 dBA
Total Noise Exposure:	72 dBA
Increase:	12 dB
Impact?:	**Severe**

Distance to Impact Contours

Dist to Mod. Impact Contour (Sources 1+2):	760 ft
Dist to Sev. Impact Contour (Sources 1+2):	321 ft

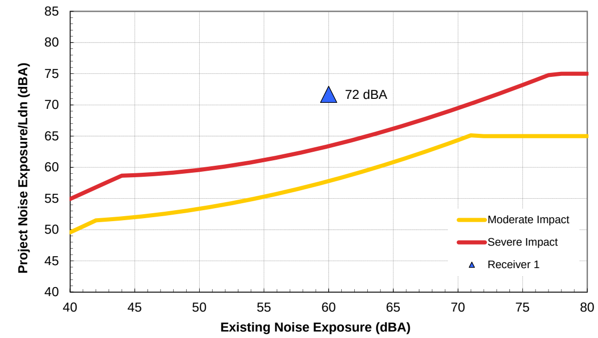
Source 1 Results

Leq(day):	64.2 dBA
Leq(night):	59.4 dBA
Ldn:	66.9 dBA

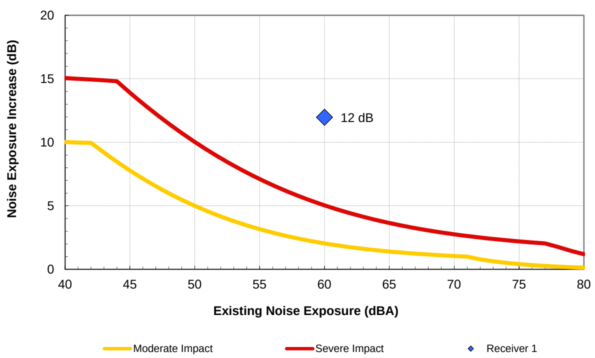
Source 2 Results

Leq(day):	67.2 dBA
Leq(night):	62.4 dBA
Ldn:	69.9 dBA
Incremental Ldn (Src 1-2):	71.7 dBA

Noise Impact Criteria
(FTA Manual, Fig 4-2)



Increase in Cumulative Noise Levels Allowed
(FTA Manual, Figs 4-3 and 4-4)



Federal Transit Administration
Noise Impact Assessment Spreadsheet

version: 1/29/2019

Project:	BNSF Ono - R105

Receiver Parameters	
Receiver:	Receiver 1
Land Use Category:	2. Residential
Existing Noise (Measured or Generic Value):	60 dBA

Noise Source Parameters	
Number of Noise Sources:	2

Noise Source Parameters		Source 1
	Source Type:	Fixed Guideway
	Specific Source:	Diesel Electric Locomotive
Daytime hrs	Avg. Number of Locos/train	4
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	Avg. Number of Locos/train	4
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	Distance from Source to Receiver (ft)	128
	Number of Intervening Rows of Buildings	1
Adjustments		

Noise Source Parameters		Source 2
	Source Type:	Fixed Guideway
	Specific Source:	Rail Car
Daytime hrs	Avg. Number of Rail Cars/train	60
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	Avg. Number of Rail Cars/train	60
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	Distance from Source to Receiver (ft)	128
	Number of Intervening Rows of Buildings	1
Adjustments	Noise Barrier?	No
	Joint Track/Crossover?	No
	Embedded Track?	No
	Aerial Structure?	No

Project Results Summary

Existing Ldn:	60 dBA
Total Project Ldn:	65 dBA
Total Noise Exposure:	66 dBA
Increase:	6 dB
Impact?:	Severe

Distance to Impact Contours

Dist to Mod. Impact Contour (Sources 1+2):	760 ft
Dist to Sev. Impact Contour (Sources 1+2):	321 ft

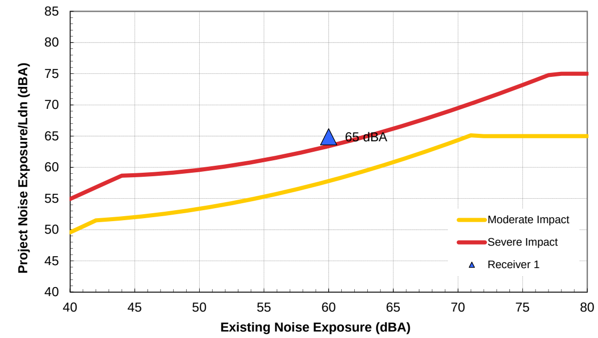
Source 1 Results

Leq(day):	57.4 dBA
Leq(night):	52.6 dBA
Ldn:	60.1 dBA

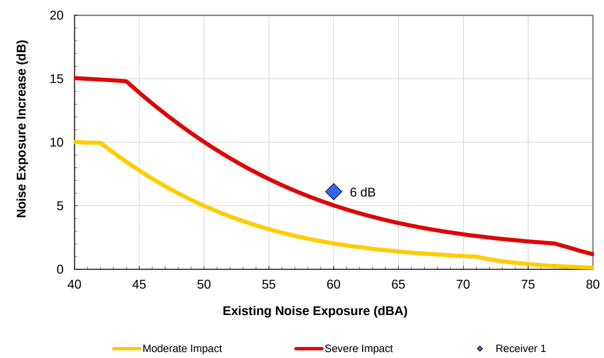
Source 2 Results

Leq(day):	60.4 dBA
Leq(night):	55.6 dBA
Ldn:	63.1 dBA
Incremental Ldn (Src 1-2):	64.9 dBA

Noise Impact Criteria
(FTA Manual, Fig 4-2)



Increase in Cumulative Noise Levels Allowed
(FTA Manual, Figs 4-3 and 4-4)



Federal Transit Administration
Noise Impact Assessment Spreadsheet

version: 1/29/2019

Project:	**BNSF Ono - R106**

Receiver Parameters	
Receiver:	**Receiver 1**
Land Use Category:	**2. Residential**
Existing Noise (Measured or Generic Value):	**60 dBA**

Noise Source Parameters	
Number of Noise Sources:	**2**

Noise Source Parameters		Source 1
	Source Type:	Fixed Guideway
	Specific Source:	Diesel Electric Locomotive
Daytime hrs	**Avg. Number of Locos/train**	4
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	**Avg. Number of Locos/train**	4
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	**Distance from Source to Receiver (ft)**	74
	Number of Intervening Rows of Buildings	0
Adjustments		

Noise Source Parameters		Source 2
	Source Type:	Fixed Guideway
	Specific Source:	Rail Car
Daytime hrs	**Avg. Number of Rail Cars/train**	60
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	**Avg. Number of Rail Cars/train**	60
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	**Distance from Source to Receiver (ft)**	74
	Number of Intervening Rows of Buildings	0
Adjustments	**Noise Barrier?**	No
	Joint Track/Crossover?	No
	Embedded Track?	No
	Aerial Structure?	No

Project Results Summary

Existing Ldn:	60 dBA
Total Project Ldn:	73 dBA
Total Noise Exposure:	73 dBA
Increase:	13 dB
Impact?:	Severe

Distance to Impact Contours

Dist to Mod. Impact Contour (Sources 1+2):	760 ft
Dist to Sev. Impact Contour (Sources 1+2):	321 ft

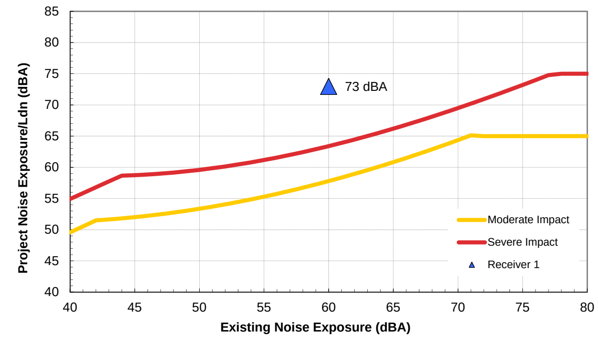
Source 1 Results

Leq(day):	65.5 dBA
Leq(night):	60.7 dBA
Ldn:	68.2 dBA

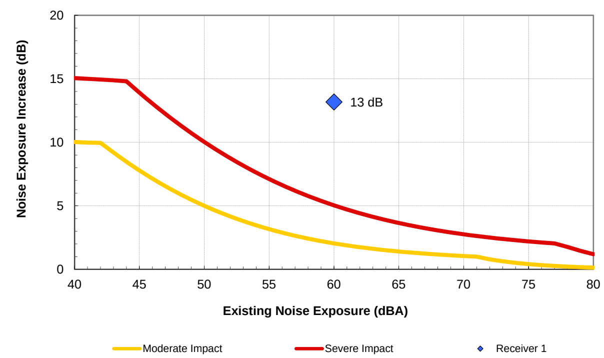
Source 2 Results

Leq(day):	68.5 dBA
Leq(night):	63.7 dBA
Ldn:	71.2 dBA
Incremental Ldn (Src 1-2):	73.0 dBA

Noise Impact Criteria
(FTA Manual, Fig 4-2)



Increase in Cumulative Noise Levels Allowed
(FTA Manual, Figs 4-3 and 4-4)



Federal Transit Administration
Noise Impact Assessment Spreadsheet

version: 1/29/2019

Project:	BNSF Ono - R106

Receiver Parameters	
Receiver:	Receiver 1
Land Use Category:	2. Residential
Existing Noise (Measured or Generic Value):	60 dBA

Noise Source Parameters	
Number of Noise Sources:	2

Noise Source Parameters		Source 1
	Source Type:	Fixed Guideway
	Specific Source:	Diesel Electric Locomotive
Daytime hrs	Avg. Number of Locos/train	4
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	Avg. Number of Locos/train	4
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	Distance from Source to Receiver (ft)	115
	Number of Intervening Rows of Buildings	1
Adjustments		

Noise Source Parameters		Source 2
	Source Type:	Fixed Guideway
	Specific Source:	Rail Car
Daytime hrs	Avg. Number of Rail Cars/train	60
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	Avg. Number of Rail Cars/train	60
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	Distance from Source to Receiver (ft)	115
	Number of Intervening Rows of Buildings	1
Adjustments	Noise Barrier?	No
	Joint Track/Crossover?	No
	Embedded Track?	No
	Aerial Structure?	No

