LOSSAN
Los Angeles - San Diego - San Luis Obispo
Rail Corridor Agency

Noise and Vibration Technical Report

Central Coast Layover Facility Project

November 2021

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Acronyms

Agency	LOSSAN Rail Corridor Agency
CEQA	California Environmental Quality Act
CP	control point
dB	decibel
dBA	A-weighted decibels
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
L_{dn}	day-night average sound level
L_{eq}	equivalent sound level
L_{max}	Maximum sound level
LOSSAN	Los Angeles – San Diego – San Luis Obispo
MP	mile post
PPV	peak particle velocity
Project	Central Coast Layover Facility
ROW	right-of-way
VdB	vibration decibels

1 Introduction

At the request of the Los Angeles – San Diego – San Luis Obispo (LOSSAN) Rail Corridor Agency (Agency), HDR and HMMH conducted noise and vibration analysis for the proposed Central Coast Layover Facility (CCLF) Project (Project). The purpose of this report is to analyze the potential for noise and vibration impacts on sensitive land uses as a result of the Project. The analysis areas for this report include the noise analysis area defined as the area within 650 feet of the Project which is the screening distance identified by the Federal Transit Administration (FTA) (FTA, 2018), and vibration analysis area defined as the area within 200 feet, also the screening distance identified by FTA, of where intercity trains would operate.

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2 Project Description

2.1 Project Overview

The Los Angeles – San Diego – San Luis Obispo (LOSSAN) Rail Corridor Agency (Agency) is proposing the relocation and expansion of the existing Pacific Surfliner layover facility located at the northern end of the LOSSAN rail corridor in San Luis Obispo, California. The proposed facility would increase overnight layover and storage capacity to support the service goals and objectives outlined for the Pacific Surfliner in both the 2018 California State Rail Plan (State Rail Plan) and the LOSSAN Agency's Fiscal Year (FY) 2019-20 and 2020-21 Business Plan (Business Plan).

Currently, one Pacific Surfliner train overnights each day in San Luis Obispo for an early morning departure the following day. Both the State Rail Plan and the LOSSAN Agency Business Plan identify growth in the service levels of the Pacific Surfliner to San Luis Obispo. As currently configured, the existing single-track facility does not have the capacity to accommodate any growth in service levels beyond the current service. The proposed Project will facilitate the maintenance of equipment at the northern terminus of the LOSSAN rail corridor. It will allow additional passenger trains to be maintained, serviced, and stored in San Luis Obispo overnight with no impact to the operations of Union Pacific (UP), allowing a second, more convenient, morning departure from San Luis Obispo, subject to UP approval of the proposed schedule. It will also provide for the opportunity to store and service additional train sets used for further expansion of the Service.

2.2 Project Location

The Project site is located on approximately 13 acres of relatively undeveloped land in the City of San Luis Obispo, which is situated along the Central Coast region of California, approximately 190 miles north of Los Angeles (Figure 2-1). The existing Pacific Surfliner layover facility is located directly across from the San Luis Obispo Amtrak Station, located at 1011 Railroad Avenue. The Project site is located approximately 0.3-mile south of the San Luis Obispo Amtrak Station. The Project site extends from south of the San Luis Obispo Railroad Museum's parking lot to east of Lawrence Drive. The Project site is between the Union Pacific Main Tracks and existing commercial and residential development to the west.

As shown on Figure 2-2, the Project site is located entirely within the City of San Luis Obispo's Railroad Historic District (District). The District boundary covers approximately one-half square mile and extends along the railroad right-of-way (ROW) for a distance of about 1.7 miles in roughly a north-south axis. The District includes the original railroad yard, plus residential and commercial-zoned property on the west side of the railroad ROW (City of San Luis Obispo Community Development Department 1998).

Figure 2-1. Regional Location

Figure 2-2. Project Site

2.3 Proposed Project

The proposed Project includes the construction of a new rail yard, storage and servicing tracks, operations and maintenance buildings, landscape improvements, and safety and security features. Perimeter fencing would be installed around the facility for site security and public safety.

2.3.1 Rail Yard and Tracks

The proposed Project would construct a new rail yard with up to five new tracks, with Track 1 positioned as the westernmost track and Track 5 positioned as the easternmost track.

- Track 1 – Bypass and wash track with train wash building
- Track 2 – Storage track with service and inspection (S&I) position
- Track 3 – Storage track
- Track 4 – Storage track
- Track 5 – Storage track

Trains would enter the site from the mainline switch at the north end of the site, passing through the Train Wash on Track 1. Trains would travel south, passing the train wash building onto the tail track and then reverse direction into either S&I position or to one of the other storage tracks. Upon reaching the S&I position or a storage track, the trains would park for the night, connecting to ground power to allow for the electric functions of the train to continue and connecting to a yard air compressor to keep the brake system charged. These connections allow for continuity of these functions without the locomotive engine running, minimizing engine idling within the facility.

From the S&I or storage positions, daily servicing and light maintenance can occur. Trains stored on the S&I track would also undergo additional safety, operational and reliability inspections.

Trains would exit the facility north toward the San Luis Obispo station at intervals based on the approved and published service schedules.

2.3.2 Buildings

The proposed CCLF would consist of a series of single-story structures housing a variety of functions including office space, storage space, workshops, train wash, train S&I and wheel truing.

Operations/Fleet Maintenance Building. The Operations Building would be an approximately 3,000 square foot (sf) one-story building, which would house administrative offices and restrooms for operations and maintenance staff.

Fleet Maintenance Shops Building. The Fleet Maintenance Shops Building would be a one-story building and approximately 2,900 sf, and would house a welding/fabrication shop, brake and coupler shop, and toolbox storage.

Parts Storeroom Building. The Parts Storeroom Building would be a one-story building, approximately 1,500 sf, located adjacent to the Fleet Maintenance Shops Building and Maintenance of Way Building. This building would store components and parts that are required on a frequent basis to support maintenance activities, and would include a dedicated secure area for shipping, receiving and storage.

Maintenance of Way (MOW) Building. The MOW Building would be a one-story building, approximately 2,200 sf, located adjacent to the Parts Storeroom Building. MOW is responsible for inspection and maintenance of track, roadbed, and buildings. MOW is also responsible for inspection and maintenance of non-revenue vehicles assigned to the CCLF.

Wash Building. The Wash Building would be a 9-10,000 sf one-story building, located at the center of the Project site on Track 1. An automatic, drive-through train wash would be enclosed in the Wash Building. As described above, trains entering the maintenance facility would pass through the Train Wash Building for cleaning prior to being placed on one of the storage tracks.

The train wash would operate 7 days per week. Each train arriving at the facility at the end of its service day will enter through the wash, requiring it to run for about 5-10 minutes for each train. The timing of the train wash operation will depend on the approved and published service schedule and would likely be during the evening hours.

Wheel Truing Building. The Wheel Truing Building would be a one-story building, approximately 1,900 sf in size and located at the north end of the Project site adjacent to the San Luis Obispo Railroad Museum parking lot. The Wheel Truing Building would house an underfloor pit-mounted wheel truing machine. Use of this facility is anticipated to be infrequent and not part of the daily operation.

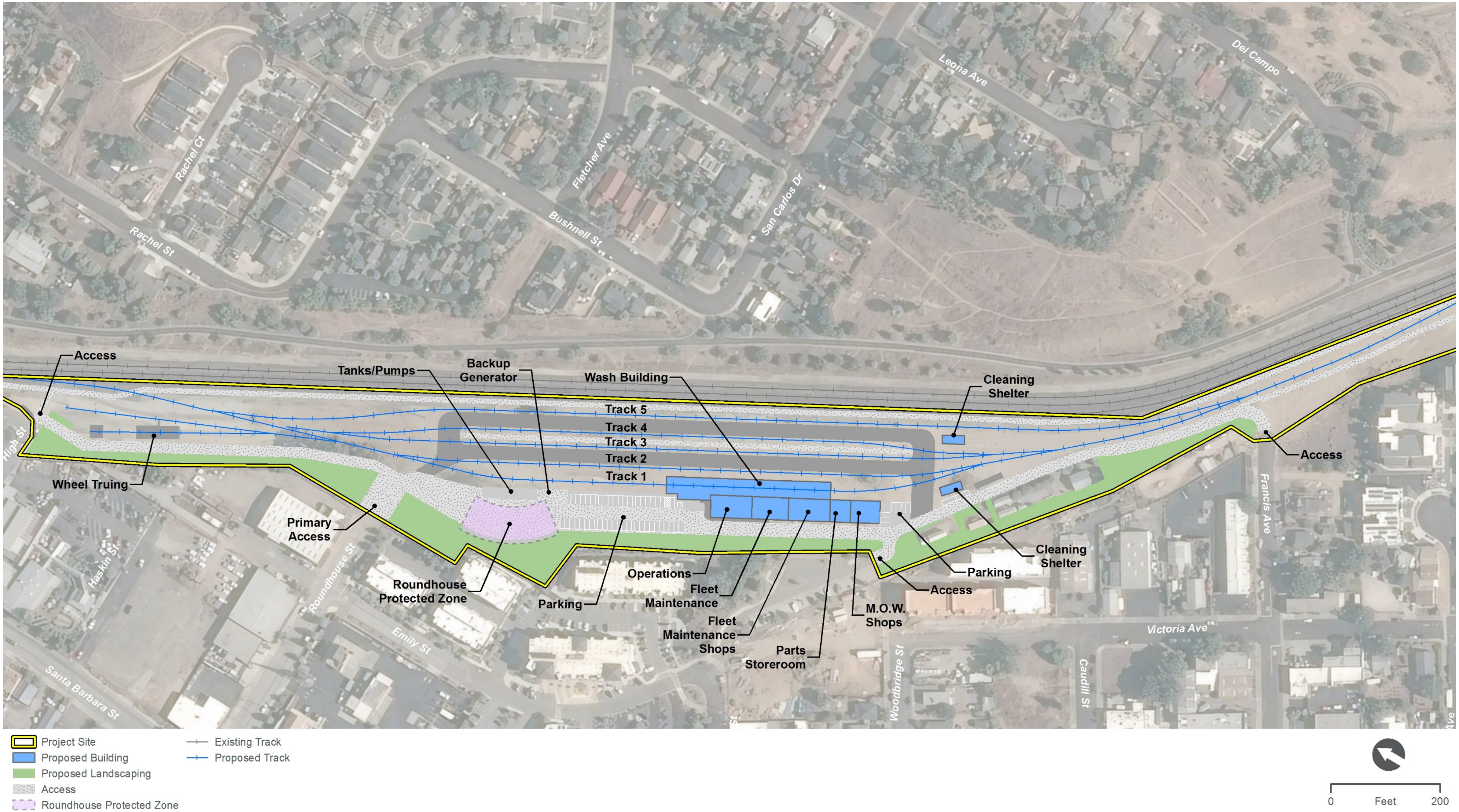
S&I Shelter

Track 2 would function as a storage track with an S&I position. The S&I track would be covered by a 24' high shelter. To provide access to the underside of a train for inspection and maintenance, a lower level work area or gauge pit would be installed.

Cleaning Shelters

Two cleaning shelters would be provided south of the Wash Building and storage tracks.

Figure 2-3. Site Plan



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Parking

The proposed Project would provide a total of 54 on-site parking spaces for employees and visitors. Most of the parking spaces would be located on the west end of the central yard in between the Roundhouse Site and Operations building. The other parking spaces would be located adjacent to the MOW Shops building.

Access

Primary employee and visitor access to the site would be from Roundhouse Avenue. Additional emergency access to the site would be available from the train museum parking lot (north end of site), from the parking lot off Alphonso Street (center of site), and from Francis Avenue (south end of site).

Landscape Plan

The proposed Project would install landscaping to buffer maintenance and servicing operations from adjacent neighboring residential and recreational uses. The Project's plant palette will be comprised of species native or fully adapted to San Luis Obispo's climate. The list of species will draw from the San Luis Obispo County-Approved Plant List and the Calscape, or California Native Plant Society, database of plants native to the area. Species will be selected to be relatively low maintenance, have minimal leaf litter, and be non-fruiting so as not to attract vectors or birds.

East Landscape Buffer

Single-family residences overlook the east edge of the Project site, with views toward the hills of the surrounding regional open space west of the city. A Class I bike trail traverses the Historic Railroad District, connecting to regional trails and other San Luis Obispo recreation sites.

Landscape material for the east buffer will be congruent with the existing plant palette – a diverse mix of native/adaptive species consistent with the California chaparral and foothill meadow plant communities. The main objective in enhancing the landscape buffer at the east edge is to frame views over the existing rail yard toward the distant hills, screening the Project site and its enhanced maintenance operations.

West Landscape Buffer and Class I Bike Trail

Multi-family condominiums and apartments are located adjacent to the Project site's western edge. The majority of the on-site landscape buffer area is to be established between the proposed rail improvements and maintenance program elements and these adjacent residences.

Additionally, a new segment of Class I bike trail, from approximately High Street to Francis Avenue, is identified in the City of San Luis Obispo's 2013 Bicycle Transportation Plan's Eastern Area Implementation Projects as a future Class I trail connecting existing Class I, II, and III segments to comprise the Railroad Safety Trail. This portion incorporates the *High to Roundhouse* segment and the majority of the *Roundhouse to McMillian* segment, approximately 1,750 linear feet of new Class I trail. Should Project conditions, land use, and right-of-way alignments allow, this segment could be constructed, to complete the connection to Francis Avenue.

The bike path would meander slightly through the landscape buffer, providing users distance from the rail yard operations and limiting the impact of trail activity noise on the adjacent residential communities. This new connection would provide largely protected bike and pedestrian trail access from the Old Town Historic District through the Railroad Historic District, from the San Luis Obispo Railroad Museum, past the rail yard at Project site, and back into the urban fabric of housing and light commercial use.

Roundhouse Protected Zone

The new segment of Class I bike trail presents the opportunity to facilitate public view of the historic site of the Southern Pacific Railroad roundhouse, where the structure's remnant foundation remains visible. Hosting the last steam locomotive in 1956, the roundhouse was demolished in 1959, with the train depot following in 1971, and finally, the turntable in 1994. The unique historic relevance of the roundhouse continues the rail history narrative set by the Railroad Museum to the north, and reinforces the area's designation as the Railroad Historic District.

The Project's program elements would be arranged to avoid significant impact to the roundhouse footing, preserving as much exposed surface for view as possible. The proposed Project would install a transparent perimeter fence along the southwest edge of the roundhouse, where bench seating and interpretive signage will be sited to create an informational node along the active transportation corridor.

Site Security

The site perimeter would be secured with an 8-foot transparent anti-climb fence. Motorized vehicular gates would be provided at all egress/ingress points. Video surveillance cameras would also be installed along the perimeter of the site.

Phasing

Funding is currently not available to construct the entire facility at once. Instead a phased construction approach is intended, constructing an initial portion of the facility which includes the most immediately needed elements, and adding the remaining components as the need arises and additional funding becomes available. The following sections identify the components that would be constructed under Phase 1 and later phases of the proposed project.

Phase 1

Phase 1 intends to meet or exceed the functionality of the existing layover facility and add layover capacity for at least one additional train. This initial phase would include landscaping and trail enhancements around the Phase 1 footprint as well as water quality improvements and underground utility services to serve the ultimate facility. Phase 1 would include the following project components:

- North portions of West Landscape Buffer, 30 feet with pedestrian/bike path, 20-foot minimum setback plus 10 feet
- East Landscape Buffer, green space enhancement wrapping the existing bike path north-to-south
- Upper Yard/Lower Yard site improvements including:
  - Civil topography, grading, drainage, stormwater utilities
  - North-to-south 20-foot access drive, yard paving and service roads
  - Improvements at "Roundhouse Protected Zone"

  - Yard perimeter fencing and gates at access points - one (1) main entry at Roundhouse Street (north end of Central Yard); three (3) emergency access points (north and south end of site, south end of Central Yard); fencing only around yard body
  - All railroad maintenance roads and mainline east / west perimeter fencing; yard paving and site access roads
  - Trackside shelters and services including waste / recycling enclosure
- Temporary portable buildings for essential work functions
- 1 Service & Inspection (S&I) Position, gage pit with canopy
- 2 storage tracks, including S&I track
- Yard / Exterior Area site improvements including partial build-out of parking and driveway

Later Phases

Later phases would include the remaining Master Plan components as dictated by operational needs and as allowed by available funding. Initially this would focus on all items identified as essential components of the ultimate facility, followed later by those features that would expand overall capacity of the facility, as well as enhance operations and efficiency, but which are not immediately mandatory. The following project components could be constructed on the project site based on operational needs and available funding:

- Remaining portions of West Landscape Buffer, 30 feet with pedestrian/bike path, 20-foot minimum setback plus 10 feet
- Yard/Exterior Area site improvements remaining from Phase 1 including parking, driveway, laydown and enclosed yard areas, emergency generator
- 1 wash track with Train Wash Building foundation and pit / infrastructure
- 1 south tail track and connection
- 3 locomotive storage tracks, including 1 extended-length storage track
- Facility Structures (core/shell, interior build-out, equipment installation)
  - Operations (administration)
  - Fleet Maintenance
  - Fleet Maintenance Shops
  - Parts Store Room
  - MOW Shops foundation/pad
  - Train Wash Building, structure/wash arch/canopy
  - Wheel Truing Building and Support Areas
  - Fueling structure and arch
- Wheel Truing Building trackwork and switch
- Retaining wall and grading to support wheel truing building and trackwork

2.3.3 Construction

As described above, funding is currently not available to construct the entire facility at once. Therefore, a phased construction approach is intended, constructing the Phase 1 project components first, and adding the remaining components as the need arises and additional funding becomes available. The following sections provide details regarding the project timeline and construction process.

Phase 1

Project construction for Phase 1 would begin as early as April 2024 and last for approximately 19 months. The work would begin with ground improvements to prepare the site for construction of buildings. Once the buildings are constructed the tracks would be installed. Construction may involve multiple crews working simultaneously and would include equipment such as track stabilizers, excavators, front-end loaders, rubber-tired dozers, cranes, haul trucks, and water trucks.

A summary of the construction activities associated with Phase 1 is provided below:

- Demolition and Rough Grading
- Utility Relocations
- West/East Landscape Buffer and Bike Path
- Access Drive, yard paving and service roads
- Fencing
- S&I Position, gage pit with canopy
- Storage track and 2 turnouts
- Exterior parking and driveway

Later Phases

Project construction for the later phases would be approximately 16 months in duration. Mobilization and demobilization time would add to the duration for later phases depending on how they end up being broken out, though breaking the remaining work into smaller phases would reduce the magnitude of impact for each smaller phase. A summary of the construction activities associated with later phases is provided below:

- West/East landscape buffer and bike path
- Exterior parking and driveway
- Track construction and 10 turnouts
- Operations building
- Fleet maintenance building
- Parts store room
- MOW shops foundation/pad
- Train wash building

- Wheel truing building
- Retaining wall
- Fueling structure

Material and equipment imports and construction personnel would access the Project study area via walking points from the nearest fence access or staging area. Most construction equipment would be brought to the project site at the beginning of the construction process during construction mobilization and would remain on-site throughout the duration of the construction activities for which they were needed

Construction activities would be scheduled during time frames that allow for exclusive track occupancy by construction crews to minimize effects on LOSSAN operations. To the greatest extent possible, construction activities would be scheduled during the daytime. No weekend work is anticipated.