Project Results Summary

Existing Ldn:	60 dBA
Total Project Ldn:	66 dBA
Total Noise Exposure:	67 dBA
Increase:	7 dB
Impact?:	Severe

Distance to Impact Contours

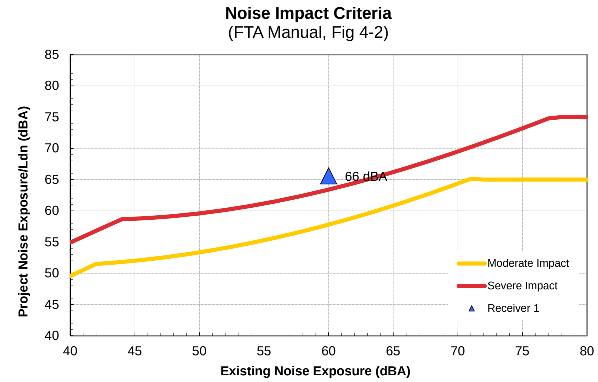
Dist to Mod. Impact Contour (Sources 1+2):	760 ft
Dist to Sev. Impact Contour (Sources 1+2):	321 ft

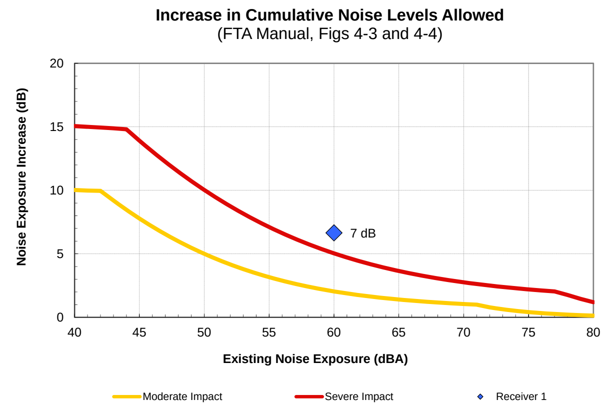
Source 1 Results

Leq(day):	58.1 dBA
Leq(night):	53.3 dBA
Ldn:	60.8 dBA

Source 2 Results

Leq(day):	61.1 dBA
Leq(night):	56.3 dBA
Ldn:	63.8 dBA
Incremental Ldn (Src 1-2):	65.6 dBA





Federal Transit Administration
Noise Impact Assessment Spreadsheet

version: 1/29/2019

Project:	**BNSF Ono - R107**

Receiver Parameters	
Receiver:	**Receiver 1**
Land Use Category:	**2. Residential**
Existing Noise (Measured or Generic Value):	**60 dBA**

Noise Source Parameters	
Number of Noise Sources:	**2**

Noise Source Parameters		**Source 1**
	Source Type:	Fixed Guideway
	Specific Source:	Diesel Electric Locomotive
Daytime hrs	**Avg. Number of Locos/train**	4
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	**Avg. Number of Locos/train**	4
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	**Distance from Source to Receiver (ft)**	40
	Number of Intervening Rows of Buildings	0
Adjustments		

Noise Source Parameters		**Source 2**
	Source Type:	Fixed Guideway
	Specific Source:	Rail Car
Daytime hrs	**Avg. Number of Rail Cars/train**	60
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	**Avg. Number of Rail Cars/train**	60
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	**Distance from Source to Receiver (ft)**	40
	Number of Intervening Rows of Buildings	0
Adjustments	**Noise Barrier?**	No
	Joint Track/Crossover?	No
	Embedded Track?	No
	Aerial Structure?	No

Project Results Summary

Existing Ldn:	60 dBA
Total Project Ldn:	77 dBA
Total Noise Exposure:	77 dBA
Increase:	17 dB
Impact?:	**Severe**

Distance to Impact Contours

Dist to Mod. Impact Contour (Sources 1+2):	760 ft
Dist to Sev. Impact Contour (Sources 1+2):	321 ft

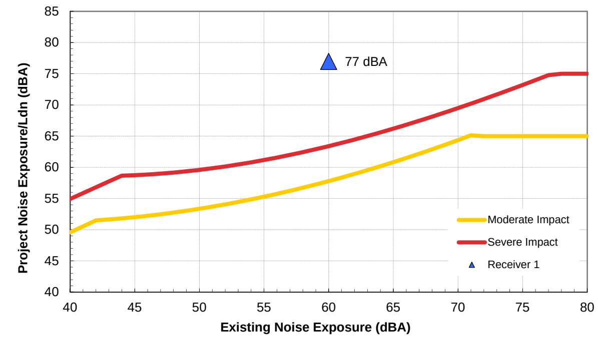
Source 1 Results

Leq(day):	69.5 dBA
Leq(night):	64.7 dBA
Ldn:	72.2 dBA

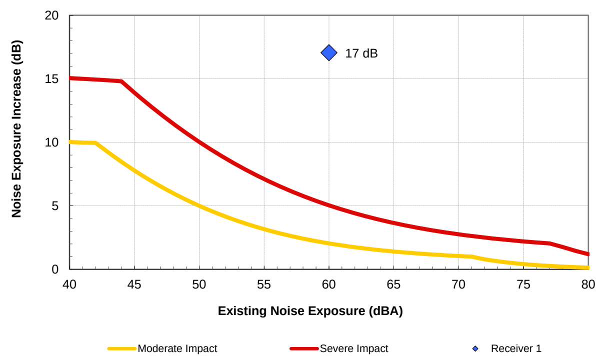
Source 2 Results

Leq(day):	72.5 dBA
Leq(night):	67.7 dBA
Ldn:	75.2 dBA
Incremental Ldn (Src 1-2):	77.0 dBA

Noise Impact Criteria
(FTA Manual, Fig 4-2)



Increase in Cumulative Noise Levels Allowed
(FTA Manual, Figs 4-3 and 4-4)



Federal Transit Administration
Noise Impact Assessment Spreadsheet

version: 1/29/2019

Project:	BNSF Ono - R107

Receiver Parameters	
Receiver:	Receiver 1
Land Use Category:	2. Residential
Existing Noise (Measured or Generic Value):	60 dBA

Noise Source Parameters	
Number of Noise Sources:	2

Noise Source Parameters		Source 1
	Source Type:	Fixed Guideway
	Specific Source:	Diesel Electric Locomotive
Daytime hrs	Avg. Number of Locos/train	4
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	Avg. Number of Locos/train	4
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	Distance from Source to Receiver (ft)	95
	Number of Intervening Rows of Buildings	1
Adjustments		

Noise Source Parameters		Source 2
	Source Type:	Fixed Guideway
	Specific Source:	Rail Car
Daytime hrs	Avg. Number of Rail Cars/train	60
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	Avg. Number of Rail Cars/train	60
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	Distance from Source to Receiver (ft)	95
	Number of Intervening Rows of Buildings	1
Adjustments	Noise Barrier?	No
	Joint Track/Crossover?	No
	Embedded Track?	No
	Aerial Structure?	No

Project Results Summary

Existing Ldn:	60 dBA
Total Project Ldn:	67 dBA
Total Noise Exposure:	68 dBA
Increase:	8 dB
Impact?:	Severe

Distance to Impact Contours

Dist to Mod. Impact Contour (Sources 1+2):	760 ft
Dist to Sev. Impact Contour (Sources 1+2):	321 ft

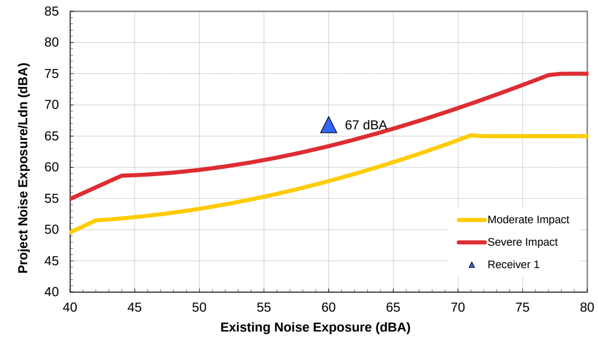
Source 1 Results

Leq(day):	59.3 dBA
Leq(night):	54.6 dBA
Ldn:	62.1 dBA

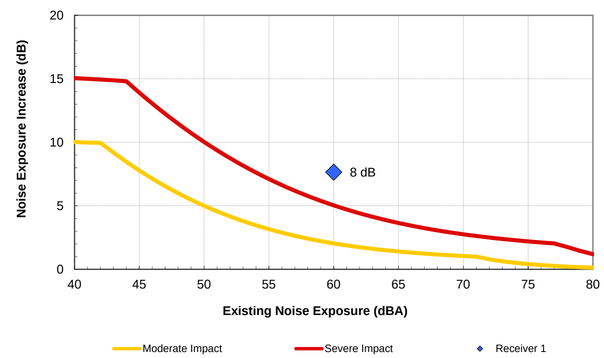
Source 2 Results

Leq(day):	62.3 dBA
Leq(night):	57.6 dBA
Ldn:	65.1 dBA
Incremental Ldn (Src 1-2):	66.8 dBA

Noise Impact Criteria
(FTA Manual, Fig 4-2)



Increase in Cumulative Noise Levels Allowed
(FTA Manual, Figs 4-3 and 4-4)



Federal Transit Administration
Noise Impact Assessment Spreadsheet

version: 1/29/2019

Project:	BNSF Ono - R108

Receiver Parameters	
Receiver:	Receiver 1
Land Use Category:	2. Residential
Existing Noise (Measured or Generic Value):	60 dBA

Noise Source Parameters	
Number of Noise Sources:	2

Noise Source Parameters		Source 1
	Source Type:	Fixed Guideway
	Specific Source:	Diesel Electric Locomotive
Daytime hrs	Avg. Number of Locos/train	4
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	Avg. Number of Locos/train	4
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	Distance from Source to Receiver (ft)	40
	Number of Intervening Rows of Buildings	0
Adjustments		

Noise Source Parameters		Source 2
	Source Type:	Fixed Guideway
	Specific Source:	Rail Car
Daytime hrs	Avg. Number of Rail Cars/train	60
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	Avg. Number of Rail Cars/train	60
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	Distance from Source to Receiver (ft)	40
	Number of Intervening Rows of Buildings	0
Adjustments	Noise Barrier?	No
	Joint Track/Crossover?	No
	Embedded Track?	No
	Aerial Structure?	No

Project Results Summary

Existing Ldn:	60 dBA
Total Project Ldn:	77 dBA
Total Noise Exposure:	77 dBA
Increase:	17 dB
Impact?:	Severe

Distance to Impact Contours

Dist to Mod. Impact Contour (Sources 1+2):	760 ft
Dist to Sev. Impact Contour (Sources 1+2):	321 ft

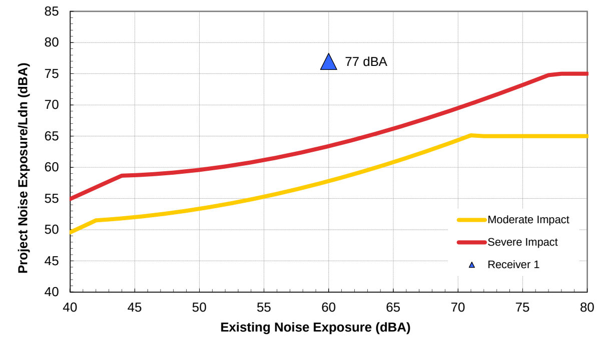
Source 1 Results

Leq(day):	69.5 dBA
Leq(night):	64.7 dBA
Ldn:	72.2 dBA

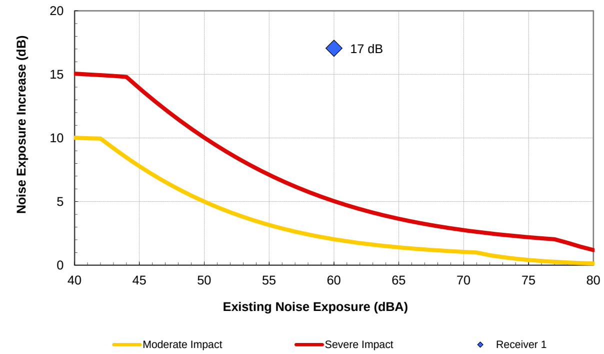
Source 2 Results

Leq(day):	72.5 dBA
Leq(night):	67.7 dBA
Ldn:	75.2 dBA
Incremental Ldn (Src 1-2):	77.0 dBA

Noise Impact Criteria
(FTA Manual, Fig 4-2)



Increase in Cumulative Noise Levels Allowed
(FTA Manual, Figs 4-3 and 4-4)



Federal Transit Administration
Noise Impact Assessment Spreadsheet

version: 1/29/2019

Project:	**BNSF Ono - R108**

Receiver Parameters	
Receiver:	**Receiver 1**
Land Use Category:	**2. Residential**
Existing Noise (Measured or Generic Value):	**60 dBA**

Noise Source Parameters	
Number of Noise Sources:	**2**

Noise Source Parameters		Source 1
	Source Type:	Fixed Guideway
	Specific Source:	Diesel Electric Locomotive
Daytime hrs	**Avg. Number of Locos/train**	4
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	**Avg. Number of Locos/train**	4
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	**Distance from Source to Receiver (ft)**	80
	Number of Intervening Rows of Buildings	1
Adjustments		

Noise Source Parameters		Source 2
	Source Type:	Fixed Guideway
	Specific Source:	Rail Car
Daytime hrs	**Avg. Number of Rail Cars/train**	60
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	**Avg. Number of Rail Cars/train**	60
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	**Distance from Source to Receiver (ft)**	80
	Number of Intervening Rows of Buildings	1
Adjustments	**Noise Barrier?**	No
	Joint Track/Crossover?	No
	Embedded Track?	No
	Aerial Structure?	No

Project Results Summary

Existing Ldn:	60 dBA
Total Project Ldn:	68 dBA
Total Noise Exposure:	69 dBA
Increase:	9 dB
Impact?:	**Severe**

Distance to Impact Contours

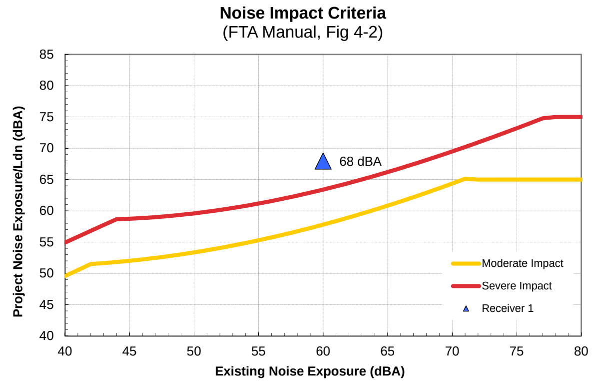
Dist to Mod. Impact Contour (Sources 1+2):	760 ft
Dist to Sev. Impact Contour (Sources 1+2):	321 ft

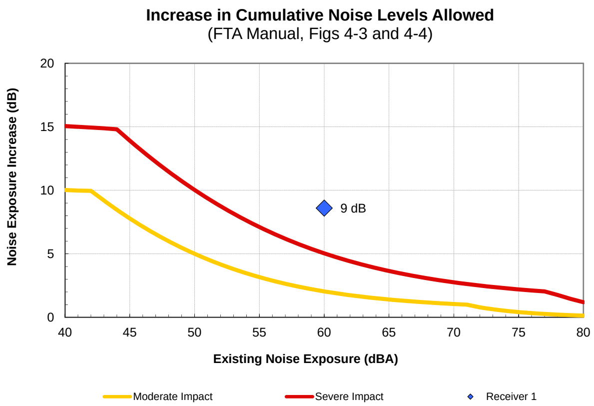
Source 1 Results

Leq(day):	60.5 dBA
Leq(night):	55.7 dBA
Ldn:	63.2 dBA

Source 2 Results

Leq(day):	63.5 dBA
Leq(night):	58.7 dBA
Ldn:	66.2 dBA
Incremental Ldn (Src 1-2):	68.0 dBA





Federal Transit Administration
Noise Impact Assessment Spreadsheet

version: 1/29/2019

Project:	BNSF Ono - R109

Receiver Parameters	
Receiver:	Receiver 1
Land Use Category:	2. Residential
Existing Noise (Measured or Generic Value):	60 dBA

Noise Source Parameters	
Number of Noise Sources:	2

Noise Source Parameters		Source 1
	Source Type:	Fixed Guideway
	Specific Source:	Diesel Electric Locomotive
Daytime hrs	Avg. Number of Locos/train	4
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	Avg. Number of Locos/train	4
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	Distance from Source to Receiver (ft)	40
	Number of Intervening Rows of Buildings	0
Adjustments		

Noise Source Parameters		Source 2
	Source Type:	Fixed Guideway
	Specific Source:	Rail Car
Daytime hrs	Avg. Number of Rail Cars/train	60
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	Avg. Number of Rail Cars/train	60
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	Distance from Source to Receiver (ft)	40
	Number of Intervening Rows of Buildings	0
Adjustments	Noise Barrier?	No
	Joint Track/Crossover?	No
	Embedded Track?	No
	Aerial Structure?	No

Project Results Summary

Existing Ldn:	60 dBA
Total Project Ldn:	77 dBA
Total Noise Exposure:	77 dBA
Increase:	17 dB
Impact?:	Severe

Distance to Impact Contours

Dist to Mod. Impact Contour (Sources 1+2):	760 ft
Dist to Sev. Impact Contour (Sources 1+2):	321 ft

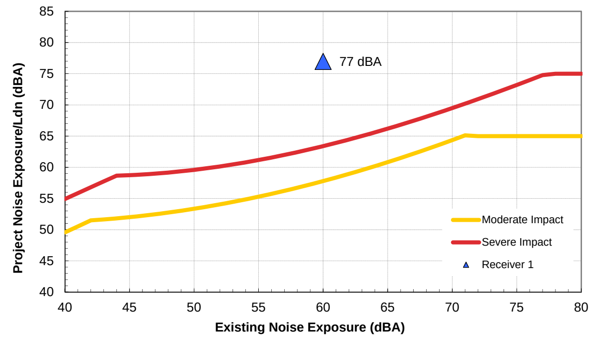
Source 1 Results

Leq(day):	69.5 dBA
Leq(night):	64.7 dBA
Ldn:	72.2 dBA

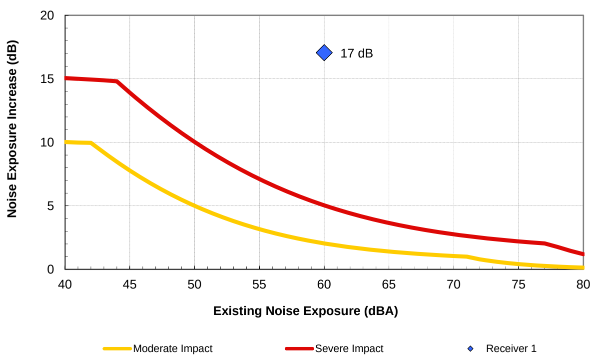
Source 2 Results

Leq(day):	72.5 dBA
Leq(night):	67.7 dBA
Ldn:	75.2 dBA
Incremental Ldn (Src 1-2):	77.0 dBA

Noise Impact Criteria
(FTA Manual, Fig 4-2)



Increase in Cumulative Noise Levels Allowed
(FTA Manual, Figs 4-3 and 4-4)



Federal Transit Administration
Noise Impact Assessment Spreadsheet

version: 1/29/2019

Project:	BNSF Ono - R109

Receiver Parameters	
Receiver:	Receiver 1
Land Use Category:	2. Residential
Existing Noise (Measured or Generic Value):	60 dBA

Noise Source Parameters	
Number of Noise Sources:	2

Noise Source Parameters		Source 1
	Source Type:	Fixed Guideway
	Specific Source:	Diesel Electric Locomotive
Daytime hrs	Avg. Number of Locos/train	4
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	Avg. Number of Locos/train	4
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	Distance from Source to Receiver (ft)	80
	Number of Intervening Rows of Buildings	1
Adjustments		