3 Regulatory Framework

3.1 Noise

3.1.1 Federal Regulations and Guidelines

Several federal laws and guidelines are relevant to the assessment of ground transportation noise and vibration impacts and apply to the Project:

- The Noise Control Act of 1972 (42 United States Code Section 4910) was the first comprehensive statement of national noise policy. It declared that "it is the policy of the United States to promote an environment for all Americans free from noise that jeopardizes their health or welfare."
- The Federal Transit Administration (FTA) *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018) provides the methodology and impact criteria applicable to conventional passenger rail and transit components associated with the Project.

FTA published a newly revised noise and vibration impact assessment manual in 2018. The impact criteria are based on the goal of maintaining a noise environment considered acceptable for land uses where noise may have an impact. The noise exposure is measured in terms of the day-night average sound level (L_{dn}) for residential land uses or in terms of the hourly equivalent sound level (L_{eq}) for other land uses.

FTA states that in cases where changes are proposed to an existing transit system, the cumulative noise criteria can be used (FTA 2018). In the case of this Project, the cumulative noise criteria are appropriate because the existing facility is being relocated and expanded withing the railroad right-of-way where LOSSAN trains operate.

In FTA's *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018), noise impact criteria for the operation of rail facilities are based on the change in outdoor noise exposure using a sliding scale with three land use categories and three degrees of impact. The criteria were established to reflect a heightened community annoyance caused by late-night or early morning service, as well as communities' varying sensitivity to noise from projects during different ambient noise conditions.

For operational rail noise, FTA's three land use categories are as follows:

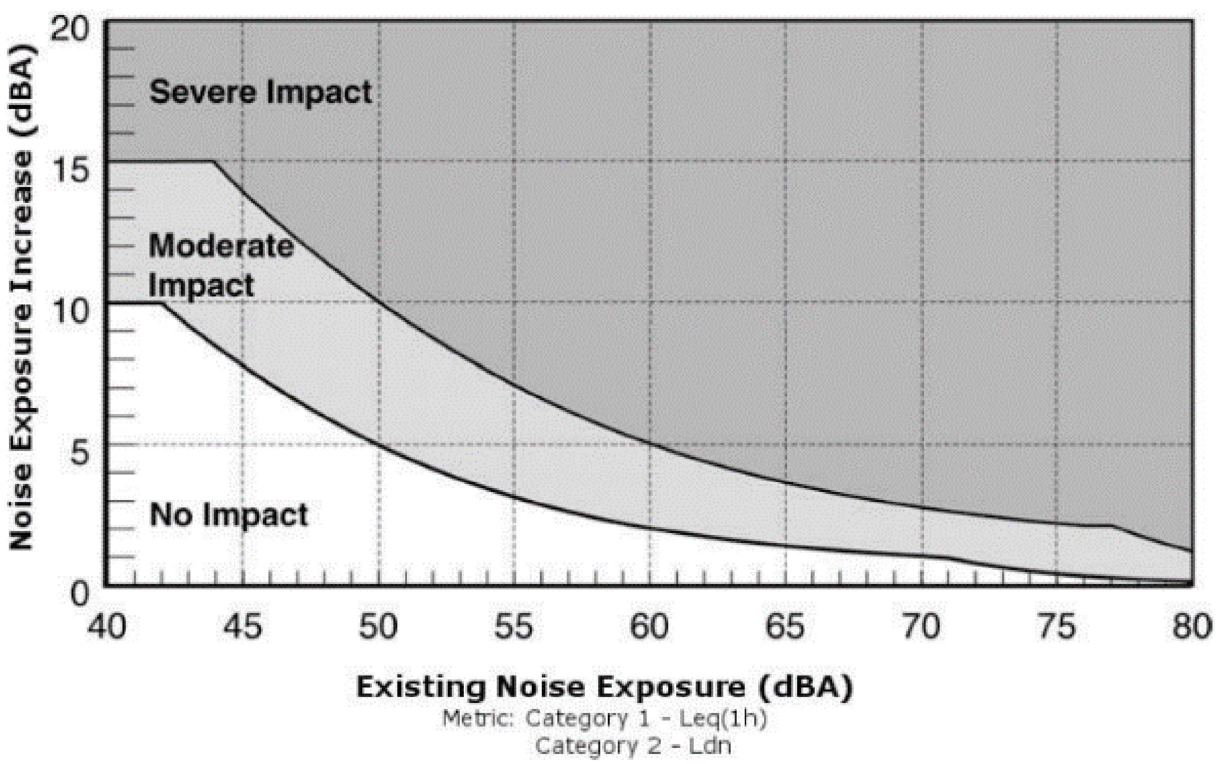
- **Noise Category 1** – Tracts of land where quiet is an essential element in their intended purpose, such as outdoor amphitheaters, concert pavilions, and national historic landmarks with significant outdoor use.
- **Noise Category 2** – Residences and buildings where people normally sleep, including homes, hospitals, and hotels.
- **Noise Category 3** – Institutional land uses (i.e., schools, places of worship, libraries) with use typically during the daytime and evening. Other uses in this category can include medical offices, conference rooms, recording studios, concert halls, cemeteries, monuments, museums, historical sites, parks, and recreational facilities.

The three categories are determined from general land use information about each receiver. No Category 1 receivers are located within 1 mile of the Project alignment, which is well beyond the typical FTA screening distance for noise or vibration impacts. Outdoor hourly L_{dn} applies to Category 2, whereas outdoor L_{eq} applies to Category 3.

Noise impacts on Category 2 and Category 3 land uses as a result of a project are assessed by comparing existing and future project-related outdoor noise levels. Figure 3-1 and Figure 3-2 illustrate the FTA noise impact criteria as they relate to each land use category. The criterion for each degree of impact is based on a sliding scale dependent on the existing noise exposure and the increase in noise exposure attributable to the project. Figure 3-1 and Figure 3-2 illustrate the cumulative noise impact criteria to be used on the Project. Based on FTA criteria, potential noise impacts fall into three types: no impact, moderate impact, and severe impact (FTA 2018). The impact categories are described further below:

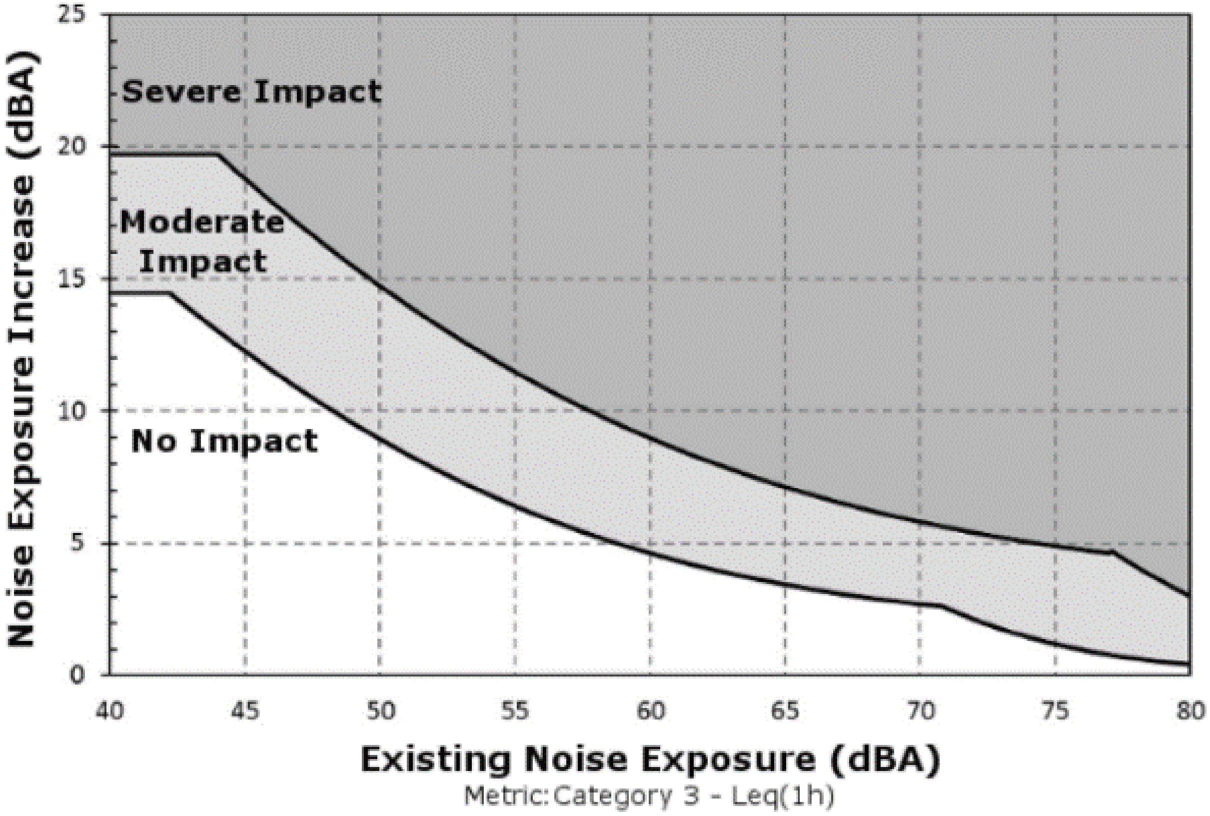
- **No impact** – A project on average would result in an insignificant increase in the number of instances where people are highly annoyed by new noise. This impact level would not require mitigation.
- **Moderate impact** – The change in cumulative noise is noticeable to most people but may not be enough to cause strong, adverse community reactions. The FTA manual indicates mitigation for this impact level should be considered but is not required.
- **Severe impact** – A significant percentage of people would be highly annoyed by the noise, possibly resulting in a strong, negative community reaction. The FTA manual indicates mitigation for this impact level is required.

Figure 3-1. Federal Transit Administration Cumulative Noise Levels Allowed by Criteria Category 2 Land Use



Source: FTA 2018

Figure 3-2. Federal Transit Administration Cumulative Noise Levels Allowed by Criteria Category 3 Land Use



Source: FTA 2018

The FTA manual contains tables listing suggested construction noise impact criteria depending upon the level of detail/understanding of the construction phase (FTA 2018). For the more detailed approach applicable to the Project, the FTA's guidelines for assessment of construction noise shown in Table 3-2 are suggested for use due to different noise levels for daytime and nighttime construction. Daytime is defined as 7:00 a.m. to 10:00 p.m., and nighttime is defined as 10:00 p.m. to 7:00 a.m.

Table 3-1. Prescriptive Federal Transit Administration Construction Noise Assessment Guidelines

Land Use	8-Hour L_{eq} (dBA)		30-Day Average L_{dn} (dBA)
	Day	Night	
Residential	80	70	75[a]
Commercial	85	85	80[b]
Industrial	90	90	85[b]

Source: FTA 2018

Notes:

[a] In urban areas with very high ambient noise levels (L_{dn} greater than 65 dB), L_{dn} from construction operations should not exceed existing ambient + 10 dB.

[b] 24-hour L_{eq}, not L_{dn}

dB=decibel; dBA=A-weighted decibel; L_{eq}=equivalent noise level; L_{dn}=day-night average sound level

3.1.2 State Regulations

At the state level, the California Noise Control Act was enacted in 1973 (Health and Safety Code Section 46010, et seq.). It allows the Department of Health Services' Office of Noise Control to offer assistance to local communities that are developing local noise control programs and work with the Office of Planning and Research to provide guidance for the preparation of the required noise elements in city and county general plans, pursuant to Government Code Section 65302(f).

The California Environmental Quality Act (CEQA; Public Resources Code, section 21000, et seq.) is a state statute passed in 1970. CEQA requires state and local agencies to identify the significant environmental impacts of their actions, including potential impacts from noise and vibration, and avoid or mitigate those impacts when feasible.

The State of California has established land use compatibility criteria that provide guidance on the compatibility of different types of land uses based upon the existing community noise level. These guidelines are often adopted by city and county agencies for land use planning purposes. The State of California has not adopted specific noise criteria that are applicable to rail projects; therefore, the noise impact assessment is based on the guidelines provided by FTA.

3.1.3 Local Regulations

The Project would be in the City of San Luis Obispo, which has regulations that pertain to construction noise; however, the City does not have authority to regulate noise from railroads. Specifically, the City controls construction noise via Chapter 9.2 of its Code of Ordinances (City of San Luis Obispo 2010). This ordinance would allow the Project to be constructed between the hours of 7:00 a.m. and 7:00 p.m. so long as it does not exceed 66 A-weighted decibels (dBA) hourly equivalent sound level (L_{eq}) at single-family residences and 65 dBA L_{eq} at multi-family residences. An exemption would be needed with the City if the Project is required to construct outside of this time period or if exceeding these thresholds is unavoidable. The City's Code does provide an exemption for federally or state mandated projects, of which the Project qualifies since it operates under the authority of the state. In lieu of applicable local regulations, the Project would have an impact if it exceeds the FTA guidelines (see Table 3-1).

3.2 Vibration

3.2.1 Federal Regulations

The evaluation of vibration-impact levels, stated as vibration decibels (VdB), is based on the land use category and the number of vibration events per day. The impact level also depends on the type of analysis being conducted (i.e., ground-borne vibration or ground-borne noise).

The FTA manual provides guidelines to assess human response to different levels of ground-borne noise and vibration, as shown in Table 3-2. There are no Category 1 land uses considered within screening distance (Section 4.3) of the Project. All of vibration-sensitive land uses in the Project study area are Category 2 land uses. Frequent events are defined as more than 70 vibration events per day, while occasional events are defined as between 30 and 70 vibration events per day. Infrequent events are defined as being fewer than 30 events per day.

For areas where there are vibration events, such as those along existing shared railroad corridors, FTA defines a corridor as being heavily used if there are more than 12 trains per day, moderately used if there are 5 to 12 trains per day, and infrequently used if there are less than 5 trains per day. The Project rail corridor would be classified as being infrequently used. For these conditions, an impact would occur if Project operational vibration levels were to exceed the thresholds provided in Table 3-2 with the addition of the Project. For areas that already exceed the FTA criteria the FTA has identified that a potential impact would occur if the Project-related vibration levels resulted in an increase of 3 VdB or more.

Ground-borne noise is normally not a consideration when trains are at grade (i.e., not underground or where there are basements or human activity in spaces underground). In these situations, the air-borne noise is the major consideration. Ground-borne noise generally becomes an important consideration for subways or other projects in which part of the alignment includes a tunnel.

FTA construction-related vibration guidelines call for an investigation of the potential for vibration-induced damage to fragile or extremely fragile buildings (FTA 2018). Damage to a building is possible (but not necessarily probable) if ground-vibration levels exceed the following criteria:

- Exceeds 0.20-inch-per-second peak particle velocity (PPV; approximately 100 VdB) for fragile buildings
- Exceeds 0.12-inch-per-second PPV (approximately 95 VdB) for extremely fragile buildings

No fragile or extremely fragile buildings are located within screening distance (Section 4.4) of the Project study area. Table 3-2 presents the ground-borne vibration and noise impact criteria.

Construction vibration is assessed based on the potential for damage and the likelihood of annoyance. FTA indicates engineered concrete and masonry structures have damage criteria of 0.3 PPV (inches per second). To assess the potential for construction-vibration annoyance, the same vibration thresholds as those identified in Table 3-2 for operational vibration are applied.

Table 3-2. Ground-borne Vibration and Noise Impact Criteria

Land Use Category	Ground-borne Vibration Impact Levels (VdB re 1 micro inch/second)			Ground-borne Noise Impact Levels (dB re 20 micropascals)		
	Frequent Events[a]	Occasional Events[b]	Infrequent Events[c]	Frequent Events[a]	Occasional Events[b]	Infrequent Events[c]
Category 1: Buildings where vibration would interfere with interior operations	65 VdB[c]	65 VdB[c]	65 VdB[c]	—[d]	—[d]	—[d]
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

Source: FTA 2018

Notes:

[a] Frequent events is defined as more than 70 vibration events per day.

[b] Occasional events is defined as between 30 and 70 vibration events of the same source per day.

[c] Infrequent events is defined as fewer than 30 vibration events per day.

[d] 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. Vibration-sensitive equipment is not sensitive to ground-borne noise.

dB=decibel; dBA=A-weighted decibel; VdB=vibration decibels

3.2.2 State Regulations

Ground-borne vibration criteria pursuant to CEQA are provided in Section 6.

3.2.3 Local Regulations

The City of San Luis Obispo does not identify vibration standards or thresholds in their municipal code or other ordinances.

4 Approach

This section describes the overall approach to preparing the noise and vibration analysis for construction and operation. The approach includes acoustic terminology description; vibration terminology description; and methods for assessing operational noise sources, operational vibration, construction noise, and construction vibration.

FTA*'s Transit Noise and Vibration Impact Assessment* (FTA 2018) was followed to evaluate the environmental impacts of the Project. Noise and vibration impacts were assessed using procedures followed by the FTA for regional/intercity rail improvements because FRA defers to FTA procedures for this type of evaluation.

4.1 Acoustic Terminology

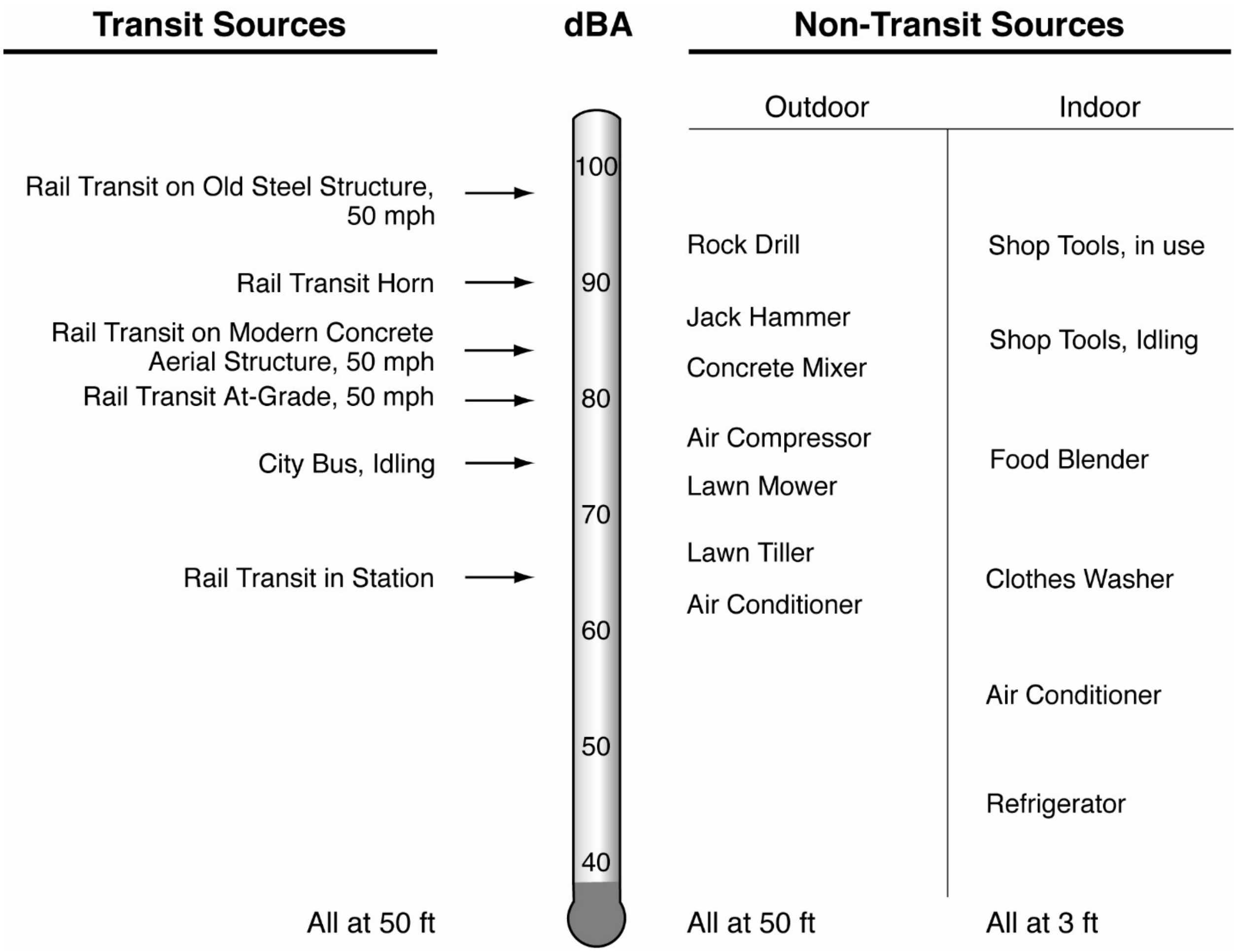
Noise levels are presented on a logarithmic scale to account for the large pressure response range of the human ear. This logarithmic scale is expressed in units of dB. A dB is defined as the ratio between a measured value and a reference value, usually corresponding to the lower threshold of human hearing. The lower threshold of human hearing is defined as 20 micropascals. Typically, a noise analysis examines 11 octave (or 33 1/3 octave) bands ranging from 16 hertz (low) to 16,000 hertz (high). This octave band encompasses the human audible frequency range. Because the human ear does not perceive every frequency with equal loudness, spectrally varying sounds are often adjusted with a weighting filter. The A-weighted filter is applied to compensate for the frequency response of the human auditory system, known as a dBA.

An inherent property of the logarithmic dB scale is that the sound pressure levels of two separate sources are not directly additive. For example, if a sound of 50 dBA is added to another sound of 50 dBA in the proximity, the result is a 3-dB increase, which is a total of 53 dBA and not an arithmetic doubling to 100 dBA. The human ear perceives changes in sound-pressure level relative to changes in loudness. Scientific research demonstrates the following general relationships between sound level and human perception for two sound levels with the same or very similar frequency characteristics:

- One dBA is the practical limit of accuracy for sound measurement systems and corresponds to an approximate 10 percent variation in the sound pressure level. A 1-dBA increase or decrease is a nonperceptible change in sound.
- A 3-dBA increase or decrease is a doubling (or halving) of acoustic pressure level, and it corresponds to the threshold of change in loudness perceptible in a laboratory environment. In practice, the average person is not able to distinguish a 3-dBA difference in environmental sound outdoors.
- A 5-dBA increase or decrease is described as a perceptible change in sound level and is a discernible change in an outdoor environment.
- A 10-dBA increase or decrease is a tenfold increase or decrease in acoustic pressure level but is perceived as a doubling or halving in loudness (e.g., the average person would judge a 10-dBA change in sound level to be twice or half as loud).

Figure 4-1 depicts the estimations of common noise sources and outdoor acoustic environments. It provides a comparison of relative loudness for each of these sources.

Figure 4-1. Relative Loudness



Source:* *FTA 2018

Noise levels can be measured, modeled, and presented in various formats. The noise metrics that were employed in this analysis have the following definitions:

- ***L_{eq}:*** Conventionally expressed in dBA, the L_{eq} is the energy-averaged, A-weighted sound level over a specified time period. It is defined as the steady, continuous sound level over a specified time, which has the same acoustic energy as the actual varying sound levels over the specified period. The daytime L_{eq} is the energy averaged sound level for the daytime period (7:00 a.m. to 10:00 p.m.), and the nighttime L_{eq} is the energy averaged sound level for the nighttime period (10:00 p.m. to 7:00 a.m.).
- ***L_{dn}:*** The L_{dn} is the average, hourly A-weighted L_{eq} for a 24-hour period, with a 10-dB penalty added to sound levels occurring during the nighttime hours (10:00 p.m. to 7:00 a.m.) to account for individuals' increased sensitivity to noise levels during nighttime hours.

- ***Community noise equivalent level:*** Community noise equivalent level is another average A-weighted L_{eq} sound level measured over a 24-hour period; however, this noise scale is adjusted to account for some individuals' increased sensitivity to noise levels during the evening and nighttime hours. A community noise equivalent level noise measurement is obtained after adding 5 dB to sound levels occurring during evening hours (7:00 p.m. to 10:00 p.m.) and 10 dB to noise levels occurring during nighttime hours (10:00 p.m. to 7:00 a.m.).

4.2 Vibration Terminology

As noted in the FTA's *Noise and Vibration Impact Assessment* (FTA 2018), both train operation and construction activities can be a source of ground-borne vibration. During the construction phase, activities such as driving piles and operating heavy equipment may cause ground-borne vibration. Due to the weight of train equipment, the operation of trains can also cause ground-borne vibration. Vibration is an oscillatory motion, which can be described in terms of displacement, velocity, or acceleration. Velocity or acceleration is typically used to describe vibration. The following two descriptors are frequently used when discussing quantification of vibration:

- ***PPV:*** the maximum instantaneous positive or negative peak of the vibration signal
- ***Root mean square (rms)***: the square root of the average of the squared amplitude of the vibration signal, which is typically calculated over a 1-second period
- ***VdB***: vibration decibels are used to compress the range of rms values

4.3 Methods for Assessing Operational Noise Sources

4.3.1 Rail Noise

The steps described in FTA's *Transit Noise and Vibration Impact Assessment Manual* (FTA 2018) were followed to evaluate the potential noise and vibration impacts of the Project. FTA methodology identifies a noise screening procedure, a general noise assessment, and a detailed noise assessment, which are outlined below.

- **Noise Screening Procedure** – Following the FTA noise screening procedure, the Project type was identified (e.g., rail yard and shops). The Project-to-receiver screening distance is provided in the manual for this Project. Adjustments to the generic screening distances are made to suit a particular project using the methodology in Section 5 of the FTA manual (FTA 2018). For the Project, the Project-to-receiver screening distance identified is associated with the yard and shop activities. FTA indicated that the potential for noise impacts beyond 650 feet is minimal (FTA 2018). Receivers outside of this distance do not require further noise analysis. Receivers within the screening distance are carried forward for either the general noise assessment or detailed noise assessment. In this case, the Project was evaluated using the detailed noise assessment methods.
- **Detailed Noise Assessment** – Following FTA's detailed noise assessment methodology, the noise impacts associated with the Project were quantified through an in-depth analysis. The methodologies outlined in Section 4.5 of the FTA manual (FTA 2018) were used to calculate the noise levels attributable to train operation on the rail alignment under the existing, future-no-project, and future-with-project scenarios (Project-related contribution). Receivers of

interest (i.e., noise-sensitive receptors) were selected using the guidance provided in Section 4.5 of the FTA manual.

The Project would be built in two phases as described in Section 2, Project Description. During the first phase, operational noise would be associated with idling trains and train movements into and out of the layover facility. The second phase would include new sound sources from the train wash and wheel truing facility. The noise modeling effort associated with the detailed noise assessment accounted for the construction fleet and duration to construct the Project, as well as the number of train movements anticipated to pass through the yard, idle, and use the train wash during daytime and nighttime hours throughout operation. For construction-related impacts, the anticipated construction equipment mix and phases were used to identify potential impacts. The following assumptions were made as part of the operational detailed noise assessment.

<u>Phase 1 Assumptions</u>

- The typical train speed in the yard is 10 miles per hour with the speed of trains through the wash 5 miles per hour.
- Future train movements and consists (e.g., the number of locomotives and cars per train movement) is one locomotive and seven passenger cars for the Pacific Surfliner Train.
- Locomotive horn use was not included in the assessment since there are no at-grade train crossings.
- The future noise exposure would be the combination of the existing noise exposure and the additional Project-related noise exposure.
    - Train movement volumes are projected to increase in the future, with a total of two trains accessing the CCLF daily. These train movements are incorporated into the noise modeling and the Project levels are logarithmically added to the existing levels, then the difference between the cumulative with Project conditions is compared with the existing levels to identify impact conditions.
- Locomotives would idle for up to 15-minutes prior to being tethered to ground power or while preparing to depart the CCLF.
- Source levels for the idling locomotives were based off of measurements conducted of the Pacific Surfliner locomotive using the existing layover facility.
- Special trackwork include an addition of 5 dB per the FTA Manual.

<u>Later Phases Assumptions</u>

- Includes all of the Phase 1 assumptions except there would be up to four trains accessing the CCLF rather than two.
- Trains would access the storage tracks according to the following approach to reduce community noise levels.
    - The first train of each day accessing the CCLF would use the easternmost storage track and would not use the train wash. Having the train stored on this track acts as a noise barrier reducing sound levels at sensitive land uses east of the storage facility.

  - The second train of each day accessing the CCLF would use the westernmost storage track (i.e., next to the service and inspection track) and would not use the train wash. Having the train stored on this track acts as a noise barrier reducing sound levels at sensitive land uses west of the storage facility.
  - The third train each day accessing the CCLF will go through the wash and then access the storage tracks between the easternmost and westernmost storage tracks.
  - The fourth train each day accessing the CCLF will go through the wash and then layover on the service and inspection track.
- Wash facility is included with the portals assumed to have a sound level of 74 dBA Leq (Sound Transit 2015).
- The wash facility would operate only during daytime hours.
- Wheel truing machine is expected to not exceed 85 dBA Leq for a 4 hour period to keep from potentially harming workers hearing per Occupational Safety and Health Administration. Additionally, the wheel truing machine would be located in a building to provide additional attenuation.
  - The wheel truing facility would be used infrequently for around 4 hours per day and 5 days per month.

Appendix A provides the noise model input detail for the operational rail noise analysis.

4.3.2 Three-Dimensional Predictive Model

Operational sound levels can be assessed using the FTA spreadsheet models; however, efficiencies can be gained by implementing off-the-shelf acoustic modeling software that implements the calculation methods of the FTA spreadsheets. For this assessment, the three-dimensional off-the-shelf predictive model (i.e., SoundPLAN) was used to calculate rail noise levels implementing the FTA methods for regional/intercity rail. This modeling program conforms to the FTA standard for rail noise sources. The SoundPLAN model includes an array of data inputs, such as sound sources, topography, buildings, and ground characteristics, such as paved areas and vegetated areas. The following steps were taken to implement the FTA standard for rail noise sources in SoundPLAN:

- Each train configuration and the number of train movements on a given track location were entered into SoundPLAN.
- Each source term was applied to specific rail lines based on estimates of train volumes.
- Modeling included terrain contours to capture terrain changes.
- Buildings were modeled as three-dimensional shapes to capture attenuation impacts.
- Ground type is assumed to be hard ground (i.e., acoustically reflective).

Operational noise levels were compared with the relevant noise impact criteria identified in Section 3.1. Noise levels associated with special track work, such as crossovers, were also included in this assessment for sensitive receptors.

4.3.3 Wheel/Rail Noise

There are no tight radius curves in the Project study area; therefore, wheel squeal is not a factor requiring consideration in the analysis.

4.3.4 Traffic Noise

Based on anticipated low trip generation during construction, no modeling of vehicular traffic noise during construction was undertaken as part of this analysis.

4.4 Operational Vibration

The FTA procedures for a general operational vibration assessment (as outlined in Section 6 of the FTA manual) were used for this analysis (FTA 2018). The FTA assessment procedure requires the following data:

- **Number of daily vibration events** – The number of daily events was classified as infrequent because there would be less than 30 vibration events of the same kind per day.
- **Receiver land use designation (categories specified above)** – Category 2 (for the residences) and no Category 1 or 3 land uses are present.
- **Vibration source levels** – The source levels were derived from Figure 6-4 of the FTA manual using the curve for locomotive-powered passenger or freight.
- **Distance from source to receiver (building) footprints** – The distance between the source (i.e., rail centerline) and the receiver was measured using a geographic information system.
- **Train speed, suspension, wheel condition (worn or flat-spots), and track condition** – Train speed estimates would be the same for vibration as stated for noise and the train's wheels were assumed to be in good condition (i.e., no flat spots).
- **Soil characteristics of ground between the vibration source and receiver** – Soil propagation characteristics were assumed to be normal (rather than efficient).
- **Receiver construction/foundation type and description, including whether it is fragile or extremely fragile** – Using the generalized ground surface vibration curve, the root mean square velocity level data at the receiver distance of interest were adjusted based on the factors affecting the source, factors affecting the vibration path, and factors affecting the receiver. Structure types and associated adjustments were also obtained from the FTA manual.

The potential for damage to adjacent sensitive resources because of Project-related operational vibration was analyzed in addition to the modeled noise- and vibration-sensitive receivers. Following FTA methodology, the potential for vibration damage and annoyance was assessed at sensitive land uses.

4.5 Construction Noise

Noise from construction activity is generated by the broad array of powered, noise-producing mechanical equipment used in the construction process. Examples of equipment used in the construction effort include hand-held pneumatic tools to excavators, loaders, a variety of trucks, and tie and rail handling equipment. To assess potential noise impacts from construction, this noise analysis used the methodology in Section 7 of the FTA manual (FTA 2018).

The noise exposure at a receiver location was calculated from the dB addition of all operating construction equipment using the equations and methodology described in the FTA manual (FTA 2018). For example, the attenuation rate used as a point source was 6 dB per doubling of distance. The intervening ground was assumed to be hard-surfaced; therefore, any additional reduction from ground effects was negligible. Shielding effects from intervening structures were ignored.

Construction equipment used in the analysis included compressors, welding machines, mobile cranes, front end loaders, rollers, dozers, graders, and excavators. The range in noise levels typically generated by the equipment assumed for the analysis ranges from 67 dBA L_{eq} (e.g., compressor) to 92 dBA L_{eq} (e.g., dump truck) at a distance of 50 feet, based on source levels from the Federal Highway Administration Roadway Construction Noise Model, Version 2.0 (Table 4-1). The equation (Eq. 7-1) from the FTA manual (FTA 2018) is provided below:

$$L_{eq.equip} = L_{emission} + 10\log(Adj_{Usage}) - 20\log(\frac{D}{50}) - 10G\log(\frac{D}{50}) \qquad \textbf{Eq. 7-1}$$

where:

$L_{eq,equip}$ = $L_{eq(t)}$ at a receiver from the operation of a single piece of equipment over a specified time period, dBA

$L_{emission}$ = noise emission level of the particular piece of equipment at the reference distance of 50 ft, dBA

Adj_{Usage} = usage factor to account for the fraction of time that the equipment is in use over the specified time period

D = distance from the receiver to the piece of equipment, ft

G = a constant that accounts for topography and ground effects

Ground effects were ignored in the analysis with an assumption made that propagation of construction noise occurs over flat terrain without intervening buildings providing attenuation. This assumption was made to be conservative.

Table 4-1. Typical Construction Equipment Noise Levels

Equipment/Source	Load Factor (%)	dBA L_{max} at 50 Feet
Dump Truck	40	92
Compactor	20	82
Concrete Truck	20	88
Crane	16	76
Excavator	40	87
Sawcutting	40	76
Front end loader	40	81
Dozer	40	86
Skid steer loader	20	73
Water Truck	20	72
Backhoe	40	84
Flatbed Truck	40	74
Grader	40	78
Telehandler/Forklift	20	88
Compactor/Smooth Drum Roller	20	82
Paver	50	82
Welding Truck	40	72
Section Truck	40	74
Manlift	20	73
Other miscellaneous construction equipment	40	74

Source: Federal Highway Administration 2019
Notes:
dBA=A-weighted decibel; L_{max}=maximum sound level

4.6 Construction Vibration

To assess potential vibration impacts from construction, this analysis used the methodology contained in Section 7.2 of the FTA manual (FTA 2018). The potential for damage to structures from Project-related construction vibration was analyzed for the sensitive receivers discussed above. Vibration source levels for a variety of typical construction equipment types are outlined in Table 7-4 of the FTA manual (reproduced in this report as Table 4-2) in terms of PPV in inches per second at a reference distance of 25 feet from the source and VdB at 25 feet (FTA 2018). For this analysis, the source of typical vibration levels for a vibratory roller (0.210 inch per second PPV) and a large bulldozer (0.089 inch per second PPV) was utilized. The equation (Equation 7-2 from the FTA Manual) used to calculate vibration levels is provided below.

$$PPV_{equip} = PPV_{ref} \times (\frac{25}{D})^{1.5} \qquad \textbf{Eq. 7-2}$$

where:

PPV_{equip} = the peak particle velocity of the equipment adjusted for distance, in/sec

PPV_{ref} = the source reference vibration level at 25 ft, in/sec

D = distance from the equipment to the receiver, ft

Table 4-2. Typical Construction Equipment Vibration Levels

Equipment/Source		PPV at 25 Feet (inch/second)	Approximate Vibration Velocity Level at 25 Feet[a]
Vibratory roller	—	0.210	94
Large bulldozer	—	0.089	87
Loaded Truck	—	0.076	86

Source: FTA 2018

Notes:

[a] Root mean square VdB reference 1 microinch per second

PPV=peak particle velocity; VdB=vibration decibels

5 Existing Conditions

Noise and vibration measurements were conducted to document existing conditions.

5.1 Noise Measurements

Noise measurements were conducted to identify existing sound levels throughout the analysis area and establish FTA impact thresholds. Table 5-1 provides the measured existing noise levels within the Project study area. Multiple residences are within the noise analysis study area (i.e., the screening distance of 650 feet). Due to the Project schedule, sound-level measurements occurred during COVID-19 pandemic conditions. To reduce the possibility of contracting or spreading the virus, measurements were completed from public ROWs that were representative of noise sensitive areas in the Project analysis area. Measurements at noise-sensitive land uses were taken on October 6 and 7, 2020. Appendix B provides the calibration sheets for the equipment used in the monitoring effort. Figure 5-1 is a map of the monitoring locations. The measured sound levels were assigned to each individual noise sensitive receptor analysis point and adjusted for distance from the dominant noise source such as the railroad corridor or major roadways. Attenuation effects from the presence of buildings were also included in the adjustments. These adjustments were completed following the procedures provided in the FTA manual.