Noise Source Parameters		Source 2
	Source Type:	Fixed Guideway
	Specific Source:	Rail Car
Daytime hrs	Avg. Number of Rail Cars/train	60
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	Avg. Number of Rail Cars/train	60
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	Distance from Source to Receiver (ft)	80
	Number of Intervening Rows of Buildings	1
Adjustments	Noise Barrier?	No
	Joint Track/Crossover?	No
	Embedded Track?	No
	Aerial Structure?	No

Project Results Summary

Existing Ldn:	60 dBA
Total Project Ldn:	68 dBA
Total Noise Exposure:	69 dBA
Increase:	9 dB
Impact?:	Severe

Distance to Impact Contours

Dist to Mod. Impact Contour (Sources 1+2):	760 ft
Dist to Sev. Impact Contour (Sources 1+2):	321 ft

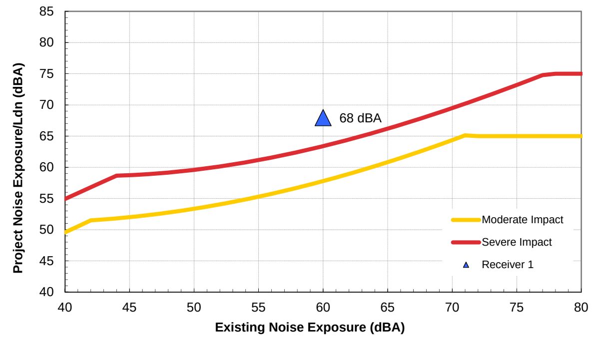
Source 1 Results

Leq(day):	60.5 dBA
Leq(night):	55.7 dBA
Ldn:	63.2 dBA

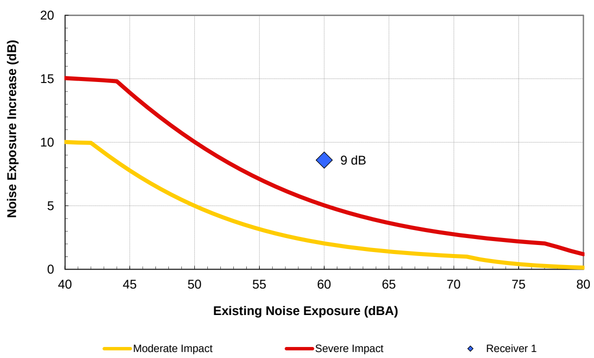
Source 2 Results

Leq(day):	63.5 dBA
Leq(night):	58.7 dBA
Ldn:	66.2 dBA
Incremental Ldn (Src 1-2):	68.0 dBA

Noise Impact Criteria
(FTA Manual, Fig 4-2)



Increase in Cumulative Noise Levels Allowed
(FTA Manual, Figs 4-3 and 4-4)



Federal Transit Administration
Noise Impact Assessment Spreadsheet

version: 1/29/2019

Project:	**BNSF Ono - R110**

Receiver Parameters	
Receiver:	**Receiver 1**
Land Use Category:	**2. Residential**
Existing Noise (Measured or Generic Value):	**60 dBA**

Noise Source Parameters	
Number of Noise Sources:	**2**

Noise Source Parameters		**Source 1**
	Source Type:	Fixed Guideway
	Specific Source:	Diesel Electric Locomotive
Daytime hrs	**Avg. Number of Locos/train**	4
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	**Avg. Number of Locos/train**	4
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	**Distance from Source to Receiver (ft)**	63
	Number of Intervening Rows of Buildings	0
Adjustments		

Noise Source Parameters		**Source 2**
	Source Type:	Fixed Guideway
	Specific Source:	Rail Car
Daytime hrs	**Avg. Number of Rail Cars/train**	60
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	**Avg. Number of Rail Cars/train**	60
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	**Distance from Source to Receiver (ft)**	63
	Number of Intervening Rows of Buildings	0
Adjustments	**Noise Barrier?**	No
	Joint Track/Crossover?	No
	Embedded Track?	No
	Aerial Structure?	No

Project Results Summary

Existing Ldn:	60 dBA
Total Project Ldn:	74 dBA
Total Noise Exposure:	74 dBA
Increase:	14 dB
Impact?:	**Severe**

Distance to Impact Contours

Dist to Mod. Impact Contour (Sources 1+2):	760 ft
Dist to Sev. Impact Contour (Sources 1+2):	321 ft

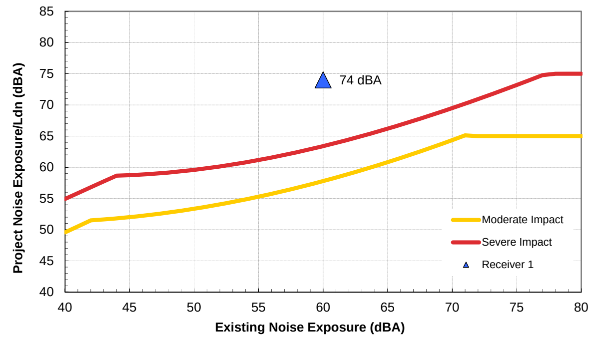
Source 1 Results

Leq(day):	66.5 dBA
Leq(night):	61.7 dBA
Ldn:	69.2 dBA

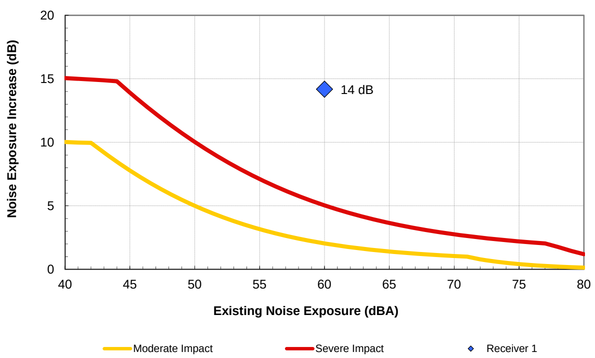
Source 2 Results

Leq(day):	69.5 dBA
Leq(night):	64.7 dBA
Ldn:	72.2 dBA
Incremental Ldn (Src 1-2):	74.0 dBA

Noise Impact Criteria
(FTA Manual, Fig 4-2)



Increase in Cumulative Noise Levels Allowed
(FTA Manual, Figs 4-3 and 4-4)



Federal Transit Administration
Noise Impact Assessment Spreadsheet

version: 1/29/2019

Project:	**BNSF Ono - R100**

Receiver Parameters	
Receiver:	**Receiver 1**
Land Use Category:	**2. Residential**
Existing Noise (Measured or Generic Value):	**60 dBA**

Noise Source Parameters	
Number of Noise Sources:	**2**

Noise Source Parameters		Source 1
	Source Type:	Fixed Guideway
	Specific Source:	Diesel Electric Locomotive
Daytime hrs	**Avg. Number of Locos/train**	4
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	**Avg. Number of Locos/train**	4
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	**Distance from Source to Receiver (ft)**	112
	Number of Intervening Rows of Buildings	0
Adjustments		

Noise Source Parameters		Source 2
	Source Type:	Fixed Guideway
	Specific Source:	Rail Car
Daytime hrs	**Avg. Number of Rail Cars/train**	60
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	**Avg. Number of Rail Cars/train**	60
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	**Distance from Source to Receiver (ft)**	112
	Number of Intervening Rows of Buildings	0
Adjustments	**Noise Barrier?**	No
	Joint Track/Crossover?	No
	Embedded Track?	No
	Aerial Structure?	No

Project Results Summary

Existing Ldn:	60 dBA
Total Project Ldn:	70 dBA
Total Noise Exposure:	71 dBA
Increase:	11 dB
Impact?:	Severe

Distance to Impact Contours

Dist to Mod. Impact Contour (Sources 1+2):	760 ft
Dist to Sev. Impact Contour (Sources 1+2):	321 ft

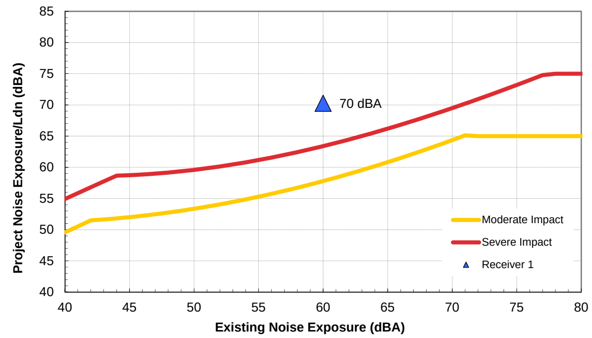
Source 1 Results

Leq(day):	62.8 dBA
Leq(night):	58.0 dBA
Ldn:	65.5 dBA

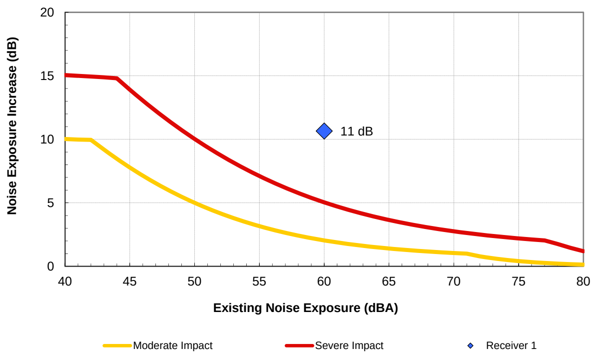
Source 2 Results

Leq(day):	65.8 dBA
Leq(night):	61.0 dBA
Ldn:	68.5 dBA
Incremental Ldn (Src 1-2):	70.3 dBA

Noise Impact Criteria
(FTA Manual, Fig 4-2)



Increase in Cumulative Noise Levels Allowed
(FTA Manual, Figs 4-3 and 4-4)



Federal Transit Administration
Noise Impact Assessment Spreadsheet

version: 1/29/2019

Project:	**BNSF Ono - R101**

Receiver Parameters	
Receiver:	**Receiver 1**
Land Use Category:	**2. Residential**
Existing Noise (Measured or Generic Value):	**60 dBA**