Table 5-1. Existing Noise Levels

Site Identification	Location	Noise Levels (dBA)	
		L_{dn}	L_{eq} (peak hour)
ML-1	2220 Emily Street (apartment building)	52	56
ML-2	881 Francis Ave (single-family home)	48	56
ML-3	2125 Rachel Street (single-family home)	48	53
ML-4	1011 San Carlos Dr (single-family home)	52	62
ML-5	SLO Railroad Safety Trailhead at the southern end of Boulevard Del Campo	42	47

Notes:
dBA=A-weighted decibel; L_{dn}=day-night average sound level; L_{eq}=equivalent noise level; ROW=right-of-way

Figure 5-1. Noise and Vibration Measurement Locations

5.1.1 Monitoring Location – 1

Monitoring location 1 (ML-1) was located east of the southernmost building in the Roundhouse Place Apartments along the railroad right-of-way fence line, see Figure 5-1. The measurement was completed using Option 2 from the FTA Manual, which included deploying a noise monitor for at least 24-hours, and in this case, left out unattended. Monitoring began on October 6, 2020 and ended on October 7, 2020. A Brüel and Kjær 2270 meter was calibrated before and after the measurement to ensure that it operated within tolerances. The microphone was affixed to a tripod and positioned at a height of approximately 5 feet above the ground. Several observed sounds could be heard, including train wheels as they operate on the track, train bells, and roadway traffic noise. Secondary observed sound sources included periodic sounds of bird chirping. Figure 5-1 and Figure 5-2 are pictures of ML-1. The results of monitoring at the ML-1 were 52 dBA Ldn and 56 dBA Leq (peak daytime hour).

Figure 5-2. Monitoring Location 1 – Noise Meter Location

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Figure 5-3. Monitoring Location 1 – Noise Meter Location

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5.1.2 Monitoring Location – 2

Monitoring location 2 (ML-2) was completed at the end of Francis Avenue, near a residence at 881 Francis Avenue, at approximately the same distance from the tracks as the residence, see Figure 5-1. The measurement was completed using Option 3 which involves conducting three 1-hour measurements during peak hour (roadway traffic noise peak), midday (off-peak), and late night (12:00 a.m. to 4:00 a.m.) from the FTA Manual. Measurements were completed on October 6, 2020 and October 7, 2020. A Brüel and Kjær 2245 meter was calibrated before and after the measurement to ensure that it operated within tolerances. The sound-level meter was affixed to a tripod with the microphone positioned at a height of approximately 5 feet above the ground (Figure 5-3 and Figure 5-4). Several observed sounds could be heard, including rolling trains, train bells, and their wheels on the track. Secondary sources of noise included roadway traffic and occasional birds. The results of the measurement effort were 48 dBA Ldn and 56 dBA Leq (daytime peak).

Figure 5-4. Monitoring Location 2 – Noise Meter Location

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Figure 5-5. Monitoring Location 2 – Noise Meter Location

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5.1.3 Monitoring Location – 3

Monitoring location 3 (ML-3) was located northeast of the SLO Safety Trail and southwest of a home located 2125 Rachel Street along the trail right-of-way, see Figure 5-1. The measurement was completed using Option 2 from the FTA Manual, which included deploying a noise monitor for at least 24-hours, and in this case, left out unattended. Monitoring began on October 6, 2020 and ended on October 7, 2020. A Brüel and Kjær 2270 meter was calibrated before and after the measurement to ensure that it operated within tolerances. The microphone was affixed to a tripod and positioned at a height of approximately 5 feet above the ground. Several observed sounds could be heard, including train wheels as they operate on the track, train bells, local roadway traffic noise. Secondary observed sound sources included periodic sounds of bird chirping. Figure 5-6 and Figure 5-7 are pictures of ML-3. The results of the measurement effort were 48 dBA Ldn and 53 dBA Leq (daytime peak hour).

Figure 5-6. Monitoring Location 3 – Noise Meter Location

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Figure 5-7. Monitoring Location 3 – Noise Meter Location

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5.1.4 Monitoring Location – 4

Monitoring location 4 (ML-4) was completed at a residence near the intersection of Bushnell Street and San Carlos Drive, at approximately the same distance from the tracks as the residence, see Figure 5-1. The measurement was completed using Option 3 from the FTA Manual. Measurements were completed on October 6, 2020 and October 7, 2020. A Brüel and Kjær 2245 meter was calibrated before and after the measurement to ensure that it operated within tolerances. The sound-level meter was affixed to a tripod with the microphone positioned at a height of approximately 5 feet above the ground (Figure 5-8 and Figure 5-9). Several observed sounds could be heard, including rolling trains, train bells, and their wheels on the track. Secondary sources of noise included roadway traffic and occasional birds. Results of the measurement effort were 52 dBA Ldn and 62 dBA Leq (daytime peak hour).

Figure 5-8. Monitoring Location 4 – Noise Meter Location

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Figure 5-9. Monitoring Location 4 – Noise Meter Location

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5.1.5 Monitoring Location – 5

Monitoring location 5 (ML-5) was completed at the trail head at the end of Boulevard Del Campo at a distance roughly the same as the residences located across from the trail head, see Figure 5-1. The measurement was completed using Option 3 from the FTA Manual. Measurements were completed on October 6, 2020 and October 7, 2020. A Brüel and Kjær 2245 meter was calibrated before and after the measurement to ensure that it operated within tolerances. The sound-level meter was affixed to a tripod with the microphone positioned at a height of approximately 5 feet above the ground (Figure 5-10 and Figure 5-11). Several observed sounds could be heard, including rolling trains, train bells, and their wheels on the track. Secondary sources of noise included roadway traffic and occasional birds. Results of the measurement effort were 42 dBA Ldn and 47 dBA Leq (daytime peak hour).

Figure 5-10. Monitoring Location 5 – Noise Meter Location

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Figure 5-11. Monitoring Location 5 – Noise Meter Location

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5.2 Vibration Measurements

Vibration measurements were completed to document vibration levels from existing train pass-by events. Measurements were completed with Brüel and Kjær 2270 data loggers paired with seismic accelerometers. Appendix B includes monitoring equipment calibration sheets. The measurement data was used to confirm that the locomotive curve in the FTA manual was appropriate for use in the analysis. An array of vibration sensors was set up near the noise monitoring location ML-1 on October 6, 2020, at distances of 63 feet, 88 feet, 188 feet, and 263 feet from the existing track. On October 7, 2020, the vibration array was redeployed at ML-4 at distances of 25 feet, 50 feet, 175 feet, and 223 feet. Table 5-2 provides the vibration measurement results. When normalized to 50 miles per hour the monitored levels are generally 2 VdB lower than the passenger train diesel locomotive curves in the FTA manual. Therefore, use of the locomotive curve in the FTA manual is considered conservative for assessing vibration impacts.

Table 5-2. Existing Vibration Levels

Location	Train Pass-by Event	Speed (miles per hour)	Distance from Existing Track (feet)	Measured VdB
ML-1	Amtrak Surfliner	15	63	70
			88	64
			188	61
			263	57
ML-4	Amtrak Surfliner	15	25	73
			50	68
			175	66
			223	62

Notes:
VdB=Vibration decibels

6 California Environmental Quality Act Thresholds of Significance

For the purposes of this noise and vibration study, the Project would have a significant impact on noise and vibration if:

A. Project construction and operation would generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.

B. Project construction and operation would generate excessive groundborne vibration or groundborne noise levels.

C. For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, the Project would expose people residing or working in the Project study area to excessive noise levels.

These thresholds of significance are considered in the noise and vibration impact assessment.

6.1 Issues Requiring No Further Consideration

Threshold C. The Project site is located approximately 1.60 miles north of the San Luis Obispo County Regional Airport. According to Figure 4-1: San Luis Obispo County Regional Airport Noise Contours of the San Luis Obispo County Regional Airport –Airport Land Use Plan, the Project site is not located within any airport noise impact contours (RS&H 2021). Therefore, the proposed Project would not expose residents or workers to excessive noise levels from airport or private air strip operations and no impact would occur. No further discussion is required.

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7 Noise- and Vibration-Sensitive Land Uses and Sensitive Receptors

The following discussion provides a description of the noise- and vibration-sensitive land uses where sensitive receptors (Category 2 and 3 land uses) in the Project study area occur. The receiver locations are used for predictions and either represent an individual sensitive receptor or a cluster of sensitive receptors, which is consistent with the FTA guidance and regulations. The noise analysis area includes those noise-sensitive areas within screening distance (1,000-feet unobstructed and 650-feet obstructed) of the Project. The 650-foot screening distance applies to the Project since existing first row buildings are present. Additionally, because vibration attenuates more quickly with distance, the vibration analysis area is substantially smaller; therefore, it includes only those vibration-sensitive land uses and structures within 200 feet of the Project.

Noise- and vibration-sensitive land uses include single-family and multi-family residential areas. No schools or other Category 3 (such as parks where passive use occurs) land uses are located within the analysis area.

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8 Environmental Impacts

8.1 Operational Noise

CRITERIA A	Generation of a substantial permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

8.1.1 Phase 1

The results of the rail noise impact assessment for Phase 1 are summarized in Table 8-1 and the locations are depicted on Figure 8-1. For the future Project conditions, the Project would introduce new sources of noise where there presently are none, specifically train movements on two tracks and idling locomotives. The new sources of noise would increase noise levels in the analysis area. As shown in Table 8-1, the Project is predicted to result in no severe impacts and moderate impacts at 35 Category 2 land uses (residences) in the absence of mitigation.

Table 8-1. Project Operational Noise Conditions

Impact Type	Number of Category 2 Land Use Impacts
Severe	0
Moderate	35*
No impact	*288*

*Note: * See Table 8-2 for the noise calculation results at moderately impacted receptors.*

Moderate impacts would occur throughout the neighborhood north of the proposed layover facility in part because of idling trains. The moderate impacts are considered significant in the absence of mitigation. Moderately impacted receptor noise levels are provided in Table 8-2. Section 9 identifies mitigation measures that would minimize and/or avoid these impacts. Detailed noise calculation results at all receptors are provided in Appendix C.

Table 8-2. Phase 1 Operational Noise Impacts

Receptor	Land Use Category	Units	Existing L_{dn}/L_{eq}	Impact Threshold		Proposed Project (L_{dn}/L_{eq})	Proposed Project Cumulative (L_{dn}/L_{eq})	Increase (dB)	Impact Category
				Moderate	Severe				
R43	2	1	47.5	6.3	11.9	54.3	55.1	7.6	Moderate
R44	2	1	47.5	6.3	11.9	54.5	55.3	7.8	Moderate
R51	2	1	47.0	6.6	12.3	55.5	56.1	9.1	Moderate
R52	2	1	46.9	6.6	12.3	56.4	56.9	10.0	Moderate
R53	2	1	46.8	6.7	12.4	56.9	57.3	10.5	Moderate
R54	2	1	46.6	6.8	12.6	56.7	57.1	10.5	Moderate
R55	2	1	46.5	6.9	12.7	57.8	58.1	11.6	Moderate
R56	2	1	46.3	7.0	12.8	57.3	57.6	11.3	Moderate
R57	2	1	46.2	7.0	12.9	57.5	57.8	11.6	Moderate
R65	2	1	45.7	7.3	13.3	54.7	55.2	9.5	Moderate
R107	2	1	51.2	4.5	9.3	54.7	56.3	5.1	Moderate
R176	2	21	52.2	4.1	8.6	57.1	58.3	6.1	Moderate
R198	2	1	46.2	7.0	12.9	56.4	56.8	10.6	Moderate
R200	2	1	46.2	7.0	12.9	57.4	57.7	11.5	Moderate
R201	2	1	46.2	7.0	12.9	57.2	57.5	11.3	Moderate
TOTAL	--	**35**	--	--	--	--	--	--	--

8.1.2 Later Phases

The results of the rail noise impact assessment for the Later Phases condition are summarized in Table 8-3 and the locations are depicted on Figure 8-2. For the future Project conditions, the Project would introduce new sources of noise where there presently are none, specifically train movements, idling locomotives, the train wash and wheel truing facility. The wheel truing facility and the train wash would not be present in Phase 1, nor would the building that house these components of the CCLF. The new sources of noise would increase noise levels in the analysis area. As shown in Table 8-3, the Project is predicted to result in no severe impacts and moderate impacts at 44 Category 2 land uses (residences) in the absence of mitigation.

Table 8-3. Later Phases - Project Operational Noise Conditions

Impact Type	Number of Category 2 Land Use Impacts
Severe	0
Moderate	44*
No impact	279

*Note: * See* Table 8-4 *for the noise calculation results at moderately impacted receptors.*

The moderate impacts are predicted at single-family residences north of the Project and at a multi-family apartment building to the south. Moderate impacts would also occur throughout the neighborhood north of the proposed maintenance facility. The moderate impacts are considered significant in the absence of mitigation. Moderately impacted receptor noise levels are provided in Table 8-4. Section 9 identifies mitigation measures that would minimize and/or avoid these impacts. Detailed noise calculation results at all receptors are provided in Appendix C.

Table 8-4. Later Phases Operational Noise Impacts

Receptor	Land Use Category	Units	Existing L_{dn}/L_{eq}	Impact Threshold		Proposed Project (L_{dn}/L_{eq})	Proposed Project Cumulative (L_{dn}/L_{eq})	Increase (dB)	Impact Category
				Moderate	Severe				
R18	2	1	49.9	5.0	10.1	54.6	55.9	6.0	Moderate
R29	2	1	47.9	6.1	11.6	53.6	54.6	6.7	Moderate
R43	2	1	47.5	6.3	11.9	56.9	57.3	9.8	Moderate
R44	2	1	47.5	6.3	11.9	57.1	57.5	10.0	Moderate
R51	2	1	47.0	6.6	12.3	57.4	57.7	10.7	Moderate
R52	2	1	46.9	6.6	12.3	57.7	58.0	11.1	Moderate
R53	2	1	46.8	6.7	12.4	57.5	57.8	11.0	Moderate
R54	2	1	46.6	6.8	12.6	57.4	57.7	11.1	Moderate
R55	2	1	46.5	6.9	12.7	57.5	57.8	11.3	Moderate
R56	2	1	46.3	7.0	12.8	57.1	57.5	11.2	Moderate
R57	2	1	46.2	7.0	12.9	57.2	57.5	11.3	Moderate
R65	2	1	45.7	7.3	13.3	53.4	54.1	8.4	Moderate
R170	2	8	49.0	5.5	10.7	55.5	56.4	7.4	Moderate
R176	2	21	52.2	4.1	8.6	58.5	59.4	7.2	Moderate
R198	2	1	46.2	7.0	12.9	54.4	55.0	8.8	Moderate
R200	2	1	46.2	7.0	12.9	55.2	55.7	9.5	Moderate
R201	2	1	46.2	7.0	12.9	55.4	55.9	9.7	Moderate
TOTAL	--	**44**	--	--	--	--	--	--	--

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Figure 8-1. Noise- and Vibration-Sensitive Land Uses, Community Noise and Vibration Monitoring Locations, and Phase 1 Operational Noise Impacts

Note: Receptor 176 is a multi-family residential complex. Although only one yellow dot representing a moderate impact is shown in this graphic, this dot is intended to represent 21 residential units that would be moderately impacted in the multi-family residential complex.

Figure 8-2. Noise- and Vibration-Sensitive Land Uses, Community Noise and Vibration Monitoring Locations, and Later Phases Operational Noise Impacts

Note: Receptor 176 is a multi-family residential complex. Although only one yellow dot representing a moderate impact is shown in this graphic, this dot is intended to represent 21 residential units that would be moderately impacted in the multi-family residential complex. Receptor 170 is a multi-family residential complex. Although only one yellow dot representing a moderate impact is shown in this graphic, this dot is intended to represent 8 residential units that would be moderately impacted in the multi-family residential complex.

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8.2 Operational Vibration

CRITERION B	Exposure of persons to, or generation of, excessive ground-borne vibration or ground-borne noise levels during operations?

Vibration levels were predicted for operation of the Project. The Project corridor would be characterized as one that is infrequently used, per FTA. Project vibration levels are evaluated against the FTA criteria for infrequently used railroad lines (80 VdB). The analysis evaluated the Later Phases conditions because this has the highest potential for vibration impacts since trains would operate in closest proximity to sensitive structures.

Under the Later Phases operational scenario, no vibration impacts are predicted from the Project based on the vibration. Table 8-5 provides the predicted vibration levels for the sensitive areas with the highest predicted levels based on the proposed track configuration for the Project. As shown in Table 8-5, Project vibration would not exceed FTA's criteria.

Ground-borne noise levels are assumed to be 35 dB lower than ground-borne vibration levels analyzed per the FTA Manual for the Project. Applying this adjustment results in a maximum ground-borne noise level of 33 dBA, a level that is lower than the FTA impact criteria of 43 dBA. This demonstrates that there would be no ground-borne noise impacts from the Project.

Table 8-5. Operational Ground-borne Vibration and Noise Results

Receptor	FTA Category	Impact Threshold	Distance (feet)	Speed (mph)	VdB Base Curve	Speed Adjustment	Special Trackwork Adjustment	Building Adjustment	VdB Adjusted	Impact
R113	2	80	204	10	71	-14	0	-2	55	No Impact
R114	2	80	230	10	70	-14	0	-2	54	No Impact
R198	2	80	192	10	72	-14	0	-2	56	No Impact
R200	2	80	204	10	71	-14	0	-2	55	No Impact
R201	2	80	194	10	72	-14	0	-2	56	No Impact
R159	2	80	197	10	72	-14	0	-2	56	No Impact
R160	2	80	133	10	76	-14	5	-2	65	No Impact
R161	2	80	130	10	76	-14	0	-2	60	No Impact
R162	2	80	149	10	75	-14	0	-2	59	No Impact
R163	2	80	204	10	71	-14	0	-2	55	No Impact
R169	2	80	237	10	70	-14	0	-2	54	No Impact
R170	2	80	164	10	74	-14	5	-2	63	No Impact
R179	2	80	189	10	72	-14	5	-2	61	No Impact
R167	2	80	190	10	72	-14	0	-2	56	No Impact
R168	2	80	213	10	71	-14	0	-2	55	No Impact
R176	2	80	144	10	75	-14	0	-2	59	No Impact
R177	2	80	167	10	73	-14	5	-2	62	No Impact
R178	2	80	235	10	70	-14	0	-2	54	No Impact

8.3 Construction Noise

CRITERIA C	Generation of a substantial temporary increase in ambient noise levels in the vicinity of the Project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

Construction noise levels were predicted using each piece of equipment planned for each phase and subphase of construction. The maximum equipment noise levels (L_{max}) at 50 feet, obtained from the Federal Highway Administration's Roadway Construction Noise Model 2.0, were used in the predictions.