Noise Source Parameters	
Number of Noise Sources:	**2**

Noise Source Parameters		**Source 1**
	Source Type:	Fixed Guideway
	Specific Source:	Diesel Electric Locomotive
Daytime hrs	**Avg. Number of Locos/train**	4
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	**Avg. Number of Locos/train**	4
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	**Distance from Source to Receiver (ft)**	976
	Number of Intervening Rows of Buildings	0
Adjustments		

Noise Source Parameters		**Source 2**
	Source Type:	Fixed Guideway
	Specific Source:	Rail Car
Daytime hrs	**Avg. Number of Rail Cars/train**	60
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	**Avg. Number of Rail Cars/train**	60
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	**Distance from Source to Receiver (ft)**	976
	Number of Intervening Rows of Buildings	0
Adjustments	**Noise Barrier?**	No
	Embedded Track?	No
	Aerial Structure?	No

Project Results Summary

Existing Ldn:	60 dBA
Total Project Ldn:	56 dBA
Total Noise Exposure:	62 dBA
Increase:	2 dB
Impact?:	None

Distance to Impact Contours

Dist to Mod. Impact Contour (Sources 1+2):	760 ft
Dist to Sev. Impact Contour (Sources 1+2):	321 ft

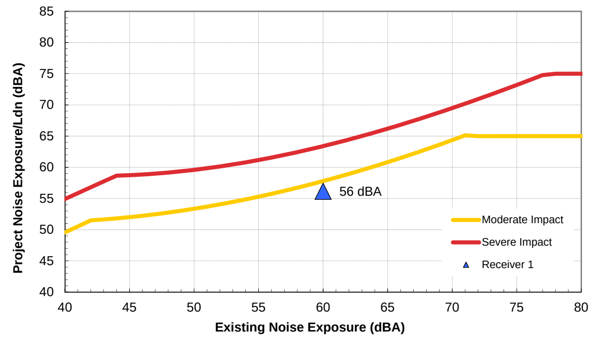
Source 1 Results

Leq(day):	48.7 dBA
Leq(night):	43.9 dBA
Ldn:	51.4 dBA

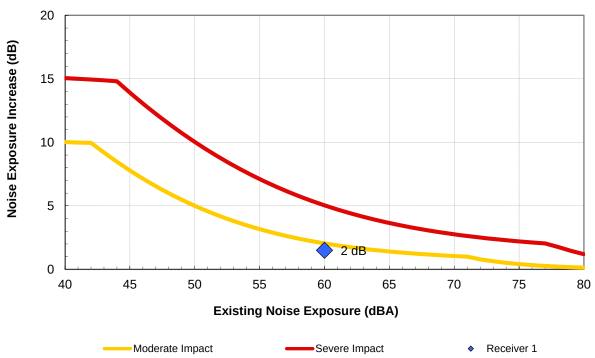
Source 2 Results

Leq(day):	51.7 dBA
Leq(night):	46.9 dBA
Ldn:	54.4 dBA
Incremental Ldn (Src 1-2):	56.2 dBA

Noise Impact Criteria
(FTA Manual, Fig 4-2)



Increase in Cumulative Noise Levels Allowed
(FTA Manual, Figs 4-3 and 4-4)



Federal Transit Administration
Noise Impact Assessment Spreadsheet

version: 1/29/2019

Project:	**BNSF Ono - R102**

Receiver Parameters	
Receiver:	**Receiver 1**
Land Use Category:	**2. Residential**
Existing Noise (Measured or Generic Value):	**60 dBA**

Noise Source Parameters	
Number of Noise Sources:	**2**

Noise Source Parameters		**Source 1**
	Source Type:	Fixed Guideway
	Specific Source:	Diesel Electric Locomotive
Daytime hrs	**Avg. Number of Locos/train**	4
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	**Avg. Number of Locos/train**	4
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	**Distance from Source to Receiver (ft)**	65
	Number of Intervening Rows of Buildings	1
Adjustments		

Noise Source Parameters		**Source 2**
	Source Type:	Fixed Guideway
	Specific Source:	Rail Car
Daytime hrs	**Avg. Number of Rail Cars/train**	60
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	**Avg. Number of Rail Cars/train**	60
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	**Distance from Source to Receiver (ft)**	65
	Number of Intervening Rows of Buildings	1
Adjustments	**Noise Barrier?**	No
	Joint Track/Crossover?	No
	Embedded Track?	No
	Aerial Structure?	No

Project Results Summary

Existing Ldn:	60 dBA
Total Project Ldn:	69 dBA
Total Noise Exposure:	70 dBA
Increase:	10 dB
Impact?:	**Severe**

Distance to Impact Contours

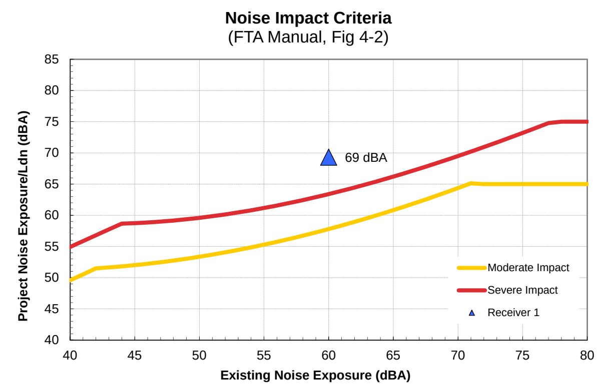
Dist to Mod. Impact Contour (Sources 1+2):	760 ft
Dist to Sev. Impact Contour (Sources 1+2):	321 ft

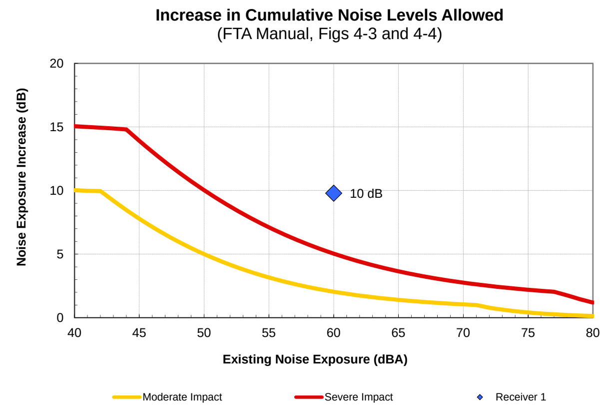
Source 1 Results

Leq(day):	61.8 dBA
Leq(night):	57.0 dBA
Ldn:	64.5 dBA

Source 2 Results

Leq(day):	64.8 dBA
Leq(night):	60.0 dBA
Ldn:	67.5 dBA
Incremental Ldn (Src 1-2):	69.3 dBA





Federal Transit Administration
Noise Impact Assessment Spreadsheet

version: 1/29/2019

Project:	**BNSF Ono - R103**

Receiver Parameters	
Receiver:	**Receiver 1**
Land Use Category:	**2. Residential**
Existing Noise (Measured or Generic Value):	**60 dBA**

Noise Source Parameters	
Number of Noise Sources:	**2**

Noise Source Parameters		**Source 1**
	Source Type:	Fixed Guideway
	Specific Source:	Diesel Electric Locomotive
Daytime hrs	**Avg. Number of Locos/train**	4
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	**Avg. Number of Locos/train**	4
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	**Distance from Source to Receiver (ft)**	110
	Number of Intervening Rows of Buildings	0
Adjustments		

Noise Source Parameters		**Source 2**
	Source Type:	Fixed Guideway
	Specific Source:	Rail Car
Daytime hrs	**Avg. Number of Rail Cars/train**	60
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	**Avg. Number of Rail Cars/train**	60
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	**Distance from Source to Receiver (ft)**	110
	Number of Intervening Rows of Buildings	0
Adjustments	**Noise Barrier?**	No
	Joint Track/Crossover?	No
	Embedded Track?	No
	Aerial Structure?	No

Project Results Summary

Existing Ldn:	60 dBA
Total Project Ldn:	70 dBA
Total Noise Exposure:	71 dBA
Increase:	11 dB
Impact?:	**Severe**

Distance to Impact Contours

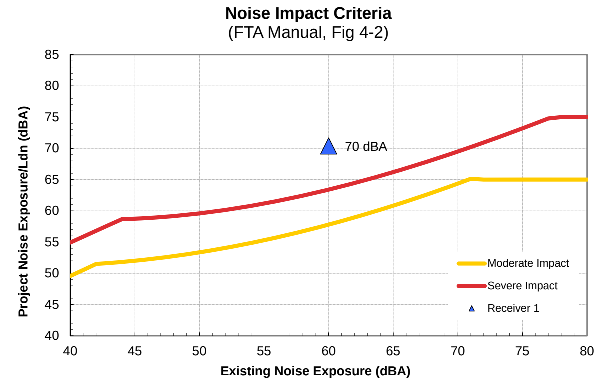
Dist to Mod. Impact Contour (Sources 1+2):	760 ft
Dist to Sev. Impact Contour (Sources 1+2):	321 ft

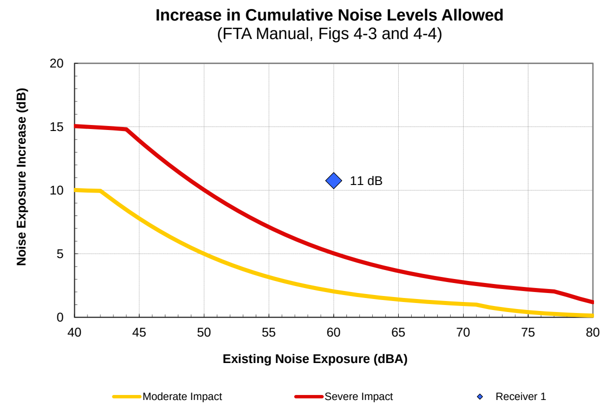
Source 1 Results

Leq(day):	62.9 dBA
Leq(night):	58.1 dBA
Ldn:	65.6 dBA

Source 2 Results

Leq(day):	65.9 dBA
Leq(night):	61.1 dBA
Ldn:	68.6 dBA
Incremental Ldn (Src 1-2):	70.4 dBA





Federal Transit Administration
Noise Impact Assessment Spreadsheet

version: 1/29/2019

Project:	**BNSF Ono 104**

Receiver Parameters	
Receiver:	**Receiver 1**
Land Use Category:	**2. Residential**
Existing Noise (Measured or Generic Value):	**60 dBA**