Project construction would be conducted during daytime hours. As stipulated in the City's code, LOSSAN and the Project are exempted from the City's code since it is a Project by a state-run agency. In the absence of numerical limits at the local level applicable to the Project, a construction noise impact would occur if construction noise exceeds the FTA guideline of 80 dBA L_{eq}. The 10 receptors with the highest predicted construction noise levels are provided in Table 8-6. The range of predicted construction noise levels are provided in Table 8-7. Exceedances of the FTA daytime guideline would occur at 3 receptors and would be significant absent mitigation. Construction noise mitigation is described in Section 9.2. Figure 8-3 is a map that shows where the construction noise impacts would be located.

Table 8-6. Construction Noise Results

Receptor	Distance to Construction (feet)	FTA Daytime Guideline (dBA Leq)	Highest Construction Noise Level (dBA Leq) any Phase	Impact (Yes/No)
R113	204	80	79	No
R159	197	80	79	No
R161	130	80	83	Yes
R163	204	80	79	No
R167	190	80	79	No
R170	164	80	81	Yes
R176	144	80	82	Yes
R177	167	80	80	No
R179	189	80	79	No
R198	192	80	79	No

Notes:
FTA=Federal Transit Administration; VdB=vibration decibels, PPV=peak particle velocity in inches per second

Figure 8-3. Noise- and Vibration-Sensitive Land Uses, Community Noise and Vibration Monitoring Locations, and Construction Noise Impacts Phase 1 or Later Phases

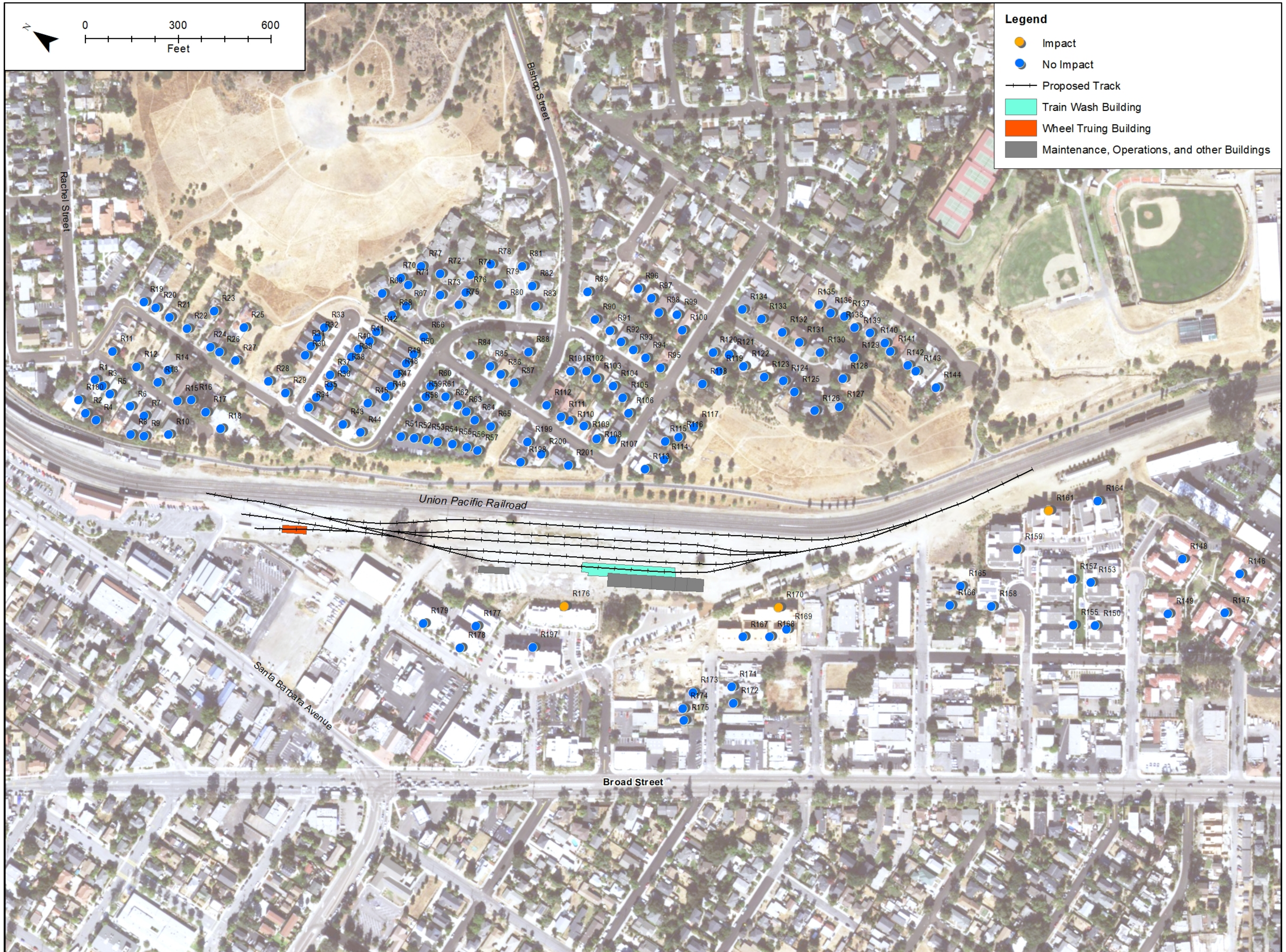

Table 8-7. Construction Noise Summary

Phase	Equipment	dBA Lmax at 50ft	Composite dBA Leq at 50ft	FTA Daytime Guideline Exceedances	Range of Sound Levels	Potential Impact Type
Phase 1						
Phase 1a Demolition and Rough Grading	Rubber Tire Front Loaders (972K or 988)	81	80	none	54 - 77	none
	Backhoe	84	80			
	CAT Scrapper	78	75			
	Water Truck	72	65			
	Dump Truck	73	72			
	Skid Steer Loader	73	66			
	Motor Grader (CAT 140)	78	75			
	Other Miscellaneous Construction Equipment and Labor (i.e. work trucks)	74	76			
Phase 1b Utility Relocations	Backhoe with Concrete Breaker	84	83	Daytime	59 - 81	none
	Sawcutting	76	75			
	Dump Truck	73	72			
	Rubber Tire Front Loaders (972K or 988)	81	80			
	Concrete Truck	88	87			
	Flatbed Material Delivery Trucks	74	77			
	Other Miscellaneous Construction Equipment and Labor (i.e. work trucks)	74	78			
Phase 1c West/East Landscape Buffer and Bike Path	Concrete Truck	88	84	none	55 - 77	none
	Motor Grader (CAT 140)	78	75			
	Compactor/Smooth Drum Roller	82	75			
	Skid Steer Loader	73	66			
	Dump Truck	73	69			
	Flatbed Material Delivery Truck	74	75			
	Water Truck	72	65			

Table 8-7. Construction Noise Summary

Phase	Equipment	dBA Lmax at 50ft	Composite dBA Leq at 50ft	FTA Daytime Guideline Exceedances	Range of Sound Levels	Potential Impact Type
	Other Miscellaneous Construction Equipment and Labor (i.e. work trucks)	74	76			
Phase 1d Access drive, yard paving and service roads	Concrete Truck	88	87	none	57 - 79	none
	Motor Grader (CAT 140)	78	75			
	Compactor/Smooth Drum Roller	82	75			
	Skid Steer Loader	73	66			
	Dump Truck	73	69			
	Water Truck	72	65			
	Other Construction Equipment	74	76			
Phase 1e Fencing	Backhoe	84	80	none	51 - 74	none
	Flatbed Material Delivery Truck	74	76			
	Other Miscellaneous Construction Equipment and Labor (i.e. work trucks)	74	73			
Phase 1f S&I Position, gage pit with Canopy	Rubber Tire Front Loaders (972K or 988)	81	77	Daytime	60 - 83	none
	Backhoe	84	80			
	Concrete Truck	88	90			
	Crane	76	68			
	Manlift	73	66			
	Telehandler/Forklift	88	81			
	Other Miscellaneous Construction Equipment and Labor (i.e. work trucks)	74	73			
Phase 1g Storage Track Approx 2,750 TF and 2 Turnouts	Tamper	73	66	none	55 - 77	none
	Regulator	82	78			
	Rubber Tire Front Loaders (972K or 988)	81	80			
	Backhoe	84	80			
	Welding Truck	72	68			

Table 8-7. Construction Noise Summary

Phase	Equipment	dBA Lmax at 50ft	Composite dBA Leq at 50ft	FTA Daytime Guideline Exceedances	Range of Sound Levels	Potential Impact Type
	Section Truck	74	70			
	Ballast Delivery Truck (aka dump truck)	73	69			
	Flatbed Material Delivery Truck	74	75			
	Other Miscellaneous Construction Equipment and Labor (i.e. work trucks)	74	76			
Phase 1h Exterior Parking and Driveway	Concrete Truck	88	84	none	56 - 79	none
	Motor Grader (CAT 140)	78	75			
	Compactor/Smooth Drum Roller	82	75			
	Skid Steer Loader	73	66			
	Asphalt Dump Truck	73	72			
	Asphalt Paver	82	79			
	Smooth Drum/Vibratory Roller	80	76			
	Dump Truck	73	74			
	Other Miscellaneous Construction Equipment and Labor (i.e. work trucks)	74	76			
Later Phases						
Phase a West/East Landscape Buffer and Bike Path	Concrete Truck	88	84	none	55 - 77	none
	Motor Grader (CAT 140)	78	75			
	Compactor/Smooth Drum Roller	82	75			
	Skid Steer Loader	73	66			
	Dump Truck	73	69			
	Flatbed Material Delivery Truck	74	75			
	Water Truck	72	65			
	Other Miscellaneous Construction Equipment and Labor (i.e. work trucks)	74	76			
Phase b	Concrete Truck	88	84	none	56 - 78	none
	Motor Grader (CAT 140)	78	75			

Table 8-7. Construction Noise Summary

Phase	Equipment	dBA Lmax at 50ft	Composite dBA Leq at 50ft	FTA Daytime Guideline Exceedances	Range of Sound Levels	Potential Impact Type
	Compactor/Smooth Drum Roller	82	75			
	Skid Steer Loader	73	66			
	Asphalt Dump Truck	73	72			
Exterior Parking and Driveway	Asphalt Paver	82	79			
	Smooth Drum/Vibratory Roller	80	73			
	Dump Truck	73	74			
	Other Miscellaneous Construction Equipment and Labor (i.e. work trucks)	74	76			
Phase c	Tamper	73	69	none	56 - 78	none
	Regulator	82	78			
	Rubber Tire Front Loaders (972K or 988)	81	82			
	Backhoe	84	80			
Track Construction Approx 5,500 TF and 10 Turnout	Welding Truck	72	68			
	Section Truck	74	70			
	Ballast Delivery Truck (aka dump truck)	73	69			
	Flatbed Material Delivery Truck	74	78			
	Other Miscellaneous Construction Equipment and Labor (i.e. work trucks)	74	76			
Phase d	Rubber Tire Front Loaders (972K or 988)	81	77	none	55 - 78	none
	Backhoe	84	80			
	Concrete Truck	88	81			
Operations Building	Crane	76	68			
	Manlift	73	66			
	Telehandler/Forklift	88	81			
	Other Miscellaneous Construction Equipment and Labor (i.e. work trucks)	74	73			

Table 8-7. Construction Noise Summary

Phase	Equipment	dBA Lmax at 50ft	Composite dBA Leq at 50ft	FTA Daytime Guideline Exceedances	Range of Sound Levels	Potential Impact Type
Phase e Fleet Maintenance Building	Rubber Tire Front Loaders (972K or 988)	81	77	none	55 - 78	none
	Backhoe	84	80			
	Concrete Truck	88	81			
	Crane	76	68			
	Manlift	73	66			
	Telehandler	88	81			
	Other Miscellaneous Construction Equipment and Labor (i.e. work trucks)	74	73			
Phase f Parts Store Room	Rubber Tire Front Loaders (972K or 988)	81	77	none	54 - 76	none
	Backhoe	84	80			
	Concrete Truck	88	81			
	Other Miscellaneous Construction Equipment and Labor (i.e. work trucks)	74	73			
Phase g MOW Shops Foundation/Pad	Rubber Tire Front Loaders (972K or 988)	81	77	none	54 - 76	none
	Backhoe	84	80			
	Concrete Truck	88	81			
	Crane	76	68			
	Other Miscellaneous Construction Equipment and Labor (i.e. work trucks)	74	73			
Phase h Train Wash Building	Rubber Tire Front Loaders (972K or 988)	81	77	none	54 - 76	none
	Backhoe	84	80			
	Concrete Truck	88	81			
	Crane	76	68			
	Other Miscellaneous Construction Equipment and Labor (i.e. work trucks)	74	73			
Phase i	Rubber Tire Front Loaders (972K or 988)	81	77	none	55 - 78	none

Table 8-7. Construction Noise Summary

Phase	Equipment	dBA Lmax at 50ft	Composite dBA Leq at 50ft	FTA Daytime Guideline Exceedances	Range of Sound Levels	Potential Impact Type
Wheel Truing Building	Backhoe	84	80			
	Concrete Truck	88	81			
	Crane	76	68			
	Manlift	73	66			
	Telehandler	88	81			
	Other Miscellaneous Construction Equipment and Labor (i.e. work trucks)	74	73			
Phase j Retaining Wall	Rubber Tire Front Loaders (972K or 988)	81	77	none	57 - 79	none
	Dump Trucks	73	72			
	Flatbed Material Delivery Truck	74	73			
	Concrete Truck	88	87			
	Skid Steer Loader	73	66			
	Water Truck	72	65			
	Other Miscellaneous Construction Equipment and Labor (i.e. work trucks)	74	76			
Phase k Fueling Structure	Rubber Tire Front Loaders (972K or 988)	81	77	none	54 - 76	none
	Backhoe	84	80			
	Concrete Truck	88	81			
	Crane	76	71			
	Other Miscellaneous Construction Equipment and Labor (i.e. work trucks)	74	73			

8.4 Construction Vibration

CRITERION D	Exposure of persons to, or generation of, excessive ground-borne vibration or ground-borne noise levels during construction?

Vibration levels were analyzed at sensitive-receptor locations within the screening distances of the Project. To be conservative, the vibration-damage analysis assumes the most vibration-sensitive structures are FTA Category III structures, which are nonengineered timber and masonry buildings (Table 3-2). For vibration annoyance, the land use category most sensitive to construction vibration includes places where people typically sleep, such as residences.

Construction of the Project includes activities that have the potential to cause construction vibration impacts. These activities include the use of vibratory rollers and bulldozers to place track ballast and lay down railroad ties and tracks. Out of the two main pieces of equipment, vibratory rollers produce the highest levels of vibration; therefore, Category III structures located within 25 feet of vibratory roller activities would be the most susceptible to vibration damage impacts. However, based on the existing setback between these Category III structure locations and the proposed Project, the highest vibration levels are predicted at 0.018 PPV at the nearest receptor to construction. This level is below the damage impact criteria; therefore, no significant damage impact is predicted from the Project.

Vibration annoyance predictions were also calculated at each receptor and assessed against the threshold for Category 2 uses of 80 VdB because construction vibration would not be present in any location for extended periods of time. Construction vibration annoyances can be anticipated at sensitive receptors located within approximately 73 feet of the proposed construction. The closest sensitive receptor is located 130-feet from construction; therefore, no significant impacts are predicted. Table 8-8 provides results of the construction vibration analysis at all receptors analyzed.

Table 8-8. Construction Vibration Results

Receptor	FTA Category	Distance (feet)	Roller PPV	Roller VdB	Dozer PPV	Dozer VdB	Loaded Truck PPV	Loaded Truck VdB	Damage Threshold PPV	Annoyance Threshold VdB	Roller Damage Impact	Roller Annoyance Impact	Dozer Damage Impact	Dozer Annoyance Impact	Loaded Truck Damage Impact	Loaded Truck Annoyance Impact
R113	2	204	0.009	67	0.004	60	0.003	59	0.2	80	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
R114	2	230	0.008	65	0.003	58	0.003	57	0.2	80	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
R198	2	192	0.010	67	0.004	60	0.004	59	0.2	80	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
R200	2	204	0.009	67	0.004	60	0.003	59	0.2	80	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
R201	2	194	0.010	67	0.004	60	0.004	59	0.2	80	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
R159	2	197	0.009	67	0.004	60	0.003	59	0.2	80	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
R160	2	133	0.017	72	0.007	65	0.006	64	0.2	80	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
R161	2	130	0.018	73	0.007	66	0.006	65	0.2	80	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
R162	2	149	0.015	71	0.006	64	0.005	63	0.2	80	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
R163	2	204	0.009	67	0.004	60	0.003	59	0.2	80	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
R169	2	237	0.007	65	0.003	58	0.003	57	0.2	80	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
R170	2	164	0.013	70	0.005	63	0.005	62	0.2	80	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
R179	2	189	0.010	68	0.004	61	0.004	60	0.2	80	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
R167	2	190	0.010	68	0.004	61	0.004	60	0.2	80	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
R168	2	213	0.008	66	0.004	59	0.003	58	0.2	80	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
R176	2	144	0.015	71	0.006	64	0.005	63	0.2	80	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
R177	2	167	0.012	69	0.005	62	0.004	61	0.2	80	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
R178	2	235	0.007	65	0.003	58	0.003	57	0.2	80	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact

Notes:
FTA=Federal Transit Administration; VdB=vibration decibels, PPV=peak particle velocity in inches per second

9 Mitigation

9.1 Operational Noise Mitigation

Moderate impacts are predicted under Phase 1 and Later Phases operation of the Project. FTA's guidance requires that mitigation be strongly considered for severe impacts and considered for moderate impacts.

LOSSAN does not have a formal noise mitigation policy; however, their goal is to substantially reduce noise levels at severe impacts and implement noise mitigation at moderate impacts where feasible and reasonable. The following are considered by LOSSAN when determining whether noise mitigation for moderate impacts is feasible and reasonable for implementation in a project:

- **The number of noise-sensitive receptors impacted –** Clusters of impacts in a given location increase the likelihood that noise mitigation would be considered feasible and cost reasonable on a per receptor basis. LOSSAN follows the California Department of Transportation noise policy for identifying if mitigation is feasible and cost reasonable (California Department of Transportation 2020).
- **Effectiveness of a mitigation measure -** Mitigation is feasible if it achieves a 5 dB reduction at impacted receptors
    - A receptor is considered benefitted if a 5 dB reduction is achieved by a mitigation measure at a receptor whether it is impacted or not.
- **Implementation costs –** Mitigation is cost reasonable if the noise mitigation measure on a per receptor basis is less than the amount allotted for mitigation for each receptor.
- **The predicted increase over existing noise levels –** Increases in noise levels of 5 dB and greater are generally noticeable to average human hearing and 10-dB increases are perceived as a doubling in noise. Changes of 3 dB or less are generally not perceptible to average human hearing; therefore, for mitigation to be considered, an increase of at least 3 dB is required.
- **Community opinions on the mitigation measure –** If more than 50 percent of the benefitted receptors vote to implement a feasible mitigation measure, it is considered reasonable for an area that shares a given mitigation measure. For example, if a noise wall is under consideration for a series of impacted receptors in a neighborhood, more than 50 percent of the benefitted receptors behind the sound wall would need to approve of the mitigation measure for it to be implemented. Voting typically occurs during final design.