Noise Source Parameters	
Number of Noise Sources:	**2**

Noise Source Parameters		Source 1
	Source Type:	Fixed Guideway
	Specific Source:	Diesel Electric Locomotive
Daytime hrs	**Avg. Number of Locos/train**	4
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	**Avg. Number of Locos/train**	4
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	**Distance from Source to Receiver (ft)**	47
	Number of Intervening Rows of Buildings	0
Adjustments		

Noise Source Parameters		Source 2
	Source Type:	Fixed Guideway
	Specific Source:	Rail Car
Daytime hrs	**Avg. Number of Rail Cars/train**	60
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	**Avg. Number of Rail Cars/train**	60
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	**Distance from Source to Receiver (ft)**	47
	Number of Intervening Rows of Buildings	0
Adjustments	**Noise Barrier?**	No
	Joint Track/Crossover?	No
	Embedded Track?	No
	Aerial Structure?	No

Project Results Summary

Existing Ldn:	60 dBA
Total Project Ldn:	76 dBA
Total Noise Exposure:	76 dBA
Increase:	16 dB
Impact?:	**Severe**

Distance to Impact Contours

Dist to Mod. Impact Contour (Sources 1+2):	760 ft
Dist to Sev. Impact Contour (Sources 1+2):	321 ft

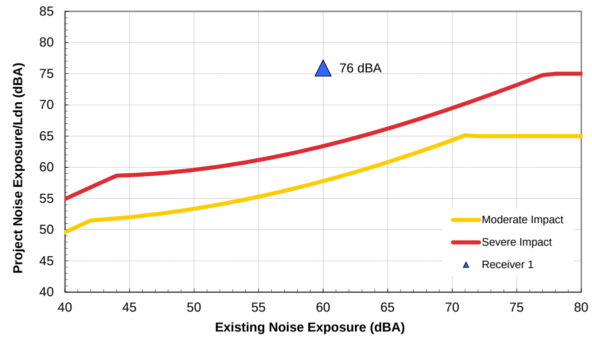
Source 1 Results

Leq(day):	68.4 dBA
Leq(night):	63.6 dBA
Ldn:	71.2 dBA

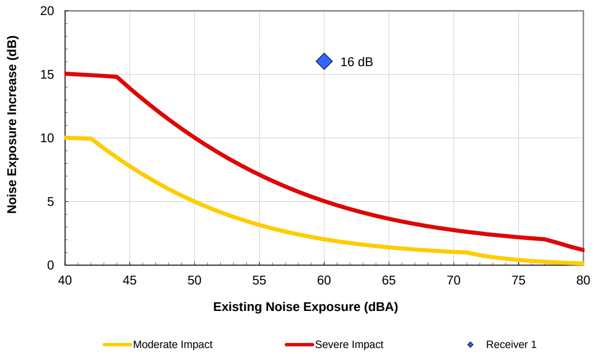
Source 2 Results

Leq(day):	71.4 dBA
Leq(night):	66.7 dBA
Ldn:	74.2 dBA
Incremental Ldn (Src 1-2):	75.9 dBA

Noise Impact Criteria
(FTA Manual, Fig 4-2)



Increase in Cumulative Noise Levels Allowed
(FTA Manual, Figs 4-3 and 4-4)



Federal Transit Administration
Noise Impact Assessment Spreadsheet

version: 1/29/2019

Project:	**BNSF Ono - R105**

Receiver Parameters	
Receiver:	**Receiver 1**
Land Use Category:	**2. Residential**
Existing Noise (Measured or Generic Value):	**60 dBA**

Noise Source Parameters	
Number of Noise Sources:	**2**

Noise Source Parameters		Source 1
	Source Type:	Fixed Guideway
	Specific Source:	Diesel Electric Locomotive
Daytime hrs	**Avg. Number of Locos/train**	4
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	**Avg. Number of Locos/train**	4
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	**Distance from Source to Receiver (ft)**	70
	Number of Intervening Rows of Buildings	0
Adjustments		

Noise Source Parameters		Source 2
	Source Type:	Fixed Guideway
	Specific Source:	Rail Car
Daytime hrs	**Avg. Number of Rail Cars/train**	60
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	**Avg. Number of Rail Cars/train**	60
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	**Distance from Source to Receiver (ft)**	70
	Number of Intervening Rows of Buildings	0
Adjustments	**Noise Barrier?**	No
	Joint Track/Crossover?	No
	Embedded Track?	No
	Aerial Structure?	No

Project Results Summary

Existing Ldn:	60 dBA
Total Project Ldn:	73 dBA
Total Noise Exposure:	74 dBA
Increase:	14 dB
Impact?:	Severe

Distance to Impact Contours

Dist to Mod. Impact Contour (Sources 1+2):	760 ft
Dist to Sev. Impact Contour (Sources 1+2):	321 ft

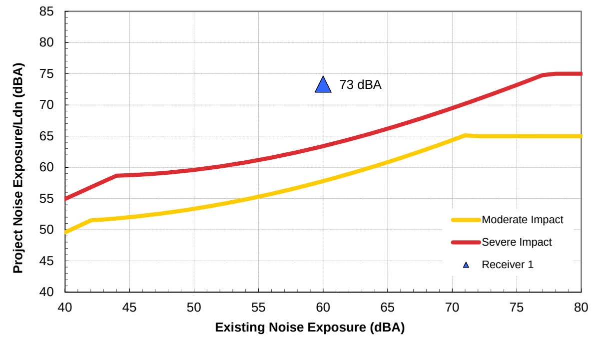
Source 1 Results

Leq(day):	65.8 dBA
Leq(night):	61.1 dBA
Ldn:	68.6 dBA

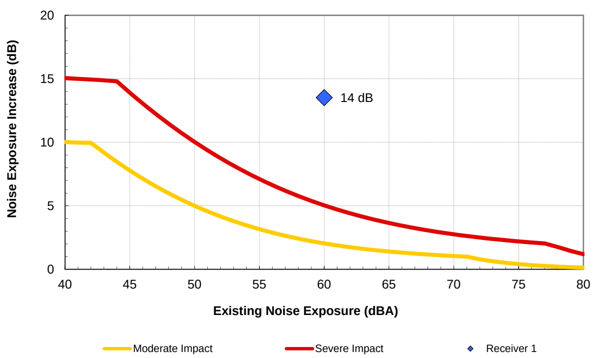
Source 2 Results

Leq(day):	68.8 dBA
Leq(night):	64.1 dBA
Ldn:	71.6 dBA
Incremental Ldn (Src 1-2):	73.3 dBA

Noise Impact Criteria
(FTA Manual, Fig 4-2)



Increase in Cumulative Noise Levels Allowed
(FTA Manual, Figs 4-3 and 4-4)



Federal Transit Administration
Noise Impact Assessment Spreadsheet

version: 1/29/2019

Project:	**BNSF Ono - R105**

Receiver Parameters	
Receiver:	**Receiver 1**
Land Use Category:	**2. Residential**
Existing Noise (Measured or Generic Value):	**60 dBA**

Noise Source Parameters	
Number of Noise Sources:	**2**

Noise Source Parameters		Source 1
	Source Type:	Fixed Guideway
	Specific Source:	Diesel Electric Locomotive
Daytime hrs	**Avg. Number of Locos/train**	4
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	**Avg. Number of Locos/train**	4
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	**Distance from Source to Receiver (ft)**	75
	Number of Intervening Rows of Buildings	0
Adjustments		

Noise Source Parameters		Source 2
	Source Type:	Fixed Guideway
	Specific Source:	Rail Car
Daytime hrs	**Avg. Number of Rail Cars/train**	60
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	**Avg. Number of Rail Cars/train**	60
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	**Distance from Source to Receiver (ft)**	75
	Number of Intervening Rows of Buildings	0
Adjustments	**Noise Barrier?**	No
	Joint Track/Crossover?	No
	Embedded Track?	No
	Aerial Structure?	No

Project Results Summary

Existing Ldn:	60 dBA
Total Project Ldn:	73 dBA
Total Noise Exposure:	73 dBA
Increase:	13 dB
Impact?:	**Severe**

Distance to Impact Contours

Dist to Mod. Impact Contour (Sources 1+2):	760 ft
Dist to Sev. Impact Contour (Sources 1+2):	321 ft

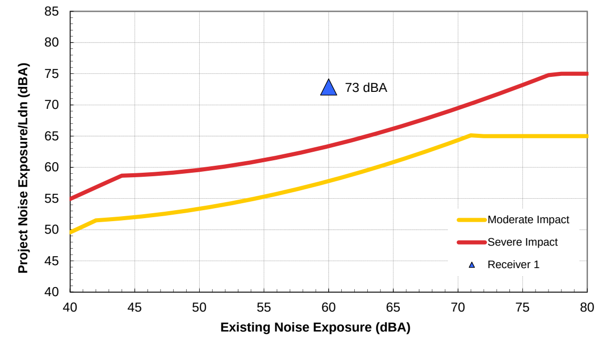
Source 1 Results

Leq(day):	65.4 dBA
Leq(night):	60.6 dBA
Ldn:	68.1 dBA

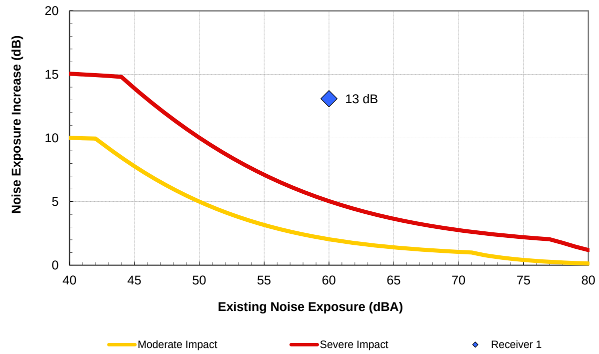
Source 2 Results

Leq(day):	68.4 dBA
Leq(night):	63.6 dBA
Ldn:	71.1 dBA
Incremental Ldn (Src 1-2):	72.9 dBA

Noise Impact Criteria
(FTA Manual, Fig 4-2)