Implementation of the following mitigation measures would reduce the potentially significant impacts as a result of Project operation to a level less than significant.

NV-1 **Operational Restrictions.** LOSSAN is committed to developing the facility operational plan with the following approaches to ensure community noise is reduced:

- Connect to ground power within 15-minutes of arrival at the facility to reduce noise from idling locomotives.
- Disconnect from ground power no sooner than 15-minutes prior to reduce noise from idling locomotives.
- Under the later phases of the project trains will access storage tracks using the following approach: The first train of each day accessing the CCLF would use the easternmost storage track and would not use the train wash. Having the train stored on this track acts as a noise barrier reducing sound levels at sensitive land uses east of the storage facility.
    - The second train of each day accessing the CCLF will use the westernmost storage track (i.e., next to the service and inspection track) and will not use the train wash. Having the train stored on this track acts as a noise barrier reducing sound levels at sensitive land uses west of the storage facility.
    - The third train each day accessing the CCLF will go through the wash and then access the storage tracks between the easternmost and westernmost storage tracks.
    - The fourth train each day accessing the CCLF will go through the wash and then layover on the service and inspection track. In this way it will act as a barrier blocking noise from other train movements and noise sources reducing sound levels at sensitive land uses east of the storage facility.

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9.2 Construction Noise Mitigation

General Project construction noise and vibration would exceed the FTA's construction guidelines at receptors nearest to the construction efforts. The Project would implement the following mitigation to reduce construction-related noise levels:

NV-2 **Employ noise- and vibration-reducing measures during construction.** The construction contractor will employ measures to minimize and reduce construction noise. Noise reduction measures that will be implemented include, but are not limited to, the following:

- Place site equipment on the construction site as far away from noise sensitive sites as possible.
- Combine noisy operations to have them occur in the same time period.
  - The total noise level produced would not be significantly greater than the level produced if the operations were performed separately.
- Nighttime construction will not be allowed.
- Use specially quieted equipment, such as quieted and enclosed air compressors and properly working mufflers on all engines.
- Select quieter demolition methods, where feasible.

NV-3 **Prepare a community notification plan for Project construction.** To proactively address community concerns related to construction noise, prior to construction, the LOSSAN Rail Corridor Agency and/or the construction contractor will prepare and maintain a community notification plan. Components of the plan will include initial information packets prepared and mailed to all residences within a 500-foot radius of Project construction. Updates to the plan will be prepared as necessary to indicate changes to the construction schedule or other processes. The LOSSAN Rail Corridor Agency will identify a Project liaison to be available to respond to questions from the community or other interested groups.

9.3 Impacts after Mitigation

9.3.1 Operational Noise

Mitigation is strongly recommended for severe impacts and considered for the moderate operational noise impacts, per FTA. Operational adjustments at the facility would reduce noise levels at remaining moderate impacts. For these reasons, after mitigation, these impacts would be less than significant. No long-term significant impacts would result with the proposed mitigation.

9.3.2 Construction

With implementation of the construction noise mitigation measures, including restricting the loudest activities to daytime periods, noise levels would be maintained below the FTA guideline. By implementing the noise reduction measures and compliance monitoring, no residual significant impact would remain.

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Appendix A. Federal Transit Administration Acoustic Modeling Input Data

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LOSSAN CCMF
Octave spectra of the sources in dB(A) -

Name	Source type	I or A m,m²	Li dB(A)	R'w dB	L'w dB(A)	Lw dB(A)	KI dB	KT dB	LwMax dB(A)	DO-Wall dB	Time histogram	Emission spectrum	63Hz dB(A)	125Hz dB(A)	250Hz dB(A)	500Hz dB(A)	1kHz dB(A)	2kHz dB(A)	4kHz dB(A)	8kHz dB(A)	16kHz dB(A)
Idling Locomotive (Track 3)	Point				107.2	107.2	0.0	0.0		0	LOSSAN CCLF Idle Tracks 1&4 Phase 1	LOSSAN Locomotive Idling	80.3	83.8	92.4	103.0	102.0	100.6	93.8	89.6	81.4
Idling Locomotive (Track 4)	Point				107.2	107.2	0.0	0.0		0	LOSSAN CCLF Idle Tracks 1&4 Phase 1	LOSSAN Locomotive Idling	80.3	83.8	92.4	103.0	102.0	100.6	93.8	89.6	81.4

LOSSAN CCMF
Hourly sound power level in dB(A) -

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Name	0-1 o'clock dB(A)	1-2 o'clock dB(A)	2-3 o'clock dB(A)	3-4 o'clock dB(A)	4-5 o'clock dB(A)	5-6 o'clock dB(A)	6-7 o'clock dB(A)	7-8 o'clock dB(A)	8-9 o'clock dB(A)	9-10 o'clock dB(A)	10-11 o'clock dB(A)	11-12 o'clock dB(A)	12-13 o'clock dB(A)	13-14 o'clock dB(A)	14-15 o'clock dB(A)	15-16 o'clock dB(A)	16-17 o'clock dB(A)	17-18 o'clock dB(A)	18-19 o'clock dB(A)	19-20 o'clock dB(A)	20-21 o'clock dB(A)	21-22 o'clock dB(A)	22-23 o'clock dB(A)	23-24 o'clock dB(A)
Idling Locomotive (Track 3)					101.2				101.2							101.2						101.2		
Idling Locomotive (Track 4)					101.2				101.2							101.2						101.2		

Noise emissions of railway traffic

Rail track:				Direction:		Section: 1	Km: 0+000	
Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	night
0+000	713421.180	3906478.587	-	-	-	-	-	-

Rail track:	Direction:		Section: 1			Km: 0+000	
Train type	Number of trains day	night	Speed km/h	Length per train m	Max	Emission level day dB(A)	night dB(A)
0	0	0	225	-	yes	-	-

Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	night
0+000	714213.752	3904656.125	71.85	-	-	-	-	-

Rail track:	Direction:		Section: 1			Km: 0+000	
Train type	Number of trains day	night	Speed km/h	Length per train m	Max	Emission level day dB(A)	night dB(A)
0	0	0	225	-	yes	-	-

Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	night
0+000	713328.338	3906194.066	-	-	-	-	-	-

Rail track:	Direction:		Section: 1			Km: 0+000	
Train type	Number of trains day	night	Speed km/h	Length per train m	Max	Emission level day dB(A)	night dB(A)
0	0	0	225	-	yes	-	-

Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	night
0+000	713332.187	3906192.003	-	-	-	-	-	-

Noise emissions of railway traffic

Rail track:				Direction:						
								Section: 1	Km: 0+000	
Train type			Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)	
		0	0	0	225	-	yes	-	-	
Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	Corrected Emission level night		
0+000	713302.215	3906110.787	-	-	-	-	-	-		

Rail track:				Direction:						
								Section: 1	Km: 0+000	
Train type			Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)	
		0	0	0	225	-	yes	-	-	
Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	Corrected Emission level night		
0+000	713280.138	3905879.985	78.85	-	-	-	-	-		

Rail track:				Direction:						
								Section: 1	Km: 0+000	
Train type			Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)	
		0	0	0	225	-	yes	-	-	
Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	Corrected Emission level night		
0+000	713301.897	3905775.090	77.79	-	-	-	-	-		

Rail track:				Direction:						
								Section: 1	Km: 0+000	
Train type			Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)	
		0	0	0	225	-	yes	-	-	
Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	Corrected Emission level night		
0+000	713372.444	3906247.341	-	-	-	-	-	-		

Noise emissions of railway traffic

Rail track:	Direction:	Section: 1	Km: 0+000					
Train type	Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)	
0	0	0	225	-	yes	-	-	
Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	night
0+000	713332.187	3906192.003	-	-	-	-	-	-

Rail track:	Direction:	Section: 1	Km: 0+000					
Train type	Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)	
0	0	0	225	-	yes	-	-	
Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	night
0+000	713328.338	3906194.066	-	-	-	-	-	-

North entry/exit to CCMF (special track) Rail track:	Direction:	Section: 1	Km: 0+000					
Train type	Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)	
0	3	1	16	177	yes	57.3	54.7	
Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	night
0+000	713300.327	3905777.883	77.74	5.0	-	-	-	-

Track 1 (special track) Rail track:	Direction:	Section: 1	Km: 0+000					
Train type	Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)	
0	2	1	16	177	yes	54.3	51.7	
Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	night
0+000	713345.921	3905670.924	74.90	5.0	-	-	-	-

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Noise emissions of railway traffic

South entrance/exit CCMF				Rail track:	Direction:			Section: 1	Km: 0+000
Train type				Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]		Corrected Emission level day	Corrected Emission level night
0+000	713676.518	3905186.934	79.65	-	-	-		-	-

to Track 2, 3, 4 & 5 (special track)				Rail track:	Direction:			Section: 1	Km: 0+000	
Train type				Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
0				3	1	16	177	yes	57.3	54.7
Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]			Corrected Emission level day	Corrected Emission level night
0+000	713345.921	3905670.924	74.90	5.0	-	-			-	-

to Track 2 & 3 (special track)				Rail track:	Direction:			Section: 1	Km: 0+000	
Train type				Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
0				2	1	16	177	yes	54.3	51.7
Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]			Corrected Emission level day	Corrected Emission level night
0+000	713357.774	3905636.894	74.02	5.0	-	-			-	-

Track 3				Rail track:	Direction:			Section: 1	Km: 0+000	
Train type				Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
0				2	1	16	177	yes	54.3	51.7
Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]			Corrected Emission level day	Corrected Emission level night
0+000	713372.273	3905607.948	73.76	5.0	-	-			-	-

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Noise emissions of railway traffic

Tracks 2, 3, 4 & 5				Rail track:	Direction:		Section: 1		Km: 0+000	
Train type				Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]		Multiple reflections [dB]		Corrected Emission level day	Corrected Emission level night
0+000	713584.787	3905263.937	75.70	-	-		-		-	-

Track 2				Rail track:	Direction:		Section: 1		Km: 0+000	
Train type				Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
0				2	1	16	177	yes	54.3	51.7
Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]		Multiple reflections [dB]		Corrected Emission level day	Corrected Emission level night
0+000	713372.273	3905607.948	73.76	5.0	-		-		-	-

Track 5 (train wash) & Track 4 (special track)				Rail track:	Direction:		Section: 1		Km: 0+000	
Train type				Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
0				2	1	16	177	yes	54.3	51.7
Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]		Multiple reflections [dB]		Corrected Emission level day	Corrected Emission level night
0+000	713357.774	3905636.894	74.02	5.0	-		-		-	-

To Track 4 & 5 (wash) (special track)				Rail track:	Direction:		Section: 1		Km: 0+000	
Train type				Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
0				2	1	16	177	yes	54.3	51.7
Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]		Multiple reflections [dB]		Corrected Emission level day	Corrected Emission level night
0+000	713370.663	3905600.190	73.51	5.0	-		-		-	-

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Noise emissions of railway traffic

Track 4 (service & inspection) (special track)	Rail track:	Direction:		Section: 1			Km: 0+000	
Train type		Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
	0	2	1	16	177	yes	54.3	51.7

Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	Corrected Emission level night
0+000	713380.929	3905571.826	73.64	5.0	-	-	-	-

Track 4 & 5 (wash) (special track)	Rail track:	Direction:		Section: 1			Km: 0+000	
Train type		Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)

Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	Corrected Emission level night
0+000	713556.401	3905292.511	75.56	5.0	-	-	-	-

Track 5 (Train Wash Track) (special track)	Rail track:	Direction:		Section: 1			Km: 0+000	
Train type		Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)

Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	Corrected Emission level night
0+000	713380.929	3905571.826	73.64	5.0	-	-	-	-

Track 2 (special track)	Rail track:	Direction:		Section: 1			Km: 0+000	
Train type		Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)

Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	Corrected Emission level night
0+000	713573.463	3905278.912	75.92	5.0	-	-	-	-

Noise emissions of railway traffic

Track 3 (special track) — Rail track: — Direction: — Section: 1 — Km: 0+000

Train type	Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)

Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	Corrected Emission level night
0+000	713563.197	3905291.824	75.86	5.0	-	-	-	-

North entry/exit to CCMF — Rail track: — Direction: — Section: 1 — Km: 0+000

Train type	Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
0	3	2	16	177	yes	56.4	56.4

Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	Corrected Emission level night
0+000	713313.244	3905749.638	77.71	-	-	-	-	-

North entry/exit to CCMF — Rail track: — Direction: — Section: 1 — Km: 0+000

Train type	Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
0	3	2	16	177	yes	56.4	56.4

Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	Corrected Emission level night
0+000	713334.411	3905702.872	76.06	-	-	-	-	-

Track 3 — Rail track: — Direction: — Section: 1 — Km: 0+000

Train type	Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)

Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	Corrected Emission level night
0+000	713533.775	3905334.474	75.48	-	-	-	-	-

Noise emissions of railway traffic

Track 4 (service & inspection)			Rail track:	Direction:			Section: 1		Km: 0+000	
Train type				Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]		Curve radius [dB]	Multiple reflections [dB]		Corrected Emission level day	night
0+000	713518.725	3905338.336	74.62	-		-	-		-	-

North entry/exit to CCMF			Rail track:	Direction:			Section: 1		Km: 0+000	
Train type				Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
0				3	2	16	177	yes	56.4	56.4
Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]		Curve radius [dB]	Multiple reflections [dB]		Corrected Emission level day	night
0+000	713302.586	3905773.115	77.79	-		-	-		-	-

to Track 2, 3, 4 & 5			Rail track:	Direction:			Section: 1		Km: 0+000	
Train type				Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
0				2	1	16	177	yes	54.2	51.6
Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]		Curve radius [dB]	Multiple reflections [dB]		Corrected Emission level day	night
0+000	713348.224	3905664.952	74.71	-		-	-		-	-

To Track 4 & 5 (wash)			Rail track:	Direction:			Section: 1		Km: 0+000	
Train type				Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
0				2	1	16	177	yes	54.2	51.6
Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]		Curve radius [dB]	Multiple reflections [dB]		Corrected Emission level day	night
0+000	713371.746	3905597.200	73.50	-		-	-		-	-

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Noise emissions of railway traffic

to Track 2 & 3	Rail track:	Direction:	Section: 1	Km: 0+000

Train type	Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
0	2	1	16	177	yes	54.2	51.6

Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	night
0+000	713359.683	3905632.986	73.98	-	-	-	-	-

Track 5 (train wash) & Track 4	Rail track:	Direction:	Section: 1	Km: 0+000

Train type	Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
0	2	1	16	177	yes	54.2	51.6

Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	night
0+000	713359.281	3905632.584	73.94	-	-	-	-	-

Track 3	Rail track:	Direction:	Section: 1	Km: 0+000

Train type	Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
0	2	1	16	177	yes	54.2	51.6

Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	night
0+000	713374.561	3905603.030	73.90	-	-	-	-	-

Track 4 (service & inspection)	Rail track:	Direction:	Section: 1	Km: 0+000

Train type	Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
0	2	1	16	177	yes	54.2	51.6

Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	night
0+000	713382.804	3905567.847	73.77	-	-	-	-	-

Noise emissions of railway traffic

South entrance/exit CCMF (special track)				Rail track:	Direction:		Section: 1		Km: 0+000	
Train type				Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]		Multiple reflections [dB]		Corrected Emission level day	Corrected Emission level night
0+000	713777.546	3905124.250	80.60	5.0	-		-		-	-

9/21/2021

LOSSAN CCMF
Octave spectra of the sources in dB(A) -

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Name	Source type	I or A m,m²	Li dB(A)	R'w dB	L'w dB(A)	Lw dB(A)	KI dB	KT dB	LwMax dB(A)	DO-Wall dB	Time histogram	Emission spectrum	63Hz dB(A)	125Hz dB(A)	250Hz dB(A)	500Hz dB(A)	1kHz dB(A)	2kHz dB(A)	4kHz dB(A)	8kHz dB(A)	16kHz dB(A)
Idling Locomotive (Track 1)	Point				107.2	107.2	0.0	0.0	106.6	0	LOSSAN CCLF Idle Track 1 Phase 2	LOSSAN Locomotive Idling	80.3	83.8	92.4	103.0	102.0	100.6	93.8	89.6	81.4

LOSSAN CCMF
Octave spectra of the sources in dB(A) -

Name	Source type	I or A	Li	R'w	L'w	Lw	KI	KT	LwMax	DO-Wall	Time histogram	Emission spectrum	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	16kHz
		m,m²	dB(A)	dB	dB(A)	dB(A)	dB	dB	dB(A)	dB			dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
Idling Locomotive (Track 3)	Point				107.2	107.2	0.0	0.0	106.6	0	LOSSAN CCLF Idle Track 3 Phase 2	LOSSAN Locomotive Idling	80.3	83.8	92.4	103.0	102.0	100.6	93.8	89.6	81.4

LOSSAN CCMF
Octave spectra of the sources in dB(A) -

Name	Source type	I or A	Li	R'w	L'w	Lw	KI	KT	LwMax	DO-Wall	Time histogram	Emission spectrum	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	16kHz
		m,m²	dB(A)	dB	dB(A)	dB(A)	dB	dB	dB(A)	dB			dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
Idling Locomotive (Track 2)	Point				107.2	107.2	0.0	0.0	106.6	0	LOSSAN CCLF Idle Track 2 Phase 2	LOSSAN Locomotive Idling	80.3	83.8	92.4	103.0	102.0	100.6	93.8	89.6	81.4
Idling Locomotive (Track 4)	Point				107.2	107.2	0.0	0.0	106.6	0	LOSSAN CCLF Idle Track 4 Phase 2	LOSSAN Locomotive Idling	80.3	83.8	92.4	103.0	102.0	100.6	93.8	89.6	81.4
Train Wash (north)	Point				97.8	97.8	0.0	0.0		0	LOSSAN CCMF Train Wash	Train Wash	71.0	81.6	90.5	95.9	85.5	84.8	80.3	70.6	
Train Wash (south)	Point				97.8	97.8	0.0	0.0		0	LOSSAN CCMF Train Wash	Train Wash	71.0	81.6	90.5	95.9	85.5	84.8	80.3	70.6	
Wheel Truing	Point				99.6	99.6	0.0	0.0		0	LOSSAN Wheel Truing	Wheel Truing					99.6				