Increase in Cumulative Noise Levels Allowed
(FTA Manual, Figs 4-3 and 4-4)



Federal Transit Administration
Noise Impact Assessment Spreadsheet

version: 1/29/2019

Project:	**BNSF Ono - R105**

Receiver Parameters	
Receiver:	**Receiver 1**
Land Use Category:	**2. Residential**
Existing Noise (Measured or Generic Value):	**60 dBA**

Noise Source Parameters	
Number of Noise Sources:	**2**

Noise Source Parameters		**Source 1**
	Source Type:	Fixed Guideway
	Specific Source:	Diesel Electric Locomotive
Daytime hrs	**Avg. Number of Locos/train**	4
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	**Avg. Number of Locos/train**	4
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	**Distance from Source to Receiver (ft)**	110
	Number of Intervening Rows of Buildings	1
Adjustments		

Noise Source Parameters		**Source 2**
	Source Type:	Fixed Guideway
	Specific Source:	Rail Car
Daytime hrs	**Avg. Number of Rail Cars/train**	60
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	**Avg. Number of Rail Cars/train**	60
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	**Distance from Source to Receiver (ft)**	110
	Number of Intervening Rows of Buildings	1
Adjustments	**Noise Barrier?**	No
	Joint Track/Crossover?	No
	Embedded Track?	No
	Aerial Structure?	No

Project Results Summary

Existing Ldn:	60 dBA
Total Project Ldn:	66 dBA
Total Noise Exposure:	67 dBA
Increase:	7 dB
Impact?:	Severe

Distance to Impact Contours

Dist to Mod. Impact Contour (Sources 1+2):	760 ft
Dist to Sev. Impact Contour (Sources 1+2):	321 ft

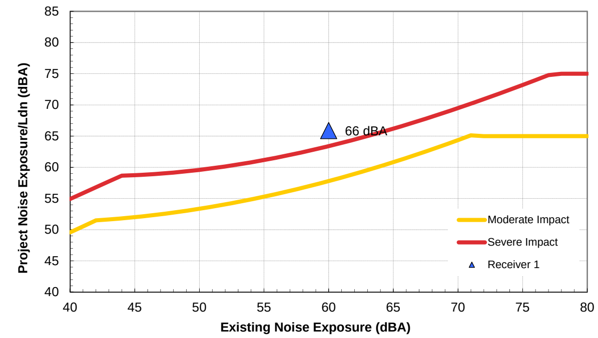
Source 1 Results

Leq(day):	58.4 dBA
Leq(night):	53.6 dBA
Ldn:	61.1 dBA

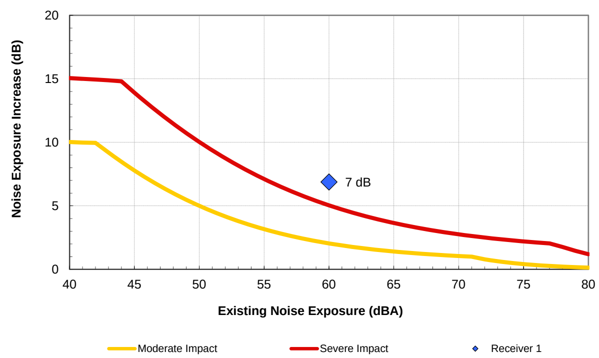
Source 2 Results

Leq(day):	61.4 dBA
Leq(night):	56.6 dBA
Ldn:	64.1 dBA
Incremental Ldn (Src 1-2):	65.9 dBA

Noise Impact Criteria
(FTA Manual, Fig 4-2)



Increase in Cumulative Noise Levels Allowed
(FTA Manual, Figs 4-3 and 4-4)



Federal Transit Administration
Noise Impact Assessment Spreadsheet

version: 1/29/2019

Project:	BNSF Ono - R106

Receiver Parameters	
Receiver:	Receiver 1
Land Use Category:	2. Residential
Existing Noise (Measured or Generic Value):	60 dBA

Noise Source Parameters	
Number of Noise Sources:	2

Noise Source Parameters		Source 1
	Source Type:	Fixed Guideway
	Specific Source:	Diesel Electric Locomotive
Daytime hrs	Avg. Number of Locos/train	4
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	Avg. Number of Locos/train	4
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	Distance from Source to Receiver (ft)	95
	Number of Intervening Rows of Buildings	0
Adjustments		

Noise Source Parameters		Source 2
	Source Type:	Fixed Guideway
	Specific Source:	Rail Car
Daytime hrs	Avg. Number of Rail Cars/train	60
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	Avg. Number of Rail Cars/train	60
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	Distance from Source to Receiver (ft)	95
	Number of Intervening Rows of Buildings	0
Adjustments	Noise Barrier?	No
	Joint Track/Crossover?	No
	Embedded Track?	No
	Aerial Structure?	No

Project Results Summary

Existing Ldn:	60 dBA
Total Project Ldn:	71 dBA
Total Noise Exposure:	72 dBA
Increase:	12 dB
Impact?:	Severe

Distance to Impact Contours

Dist to Mod. Impact Contour (Sources 1+2):	760 ft
Dist to Sev. Impact Contour (Sources 1+2):	321 ft

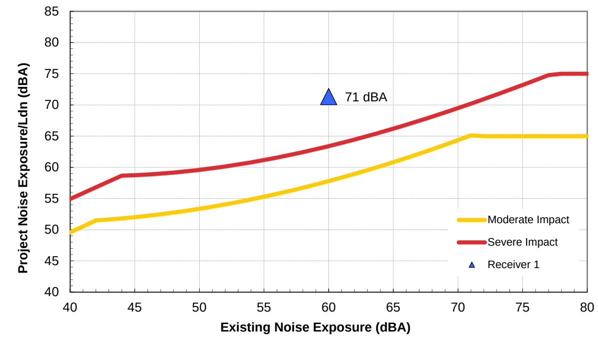
Source 1 Results

Leq(day):	63.8 dBA
Leq(night):	59.1 dBA
Ldn:	66.6 dBA

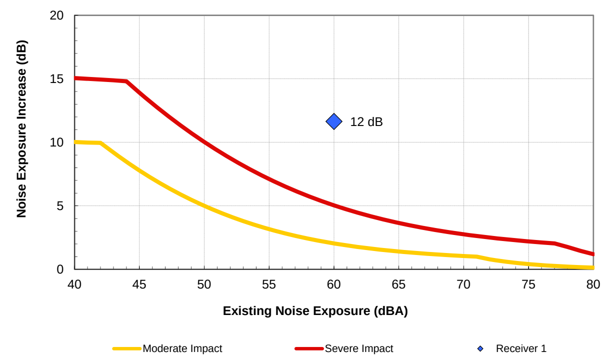
Source 2 Results

Leq(day):	66.8 dBA
Leq(night):	62.1 dBA
Ldn:	69.6 dBA
Incremental Ldn (Src 1-2):	71.3 dBA

Noise Impact Criteria
(FTA Manual, Fig 4-2)



Increase in Cumulative Noise Levels Allowed
(FTA Manual, Figs 4-3 and 4-4)



Federal Transit Administration
Noise Impact Assessment Spreadsheet

version: 1/29/2019

Project:	**BNSF Ono - R107**

Receiver Parameters	
Receiver:	**Receiver 1**
Land Use Category:	**2. Residential**
Existing Noise (Measured or Generic Value):	**60 dBA**

Noise Source Parameters	
Number of Noise Sources:	**2**

Noise Source Parameters		**Source 1**
	Source Type:	Fixed Guideway
	Specific Source:	Diesel Electric Locomotive
Daytime hrs	**Avg. Number of Locos/train**	4
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	**Avg. Number of Locos/train**	4
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	**Distance from Source to Receiver (ft)**	95
	Number of Intervening Rows of Buildings	0
Adjustments		

Noise Source Parameters		**Source 2**
	Source Type:	Fixed Guideway
	Specific Source:	Rail Car
Daytime hrs	**Avg. Number of Rail Cars/train**	60
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	**Avg. Number of Rail Cars/train**	60
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	**Distance from Source to Receiver (ft)**	95
	Number of Intervening Rows of Buildings	0
Adjustments	**Noise Barrier?**	No
	Joint Track/Crossover?	No
	Embedded Track?	No
	Aerial Structure?	No

Project Results Summary

Existing Ldn:	60 dBA
Total Project Ldn:	71 dBA
Total Noise Exposure:	72 dBA
Increase:	12 dB
Impact?:	**Severe**

Distance to Impact Contours

Dist to Mod. Impact Contour (Sources 1+2):	760 ft
Dist to Sev. Impact Contour (Sources 1+2):	321 ft

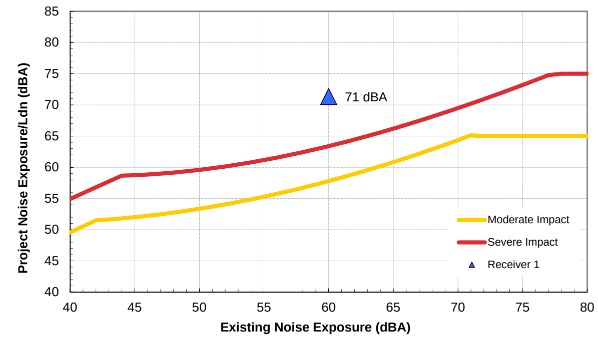
Source 1 Results

Leq(day):	63.8 dBA
Leq(night):	59.1 dBA
Ldn:	66.6 dBA

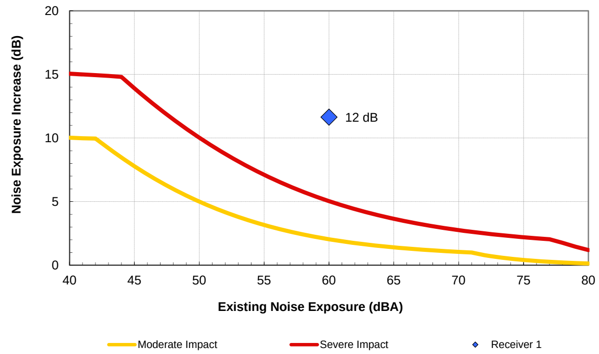
Source 2 Results

Leq(day):	66.8 dBA
Leq(night):	62.1 dBA
Ldn:	69.6 dBA
Incremental Ldn (Src 1-2):	71.3 dBA

Noise Impact Criteria
(FTA Manual, Fig 4-2)



Increase in Cumulative Noise Levels Allowed
(FTA Manual, Figs 4-3 and 4-4)



Federal Transit Administration
Noise Impact Assessment Spreadsheet

version: 1/29/2019

Project:	**BNSF Ono - R108**

Receiver Parameters	
Receiver:	**Receiver 1**
Land Use Category:	**2. Residential**
Existing Noise (Measured or Generic Value):	**60 dBA**

Noise Source Parameters	
Number of Noise Sources:	**2**

Noise Source Parameters		**Source 1**
	Source Type:	Fixed Guideway
	Specific Source:	Diesel Electric Locomotive
Daytime hrs	**Avg. Number of Locos/train**	4
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	**Avg. Number of Locos/train**	4
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	**Distance from Source to Receiver (ft)**	65
	Number of Intervening Rows of Buildings	0
Adjustments		

Noise Source Parameters		**Source 2**
	Source Type:	Fixed Guideway
	Specific Source:	Rail Car
Daytime hrs	**Avg. Number of Rail Cars/train**	60
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	**Avg. Number of Rail Cars/train**	60
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	**Distance from Source to Receiver (ft)**	65
	Number of Intervening Rows of Buildings	0
Adjustments	**Noise Barrier?**	No
	Joint Track/Crossover?	No
	Embedded Track?	No
	Aerial Structure?	No

Project Results Summary

Existing Ldn:	60 dBA
Total Project Ldn:	74 dBA
Total Noise Exposure:	74 dBA
Increase:	14 dB
Impact?:	**Severe**

Distance to Impact Contours

Dist to Mod. Impact Contour (Sources 1+2):	760 ft
Dist to Sev. Impact Contour (Sources 1+2):	321 ft

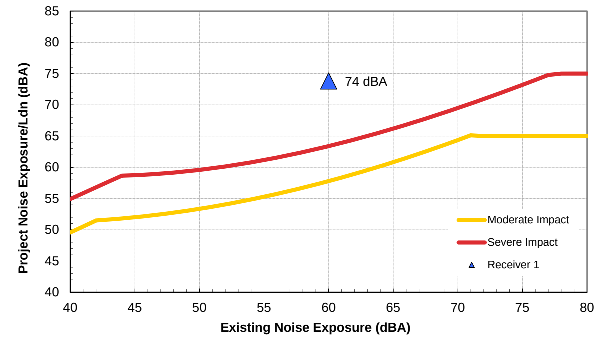
Source 1 Results

Leq(day):	66.3 dBA
Leq(night):	61.5 dBA
Ldn:	69.0 dBA

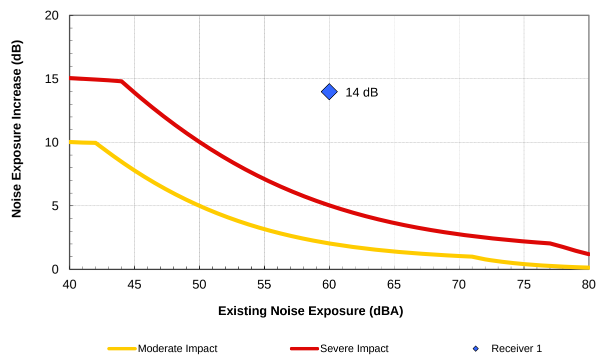
Source 2 Results

Leq(day):	69.3 dBA
Leq(night):	64.5 dBA
Ldn:	72.0 dBA
Incremental Ldn (Src 1-2):	73.8 dBA

Noise Impact Criteria
(FTA Manual, Fig 4-2)



Increase in Cumulative Noise Levels Allowed
(FTA Manual, Figs 4-3 and 4-4)



Federal Transit Administration
Noise Impact Assessment Spreadsheet

version: 1/29/2019

Project:	BNSF Ono - R109

Receiver Parameters	
Receiver:	Receiver 1
Land Use Category:	2. Residential
Existing Noise (Measured or Generic Value):	60 dBA

Noise Source Parameters	
Number of Noise Sources:	2

Noise Source Parameters		Source 1
	Source Type:	Fixed Guideway
	Specific Source:	Diesel Electric Locomotive
Daytime hrs	Avg. Number of Locos/train	4
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	Avg. Number of Locos/train	4
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	Distance from Source to Receiver (ft)	65
	Number of Intervening Rows of Buildings	0
Adjustments		

Noise Source Parameters		Source 2
	Source Type:	Fixed Guideway
	Specific Source:	Rail Car
Daytime hrs	Avg. Number of Rail Cars/train	60
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	Avg. Number of Rail Cars/train	60
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	Distance from Source to Receiver (ft)	65
	Number of Intervening Rows of Buildings	0
Adjustments	Noise Barrier?	No
	Joint Track/Crossover?	No
	Embedded Track?	No
	Aerial Structure?	No

Project Results Summary

Existing Ldn:	60 dBA
Total Project Ldn:	74 dBA
Total Noise Exposure:	74 dBA
Increase:	14 dB
Impact?:	Severe

Distance to Impact Contours

Dist to Mod. Impact Contour (Sources 1+2):	760 ft
Dist to Sev. Impact Contour (Sources 1+2):	321 ft

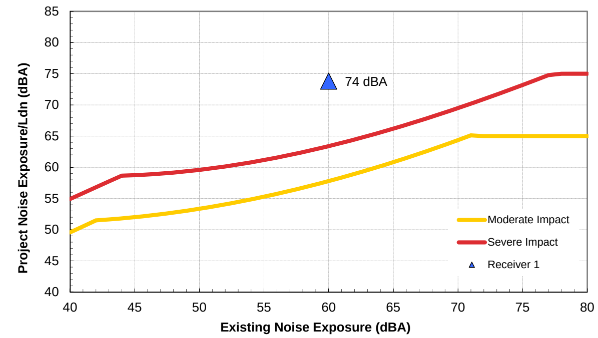
Source 1 Results

Leq(day):	66.3 dBA
Leq(night):	61.5 dBA
Ldn:	69.0 dBA

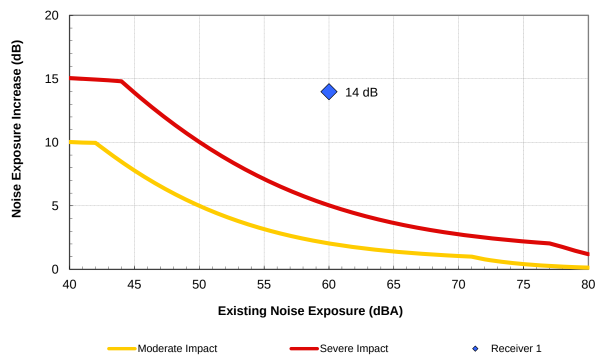
Source 2 Results

Leq(day):	69.3 dBA
Leq(night):	64.5 dBA
Ldn:	72.0 dBA
Incremental Ldn (Src 1-2):	73.8 dBA

Noise Impact Criteria
(FTA Manual, Fig 4-2)



Increase in Cumulative Noise Levels Allowed
(FTA Manual, Figs 4-3 and 4-4)



Federal Transit Administration
Noise Impact Assessment Spreadsheet

version: 1/29/2019

Project:	**BNSF Ono - R110**

Receiver Parameters	
Receiver:	**Receiver 1**
Land Use Category:	**2. Residential**
Existing Noise (Measured or Generic Value):	**60 dBA**

Noise Source Parameters	
Number of Noise Sources:	**2**

Noise Source Parameters		Source 1
	Source Type:	Fixed Guideway
	Specific Source:	Diesel Electric Locomotive
Daytime hrs	**Avg. Number of Locos/train**	4
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	**Avg. Number of Locos/train**	4
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	**Distance from Source to Receiver (ft)**	63
	Number of Intervening Rows of Buildings	0
Adjustments		

Noise Source Parameters		Source 2
	Source Type:	Fixed Guideway
	Specific Source:	Rail Car
Daytime hrs	**Avg. Number of Rail Cars/train**	60
	Speed (mph)	55
	Avg. Number of Events/hr	4
Nighttime hrs	**Avg. Number of Rail Cars/train**	60
	Speed (mph)	55
	Avg. Number of Events/hr	1.33
Distance	**Distance from Source to Receiver (ft)**	63
	Number of Intervening Rows of Buildings	0
Adjustments	**Noise Barrier?**	No
	Joint Track/Crossover?	No
	Embedded Track?	No
	Aerial Structure?	No

Project Results Summary

Existing Ldn:	60 dBA
Total Project Ldn:	74 dBA
Total Noise Exposure:	74 dBA
Increase:	14 dB
Impact?:	Severe

Distance to Impact Contours

Dist to Mod. Impact Contour (Sources 1+2):	760 ft
Dist to Sev. Impact Contour (Sources 1+2):	321 ft

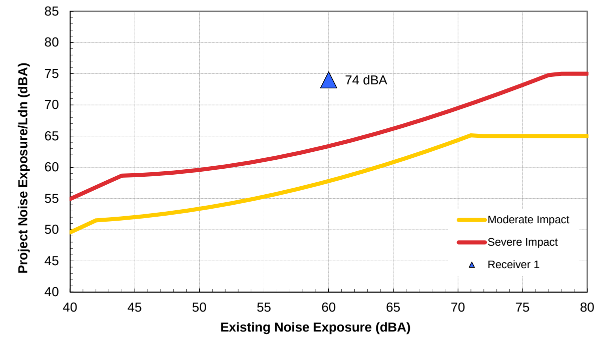
Source 1 Results

Leq(day):	66.5 dBA
Leq(night):	61.7 dBA
Ldn:	69.2 dBA

Source 2 Results

Leq(day):	69.5 dBA
Leq(night):	64.7 dBA
Ldn:	72.2 dBA
Incremental Ldn (Src 1-2):	74.0 dBA

Noise Impact Criteria
(FTA Manual, Fig 4-2)



Increase in Cumulative Noise Levels Allowed
(FTA Manual, Figs 4-3 and 4-4)