LOSSAN CCMF
Hourly sound power level in dB(A) -

5

Name	0-1 o'clock dB(A)	1-2 o'clock dB(A)	2-3 o'clock dB(A)	3-4 o'clock dB(A)	4-5 o'clock dB(A)	5-6 o'clock dB(A)	6-7 o'clock dB(A)	7-8 o'clock dB(A)	8-9 o'clock dB(A)	9-10 o'clock dB(A)	10-11 o'clock dB(A)	11-12 o'clock dB(A)	12-13 o'clock dB(A)	13-14 o'clock dB(A)	14-15 o'clock dB(A)	15-16 o'clock dB(A)	16-17 o'clock dB(A)	17-18 o'clock dB(A)	18-19 o'clock dB(A)	19-20 o'clock dB(A)	20-21 o'clock dB(A)	21-22 o'clock dB(A)	22-23 o'clock dB(A)	23-24 o'clock dB(A)
Idling Locomotive (Track 1)												101.2				101.2								

LOSSAN CCMF
Hourly sound power level in dB(A) -

5

Name	0-1 o'clock dB(A)	1-2 o'clock dB(A)	2-3 o'clock dB(A)	3-4 o'clock dB(A)	4-5 o'clock dB(A)	5-6 o'clock dB(A)	6-7 o'clock dB(A)	7-8 o'clock dB(A)	8-9 o'clock dB(A)	9-10 o'clock dB(A)	10-11 o'clock dB(A)	11-12 o'clock dB(A)	12-13 o'clock dB(A)	13-14 o'clock dB(A)	14-15 o'clock dB(A)	15-16 o'clock dB(A)	16-17 o'clock dB(A)	17-18 o'clock dB(A)	18-19 o'clock dB(A)	19-20 o'clock dB(A)	20-21 o'clock dB(A)	21-22 o'clock dB(A)	22-23 o'clock dB(A)	23-24 o'clock dB(A)
Idling Locomotive (Track 3)								101.2													101.2			

LOSSAN CCMF
Hourly sound power level in dB(A) -

Name	0-1 o'clock dB(A)	1-2 o'clock dB(A)	2-3 o'clock dB(A)	3-4 o'clock dB(A)	4-5 o'clock dB(A)	5-6 o'clock dB(A)	6-7 o'clock dB(A)	7-8 o'clock dB(A)	8-9 o'clock dB(A)	9-10 o'clock dB(A)	10-11 o'clock dB(A)	11-12 o'clock dB(A)	12-13 o'clock dB(A)	13-14 o'clock dB(A)	14-15 o'clock dB(A)	15-16 o'clock dB(A)	16-17 o'clock dB(A)	17-18 o'clock dB(A)	18-19 o'clock dB(A)	19-20 o'clock dB(A)	20-21 o'clock dB(A)	21-22 o'clock dB(A)	22-23 o'clock dB(A)	23-24 o'clock dB(A)
Idling Locomotive (Track 2)		101.2							101.2															
Idling Locomotive (Track 4)							101.2											101.2						
Train Wash (north)								84.2	84.2	84.2	84.2	84.2	84.2	84.2	84.2	84.2	84.2	84.2	84.2	84.2	84.2	84.2		
Train Wash (south)								84.2	84.2	84.2	84.2	84.2	84.2	84.2	84.2	84.2	84.2	84.2	84.2	84.2	84.2	84.2		
Wheel Truing										99.6	99.6	99.6		99.6										

Noise emissions of railway traffic

Rail track:				Direction:			Section: 1	Km: 0+000	
Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]		Corrected Emission level day	night
0+000	713421.180	3906478.587	-	-	-	-		-	-

Rail track:	Direction:					Section: 1	Km: 0+000	
Train type	Number of trains day	night	Speed km/h	Length per train m	Max		Emission level day dB(A)	night dB(A)
0	0	0	225	-	yes		-	-

Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	night
0+000	714213.752	3904656.125	71.85	-	-	-	-	-

Rail track:	Direction:					Section: 1	Km: 0+000	
Train type	Number of trains day	night	Speed km/h	Length per train m	Max		Emission level day dB(A)	night dB(A)
0	0	0	225	-	yes		-	-

Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	night
0+000	713328.338	3906194.066	-	-	-	-	-	-

Rail track:	Direction:					Section: 1	Km: 0+000	
Train type	Number of trains day	night	Speed km/h	Length per train m	Max		Emission level day dB(A)	night dB(A)
0	0	0	225	-	yes		-	-

Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	night
0+000	713332.187	3906192.003	-	-	-	-	-	-

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Noise emissions of railway traffic

Rail track:				Direction:				Section: 1		Km: 0+000
Train type				Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
0				0	0	225	-	yes	-	-
Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]		Multiple reflections [dB]		Corrected Emission level day	night
0+000	713302.215	3906110.787	-	-	-		-		-	-

Rail track:				Direction:				Section: 1		Km: 0+000
Train type				Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
0				0	0	225	-	yes	-	-
Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]		Multiple reflections [dB]		Corrected Emission level day	night
0+000	713280.138	3905879.985	78.85	-	-		-		-	-

Rail track:				Direction:				Section: 1		Km: 0+000
Train type				Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
0				0	0	225	-	yes	-	-
Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]		Multiple reflections [dB]		Corrected Emission level day	night
0+000	713301.897	3905775.090	77.79	-	-		-		-	-

Rail track:				Direction:				Section: 1		Km: 0+000
Train type				Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
0				0	0	225	-	yes	-	-
Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]		Multiple reflections [dB]		Corrected Emission level day	night
0+000	713372.444	3906247.341	-	-	-		-		-	-

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Noise emissions of railway traffic

Rail track:			Direction:					Section: 1	Km: 0+000
Train type	Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)		
0	0	0	225	-	yes	-	-		
Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	night	
0+000	713332.187	3906192.003	-	-	-	-	-	-	

Rail track:			Direction:					Section: 1	Km: 0+000
Train type	Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)		
0	0	0	225	-	yes	-	-		
Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	night	
0+000	713328.338	3906194.066	-	-	-	-	-	-	

Track 1	Rail track:		Direction:					Section: 1	Km: 0+000
Train type	Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)		
0	2	0	16	177	yes	55.4	-		
Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	night	
0+000	713349.028	3905664.952	74.76	-	-	-	-	-	

Noise emissions of railway traffic

Rail track:				Direction:			Section: 1	Km: 0+000	
Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	night
0+000	713421.180	3906478.587	-	-	-	-	-	-

Rail track:	Direction:				Section: 1	Km: 0+000	
Train type	Number of trains day	night	Speed km/h	Length per train m	Max	Emission level day dB(A)	night dB(A)
0	0	0	225	-	yes	-	-

Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	night
0+000	714213.752	3904656.125	71.85	-	-	-	-	-

Rail track:	Direction:				Section: 1	Km: 0+000	
Train type	Number of trains day	night	Speed km/h	Length per train m	Max	Emission level day dB(A)	night dB(A)
0	0	0	225	-	yes	-	-

Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	night
0+000	713328.338	3906194.066	-	-	-	-	-	-

Rail track:	Direction:				Section: 1	Km: 0+000	
Train type	Number of trains day	night	Speed km/h	Length per train m	Max	Emission level day dB(A)	night dB(A)
0	0	0	225	-	yes	-	-

Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	night
0+000	713332.187	3906192.003	-	-	-	-	-	-

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Noise emissions of railway traffic

Rail track:			Direction:				Section: 1		Km: 0+000
Train type			Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
0			0	0	225	-	yes	-	-
Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]		Corrected Emission level day	night
0+000	713302.215	3906110.787	-	-	-	-		-	-

Rail track:			Direction:				Section: 1		Km: 0+000
Train type			Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
0			0	0	225	-	yes	-	-
Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]		Corrected Emission level day	night
0+000	713280.138	3905879.985	78.85	-	-	-		-	-

Rail track:			Direction:				Section: 1		Km: 0+000
Train type			Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
0			0	0	225	-	yes	-	-
Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]		Corrected Emission level day	night
0+000	713301.897	3905775.090	77.79	-	-	-		-	-

Rail track:			Direction:				Section: 1		Km: 0+000
Train type			Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
0			0	0	225	-	yes	-	-
Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]		Corrected Emission level day	night
0+000	713372.444	3906247.341	-	-	-	-		-	-

Noise emissions of railway traffic

	Rail track:	Direction:	Section: 1	Km: 0+000

Train type	Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
0	0	0	225	-	yes	-	-

Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	Corrected Emission level night
0+000	713332.187	3906192.003	-	-	-	-	-	-

	Rail track:	Direction:	Section: 1	Km: 0+000

Train type	Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
0	0	0	225	-	yes	-	-

Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	Corrected Emission level night
0+000	713328.338	3906194.066	-	-	-	-	-	-

Track 3	Rail track:	Direction:	Section: 1	Km: 0+000

Train type	Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
0	2	0	16	177	yes	55.4	-

Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	Corrected Emission level night
0+000	713374.561	3905603.030	73.90	-	-	-	-	-

Noise emissions of railway traffic

Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	night
Rail track:				Direction:		Section: 1	Km: 0+000	
0+000	713421.180	3906478.587	-	-	-	-	-	-

Train type	Number of trains day	night	Speed km/h	Length per train m	Max	Emission level day dB(A)	night dB(A)
Rail track:	Direction:			Section: 1		Km: 0+000	
0	0	0	225	-	yes	-	-

Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	night
0+000	714213.752	3904656.125	71.85	-	-	-	-	-

Train type	Number of trains day	night	Speed km/h	Length per train m	Max	Emission level day dB(A)	night dB(A)
Rail track:	Direction:			Section: 1		Km: 0+000	
0	0	0	225	-	yes	-	-

Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	night
0+000	713328.338	3906194.066	-	-	-	-	-	-

Train type	Number of trains day	night	Speed km/h	Length per train m	Max	Emission level day dB(A)	night dB(A)
Rail track:	Direction:			Section: 1		Km: 0+000	
0	0	0	225	-	yes	-	-

Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	night
0+000	713332.187	3906192.003	-	-	-	-	-	-

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Noise emissions of railway traffic

Rail track:			Direction:				Section: 1	Km: 0+000	
Train type			Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
0			0	0	225	-	yes	-	-
Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]		Corrected Emission level day	Corrected Emission level night
0+000	713302.215	3906110.787	-	-	-	-		-	-

Rail track:			Direction:				Section: 1	Km: 0+000	
Train type			Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
0			0	0	225	-	yes	-	-
Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]		Corrected Emission level day	Corrected Emission level night
0+000	713280.138	3905879.985	78.85	-	-	-		-	-

Rail track:			Direction:				Section: 1	Km: 0+000	
Train type			Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
0			0	0	225	-	yes	-	-
Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]		Corrected Emission level day	Corrected Emission level night
0+000	713301.897	3905775.090	77.79	-	-	-		-	-

Rail track:			Direction:				Section: 1	Km: 0+000	
Train type			Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
0			0	0	225	-	yes	-	-
Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]		Corrected Emission level day	Corrected Emission level night
0+000	713372.444	3906247.341	-	-	-	-		-	-

Noise emissions of railway traffic

Rail track:		Direction:		Section: 1			Km: 0+000	
Train type	Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)	
0	0	0	225	-	yes	-	-	
Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	night
0+000	713332.187	3906192.003	-	-	-	-	-	-

Rail track:		Direction:		Section: 1			Km: 0+000	
Train type	Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)	
0	0	0	225	-	yes	-	-	
Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	night
0+000	713328.338	3906194.066	-	-	-	-	-	-

North entry/exit to CCMF (special track)	Rail track:	Direction:		Section: 1			Km: 0+000	
Train type	Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)	
0	6	2	16	177	yes	60.3	57.7	
Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	night
0+000	713300.327	3905777.883	77.74	5.0	-	-	-	-

Track 1 (special track)	Rail track:	Direction:		Section: 1			Km: 0+000	
Train type	Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)	
0	2	0	16	177	yes	55.5	-	
Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	night
0+000	713345.921	3905670.924	74.90	5.0	-	-	-	-

Noise emissions of railway traffic

South entrance/exit CCMF	Rail track:	Direction:	Section: 1	Km: 0+000

Train type	Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)

Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	Corrected Emission level night
0+000	713676.518	3905186.934	79.65	-	-	-	-	-

to Track 2, 3, 4 & 5 (special track)	Rail track:	Direction:	Section: 1	Km: 0+000

Train type	Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
0	4	2	16	177	yes	58.5	57.7

Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	Corrected Emission level night
0+000	713345.921	3905670.924	74.90	5.0	-	-	-	-

to Track 2 & 3 (special track)	Rail track:	Direction:	Section: 1	Km: 0+000

Train type	Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
0	2	2	16	177	yes	55.5	57.7

Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	Corrected Emission level night
0+000	713357.774	3905636.894	74.02	5.0	-	-	-	-

Track 3	Rail track:	Direction:	Section: 1	Km: 0+000

Train type	Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
0	1	1	16	177	yes	52.5	54.7

Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	Corrected Emission level night
0+000	713372.273	3905607.948	73.76	5.0	-	-	-	-

Noise emissions of railway traffic

Tracks 2, 3, 4 & 5 — Rail track: — Direction: — Section: 1 — Km: 0+000

Train type	Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
0	1	1	16	177	yes	52.4	54.6

Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	night
0+000	713584.787	3905263.937	75.70	-	-	-	-	-

Track 2 — Rail track: — Direction: — Section: 1 — Km: 0+000

Train type	Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
0	1	0	16	177	yes	52.5	-

Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	night
0+000	713372.273	3905607.948	73.76	5.0	-	-	-	-

Track 5 (train wash) & Track 4 (special track) — Rail track: — Direction: — Section: 1 — Km: 0+000

Train type	Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
0	3	1	16	177	yes	57.3	54.7

Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	night
0+000	713357.774	3905636.894	74.02	5.0	-	-	-	-

To Track 4 & 5 (wash) (special track) — Rail track: — Direction: — Section: 1 — Km: 0+000

Train type	Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
0	3	1	16	177	yes	57.3	54.7

Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	night
0+000	713370.663	3905600.190	73.51	5.0	-	-	-	-

Noise emissions of railway traffic

Track 4 (service & inspection) (special track)			Rail track:	Direction:			Section: 1		Km: 0+000
Train type				Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
			0	2	0	16	177	yes	55.5	-

Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	Corrected Emission level night
0+000	713380.929	3905571.826	73.64	5.0	-	-	-	-

Track 4 & 5 (wash) (special track)	Rail track:	Direction:	Section: 1	Km: 0+000

Train type	Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
0	1	1	16	177	yes	52.5	54.7

Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	Corrected Emission level night
0+000	713556.401	3905292.511	75.56	5.0	-	-	-	-

Track 5 (Train Wash Track) (special track)	Rail track:	Direction:	Section: 1	Km: 0+000

Train type	Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
0	1	1	16	177	yes	52.5	54.7

Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	Corrected Emission level night
0+000	713380.929	3905571.826	73.64	5.0	-	-	-	-

Storage tracks?	Rail track:	Direction:	Section: 1	Km: 0+000

Train type	Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
0	1	1	16	177	yes	52.4	54.6

Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	Corrected Emission level night
0+000	713303.089	3905738.334	76.70	-	-	-	-	-

9/21/2021

Noise emissions of railway traffic

Wheel Truing Tracks				Rail track:	Direction:			Section: 1		Km: 0+000
Train type				Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
0				1	1	16	177	yes	52.4	54.6
Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]		Curve radius [dB]	Multiple reflections [dB]		Corrected Emission level day	night
0+000	713299.120	3905719.491	75.98	-		-	-		-	-

entrance/exit wheel truing/storage track				Rail track:	Direction:			Section: 1		Km: 0+000
Train type				Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
0				1	1	16	177	yes	52.4	54.6
Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]		Curve radius [dB]	Multiple reflections [dB]		Corrected Emission level day	night
0+000	713353.730	3905634.639	73.67	-		-	-		-	-

Track 2 (special track)				Rail track:	Direction:			Section: 1		Km: 0+000
Train type				Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
0				0	1	16	177	yes	-	54.7
Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]		Curve radius [dB]	Multiple reflections [dB]		Corrected Emission level day	night
0+000	713573.463	3905278.912	75.92	5.0		-	-		-	-

Track 3 (special track)				Rail track:	Direction:			Section: 1		Km: 0+000
Train type				Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]		Curve radius [dB]	Multiple reflections [dB]		Corrected Emission level day	night
0+000	713563.197	3905291.824	75.86	5.0		-	-		-	-

9/21/2021

Noise emissions of railway traffic

North entry/exit to CCMF | Rail track: | Direction: | Section: 1 | Km: 0+000

Train type	Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
0	6	2	16	177	yes	60.2	57.7

Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	Corrected Emission level night
0+000	713313.244	3905749.638	77.71	-	-	-	-	-

North entry/exit to CCMF | Rail track: | Direction: | Section: 1 | Km: 0+000

Train type	Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
0	6	2	16	177	yes	60.2	57.7

Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	Corrected Emission level night
0+000	713334.411	3905702.872	76.06	-	-	-	-	-

Track 1 | Rail track: | Direction: | Section: 1 | Km: 0+000

Train type	Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)

Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	Corrected Emission level night
0+000	713552.164	3905340.458	76.52	-	-	-	-	-

Track 2 | Rail track: | Direction: | Section: 1 | Km: 0+000

Train type	Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
0	0	1	16	177	yes	-	54.6

Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	Corrected Emission level night
0+000	713538.643	3905339.343	75.79	-	-	-	-	-

9/21/2021

Noise emissions of railway traffic

Track 3			Rail track:	Direction:		Section: 1			Km: 0+000	
Train type				Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]		Curve radius [dB]	Multiple reflections [dB]		Corrected Emission level day	Corrected Emission level night
0+000	713533.775	3905334.474	75.48	-		-	-		-	-

Track 4 (service & inspection)			Rail track:	Direction:		Section: 1			Km: 0+000	
Train type				Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
			0	1	0	16	177	yes	52.4	-
Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]		Curve radius [dB]	Multiple reflections [dB]		Corrected Emission level day	Corrected Emission level night
0+000	713518.725	3905338.336	74.62	-		-	-		-	-

North entry/exit to CCMF			Rail track:	Direction:		Section: 1			Km: 0+000	
Train type				Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
			0	6	2	16	177	yes	60.2	57.7
Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]		Curve radius [dB]	Multiple reflections [dB]		Corrected Emission level day	Corrected Emission level night
0+000	713302.586	3905773.115	77.79	-		-	-		-	-

to Track 2, 3, 4 & 5			Rail track:	Direction:		Section: 1			Km: 0+000	
Train type				Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
			0	2	2	16	177	yes	55.4	57.7
Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]		Curve radius [dB]	Multiple reflections [dB]		Corrected Emission level day	Corrected Emission level night
0+000	713348.224	3905664.952	74.71	-		-	-		-	-

Noise emissions of railway traffic

To Track 4 & 5 (wash)			Rail track:	Direction:			Section: 1		Km: 0+000
Train type				Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
			0	3	1	16	177	yes	57.2	54.6

Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	Corrected Emission level night
0+000	713371.746	3905597.200	73.50	-	-	-	-	-

to Track 2 & 3			Rail track:	Direction:			Section: 1		Km: 0+000
Train type				Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
			0	1	1	16	177	yes	52.4	54.6

Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	Corrected Emission level night
0+000	713359.683	3905632.986	73.98	-	-	-	-	-

Track 5 (train wash) & Track 4			Rail track:	Direction:			Section: 1		Km: 0+000
Train type				Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
			0	3	1	16	177	yes	57.2	54.6

Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	Corrected Emission level night
0+000	713359.281	3905632.584	73.94	-	-	-	-	-

Track 2			Rail track:	Direction:			Section: 1		Km: 0+000
Train type				Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
			0	1	1	16	177	yes	52.4	54.6

Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	Corrected Emission level night
0+000	713375.164	3905603.633	73.98	-	-	-	-	-

Noise emissions of railway traffic

Track 4 (service & inspection)	Rail track:	Direction:		Section: 1			Km: 0+000	
Train type		Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
0		1	1	16	177	yes	52.4	54.6

Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	night
0+000	713382.804	3905567.847	73.77	-	-	-	-	-

Track 5 (Train Wash Track)	Rail track:	Direction:		Section: 1			Km: 0+000	
Train type		Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)
0		1	1	16	177	yes	52.4	54.6

Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	night
0+000	713382.348	3905567.697	73.72	-	-	-	-	-

South entrance/exit CCMF (special track)	Rail track:	Direction:		Section: 1			Km: 0+000	
Train type		Number of trains day	Number of trains night	Speed km/h	Length per train m	Max	Emission level day dB(A)	Emission level night dB(A)

Track Station km	Coordinates of track axis X	Y	Z	Track type [dB]	Curve radius [dB]	Multiple reflections [dB]	Corrected Emission level day	night
0+000	713777.546	3905124.250	80.60	5.0	-	-	-	-

9/21/2021

Appendix B. Monitoring Equipment Calibration Certificates

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Brüel & Kjær

MANUFACTURER'S CERTIFICATE OF CONFORMANCE

We certify that Brüel & Kjær **-2245---** Serial No. **2245-100486**
has been tested and passed all production tests, confirming compliance with the manufacturer's published specification at the date of the test.

The final test has been performed using calibrated equipment, traceable to national or international standards or by ratio measurements.

Brüel & Kjær is certified under ISO 9001 assuring that all test data is retained on file and is available for inspection upon request.

Nærum 29-apr-2020

Torben Bjørn
Vice President, Operations

Please note that this document is not a calibration certificate.
For information on our calibration services please go to www.bksv.com/service.

Brüel & Kjær

MANUFACTURER'S CERTIFICATE OF CONFORMANCE

We certify that Brüel & Kjær **-2245---** Serial No. **2245-100485**
has been tested and passed all production tests, confirming compliance with the manufacturer's published specification at the date of the test.

The final test has been performed using calibrated equipment, traceable to national or international standards or by ratio measurements.

Brüel & Kjær is certified under ISO 9001 assuring that all test data is retained on file and is available for inspection upon request.

Nærum 29-apr-2020

Torben Bjørn
Vice President, Operations

Please note that this document is not a calibration certificate.
For information on our calibration services please go to www.bksv.com/service.

Scantek, Inc.
CALIBRATION LABORATORY
ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1
ACCREDITED by NVLAP (an ILAC MRA signatory)

NVLAP®
CALIBRATION
NVLAP Lab Code: 200625-0

Calibration Certificate No.44453

Instrument:	**Sound Level Meter**	*Date Calibrated:* **3/9/2020**	*Cal Due:*
Model:	**2270**	*Status:*	**Received** / **Sent**
Manufacturer:	**Brüel and Kjær**	*In tolerance:*	**X** / **X**
Serial number:	**3024719_KIT#3**	*Out of tolerance:*	
Tested with:	**Microphone** 4189 s/n 2578556, 4189 s/n 2021340; **Preamplifier** ZC0032 s/n 6630, ZC0032 s/n 29400	*See comments:*	
Type (class):	**1**	*Contains non-accredited tests:*	__Yes _X_ No
Customer:	**Harris Miller Miller & Hanson Inc.**	*Calibration service:*	__ Basic _X_ Standard
Tel/Fax:	**781-229-0707 x3148 / 781-859-8940**	*Address:*	**700 District Avenue, Suite 800, Burlington, MA 01803**

Tested in accordance with the following procedures and standards:
Calibration of Sound Level Meters, Scantek Inc., Rev. 6/26/2015
SLM & Dosimeters – Acoustical Tests, Scantek Inc., Rev. 7/6/2011

Instrumentation used for calibration: Nor-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence Cal. Lab / Accreditation	Cal. Due
483B-Norsonic	SME Cal Unit	31052	Oct 31, 2019	Scantek, Inc./ NVLAP	Oct 31, 2020
DS-360-SRS	Function Generator	33584	Oct 23, 2019	ACR Env./ A2LA	Oct 23, 2021
34401A-Agilent Technologies	Digital Voltmeter	MY47011118	Oct 22, 2019	ACR Env. / A2LA	Oct 22, 2020
HM30-Thommen	Meteo Station	1040170/39633	Oct 24, 2019	ACR Env./ A2LA	Oct 24, 2020
PC Program 1019 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
1251-Norsonic	Calibrator	30878	Oct 23, 2019	Scantek, Inc./ NVLAP	Oct 23, 2020

Instrumentation and test results are traceable to SI (International System of Units) through standards maintained by NIST (USA) and NPL (UK).

Environmental conditions:

Temperature (°C)	Barometric pressure (kPa)	Relative Humidity (%)
23.7	101.42	42.3

Calibrated by:	Lydon Dawkins	**Authorized signatory:**	Steven E. Marshall
Signature	Lydon Dawkins	Signature	Steven E Marshall
Date	3/9/2020	Date	3/10/2020

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Scantek, Inc.
CALIBRATION LABORATORY
ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1
ACCREDITED by NVLAP (an ILAC MRA signatory)

NVLAP®
CALIBRATION
NVLAP Lab Code: 200625-0

Calibration Certificate No.44438

Instrument:	**Acoustical Calibrator**	*Date Calibrated:* **2/27/2020** *Cal Due:*		
Model:	**4231**	*Status:*	**Received**	**Sent**
Manufacturer:	**Brüel and Kjær**	*In tolerance:*	**X**	**X**
Serial number:	**2579292**	*Out of tolerance:*		
Class (IEC 60942):	**1**	*See comments:*		
Barometer type:		*Contains non-accredited tests:* __Yes _X_ No		
Barometer s/n:				
Customer:	**Harris Miller Miller & Hanson Inc.**	*Address:* **700 District Avenue, Suite 800, Burlington, MA 01803**		
Tel/Fax:	**781-229-0707 x3148 / 781-859-8940**			

Tested in accordance with the following procedures and standards:
Calibration of Acoustical Calibrators, Scantek Inc., Rev. 10/1/2010

Instrumentation used for calibration: Nor-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence Cal. Lab / Accreditation	Cal. Due
483B-Norsonic	SME Cal Unit	31052	Oct 31, 2019	Scantek, Inc./ NVLAP	Oct 31, 2020
DS-360-SRS	Function Generator	33584	Oct 23, 2019	ACR Env./ A2LA	Oct 23, 2021
34401A-Agilent Technologies	Digital Voltmeter	MY47011118	Oct 22, 2019	ACR Env. / A2LA	Oct 22, 2020
HM30-Thommen	Meteo Station	1040170/39633	Oct 24, 2019	ACR Env./ A2LA	Oct 24, 2020
140-Norsonic	Real Time Analyzer	1406423	Oct 31, 2019	Scantek / NVLAP	Oct 31, 2020
PC Program 1018 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
4134-Brüel&Kjær	Microphone	173368	Oct 23, 2019	Scantek, Inc. / NVLAP	Oct 23, 2020
1203-Norsonic	Preamplifier	14059	Feb 28, 2019	Scantek, Inc./ NVLAP	Feb 28, 2020

Instrumentation and test results are traceable to SI (International System of Units) through standards maintained by NIST (USA) and NPL (UK)

Calibrated by:	Lydon Dawkins	**Authorized signatory:**	Steven E. Marshall
Signature	Lydon Dawkins	Signature	Steven E Marshall
Date	2/27/2020	Date	3/3/2020

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Scantek, Inc.
CALIBRATION LABORATORY
ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1
ACCREDITED by NVLAP (an ILAC MRA signatory)

NVLAP®
CALIBRATION
NVLAP Lab Code: 200625-0

Calibration Certificate No.44459

Instrument:	**Sound Level Meter**	*Date Calibrated:* **3/10/2020**	*Cal Due:*
Model:	**2270**		
Manufacturer:	**Brüel and Kjær**		
Serial number:	**3024729_KIT#5**		
Tested with:	**Microphone** 4189 s/n 2616506; 4189 s/n 2386155; **Preamplifier** ZC0032 s/n 11159; ZC0032 s/n 29416		
Type (class):	**1**		
Customer:	**Harris Miller Miller & Hanson Inc.**	*Address:*	**700 District Avenue, Suite 800, Burlington, MA 01803**
Tel/Fax:	**781-229-0707 x3148 / 781-859-8940**		

Status:	Received	Sent
In tolerance:	X	X
Out of tolerance:		
See comments:		

Contains non-accredited tests: __Yes _X_ No
Calibration service: __ Basic _X_ Standard

Tested in accordance with the following procedures and standards:
Calibration of Sound Level Meters, Scantek Inc., Rev. 6/26/2015
SLM & Dosimeters – Acoustical Tests, Scantek Inc., Rev. 7/6/2011

Instrumentation used for calibration: Nor-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence Cal. Lab / Accreditation	Cal. Due
483B-Norsonic	SME Cal Unit	31052	Oct 31, 2019	Scantek, Inc./ NVLAP	Oct 31, 2020
DS-360-SRS	Function Generator	33584	Oct 23, 2019	ACR Env./ A2LA	Oct 23, 2021
34401A-Agilent Technologies	Digital Voltmeter	MY47011118	Oct 22, 2019	ACR Env. / A2LA	Oct 22, 2020
HM30-Thommen	Meteo Station	1040170/39633	Oct 24, 2019	ACR Env./ A2LA	Oct 24, 2020
PC Program 1019 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
1251-Norsonic	Calibrator	30878	Oct 23, 2019	Scantek, Inc./ NVLAP	Oct 23, 2020

Instrumentation and test results are traceable to SI (International System of Units) through standards maintained by NIST (USA) and NPL (UK).

Environmental conditions:

Temperature (°C)	Barometric pressure (kPa)	Relative Humidity (%)
24.4	100.57	40.6

Calibrated by:	Lydon Dawkins	**Authorized signatory:**	Steven E. Marshall
Signature	Lydon Dawkins	Signature	Steven E Marshall
Date	3/10/2020	Date	3/10/2020

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Scantek, Inc.
CALIBRATION LABORATORY

ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1
ACCREDITED by NVLAP (an ILAC MRA signatory)

NVLAP®
CALIBRATION
NVLAP Lab Code: 200625-0

Calibration Certificate No.44441

Instrument:	**Acoustical Calibrator**	*Date Calibrated:* **2/27/2020** *Cal Due:*			
Model:	**4231**	*Status:*	**Received**	**Sent**	
Manufacturer:	**Brüel and Kjær**	*In tolerance:*	X	X	
Serial number:	**2579294**	*Out of tolerance:*			
Class (IEC 60942):	**1**	*See comments:*			
Barometer type:		*Contains non-accredited tests:* __Yes _X_ No			
Barometer s/n:					
Customer:	**Harris Miller Miller & Hanson Inc.**	*Address:*	**700 District Avenue, Suite 800, Burlington, MA 01803**		
Tel/Fax:	**781-229-0707 x3148 / 781-859-8940**				

Tested in accordance with the following procedures and standards:
Calibration of Acoustical Calibrators, Scantek Inc., Rev. 10/1/2010

Instrumentation used for calibration: Nor-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence Cal. Lab / Accreditation	Cal. Due
483B-Norsonic	SME Cal Unit	31052	Oct 31, 2019	Scantek, Inc./ NVLAP	Oct 31, 2020
DS-360-SRS	Function Generator	33584	Oct 23, 2019	ACR Env./ A2LA	Oct 23, 2021
34401A-Agilent Technologies	Digital Voltmeter	MY47011118	Oct 22, 2019	ACR Env. / A2LA	Oct 22, 2020
HM30-Thommen	Meteo Station	1040170/39633	Oct 24, 2019	ACR Env./ A2LA	Oct 24, 2020
140-Norsonic	Real Time Analyzer	1406423	Oct 31, 2019	Scantek / NVLAP	Oct 31, 2020
PC Program 1018 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
4134-Brüel&Kjær	Microphone	173368	Oct 23, 2019	Scantek, Inc. / NVLAP	Oct 23, 2020
1203-Norsonic	Preamplifier	14059	Feb 28, 2019	Scantek, Inc./ NVLAP	Feb 28, 2020

Instrumentation and test results are traceable to SI (International System of Units) through standards maintained by NIST (USA) and NPL (UK)

Calibrated by:	Lydon Dawkins	**Authorized signatory:**	Steven E. Marshall
Signature	Lydon Dawkins	Signature	Steven E. Marshall
Date	2/27/2020	Date	3/3/2020

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Scantek, Inc.
CALIBRATION LABORATORY
ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1
ACCREDITED by NVLAP (an ILAC MRA signatory)

NVLAP®
CALIBRATION
NVLAP Lab Code: 200625-0

Calibration Certificate No.44462

Instrument:	**Sound Level Meter**	*Date Calibrated:* **3/10/2020**	*Cal Due:*
Model:	**2270**	*Status:*	**Received** / **Sent**
Manufacturer:	**Brüel and Kjær**	*In tolerance:*	X / X
Serial number:	**3024993_KIT#6**	*Out of tolerance:*	
Tested with:	**Microphone** 4189 s/n 2616507 4189 s/n 3180986 **Preamplifier** ZC0032 s/n 18967 ZC0032 s/n 29417	*See comments:*	
Type (class):	**1**	*Contains non-accredited tests:* __Yes X No	
Customer:	**Harris Miller Miller & Hanson Inc.**	*Calibration service:* __ Basic X Standard	
Tel/Fax:	**781-229-0707 x3148 / 781-859-8940**	*Address:*	**700 District Avenue, Suite 800, Burlington, MA 01803**

Tested in accordance with the following procedures and standards:
Calibration of Sound Level Meters, Scantek Inc., Rev. 6/26/2015
SLM & Dosimeters – Acoustical Tests, Scantek Inc., Rev. 7/6/2011

Instrumentation used for calibration: Nor-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence Cal. Lab / Accreditation	Cal. Due
483B-Norsonic	SME Cal Unit	31052	Oct 31, 2019	Scantek, Inc./ NVLAP	Oct 31, 2020
DS-360-SRS	Function Generator	33584	Oct 23, 2019	ACR Env./ A2LA	Oct 23, 2021
34401A-Agilent Technologies	Digital Voltmeter	MY47011118	Oct 22, 2019	ACR Env. / A2LA	Oct 22, 2020
HM30-Thommen	Meteo Station	1040170/39633	Oct 24, 2019	ACR Env./ A2LA	Oct 24, 2020
PC Program 1019 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
1251-Norsonic	Calibrator	30878	Oct 23, 2019	Scantek, Inc./ NVLAP	Oct 23, 2020

Instrumentation and test results are traceable to SI (International System of Units) through standards maintained by NIST (USA) and NPL (UK).

Environmental conditions:

Temperature (°C)	Barometric pressure (kPa)	Relative Humidity (%)
23.0	100.28	49.5

Calibrated by:	Lydon Dawkins	**Authorized signatory:**	Steven E. Marshall
Signature	Lydon Dawkins	Signature	Steven E Marshall
Date	3/10/2020	Date	3/10/2020

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Scantek, Inc.
CALIBRATION LABORATORY
ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1
ACCREDITED by NVLAP (an ILAC MRA signatory)

NVLAP®
CALIBRATION
NVLAP Lab Code: 200625-0

Calibration Certificate No.44437

Instrument:	**Acoustical Calibrator**	*Date Calibrated:* **2/27/2020** *Cal Due:*		
Model:	**4231**	*Status:*	**Received**	**Sent**
Manufacturer:	**Brüel and Kjær**	*In tolerance:*	**X**	**X**
Serial number:	**2579295**	*Out of tolerance:*		
Class (IEC 60942):	**1**	*See comments:*		
Barometer type:		*Contains non-accredited tests:* __**Yes** _X_ **No**		
Barometer s/n:				
Customer:	**Harris Miller Miller & Hanson Inc.**	*Address:*	**700 District Avenue, Suite 800,**	
Tel/Fax:	**781-229-0707 x3148 / 781-229-7939**		**Burlington, MA 01803**	

Tested in accordance with the following procedures and standards:
Calibration of Acoustical Calibrators, Scantek Inc., Rev. 10/1/2010

Instrumentation used for calibration: Nor-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence Cal. Lab / Accreditation	Cal. Due
483B-Norsonic	SME Cal Unit	31052	Oct 31, 2019	Scantek, Inc./ NVLAP	Oct 31, 2020
DS-360-SRS	Function Generator	33584	Oct 23, 2019	ACR Env./ A2LA	Oct 23, 2021
34401A-Agilent Technologies	Digital Voltmeter	MY47011118	Oct 22, 2019	ACR Env. / A2LA	Oct 22, 2020
HM30-Thommen	Meteo Station	1040170/39633	Oct 24, 2019	ACR Env./ A2LA	Oct 24, 2020
140-Norsonic	Real Time Analyzer	1406423	Oct 31, 2019	Scantek / NVLAP	Oct 31, 2020
PC Program 1018 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
4134-Brüel&Kjær	Microphone	173368	Oct 23, 2019	Scantek, Inc. / NVLAP	Oct 23, 2020
1203-Norsonic	Preamplifier	14059	Feb 28, 2019	Scantek, Inc./ NVLAP	Feb 28, 2020

Instrumentation and test results are traceable to SI (International System of Units) through standards maintained by NIST (USA) and NPL (UK)

Calibrated by:	Lydon Dawkins	**Authorized signatory:**	Steven E. Marshall
Signature	Lydon Dawkins	Signature	Steven E. Marshall
Date	2/27/2020	Date	3/3/2020

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Appendix C. Detailed Modeling Results

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Table C-1. Detailed Operational Noise Analysis Results Phase 1

Receptor	Land Use Category	Units	Existing (L_{dn}/L_{eq})	Impact Threshold		Proposed Project (L_{dn}/L_{eq})	Proposed Project Cumulative (L_{dn}/L_{eq})	Increase (dB)	Impact Category
				Moderate	Severe				
R1	2	1	51.3	4.4	9.2	34.9	51.4	0.1	No Impact
R2	2	1	52.9	3.8	8.2	35.3	53.0	0.1	No Impact
R3	2	1	51.3	4.4	9.2	35.3	51.4	0.1	No Impact
R4	2	1	52.7	3.9	8.3	36.6	52.8	0.1	No Impact
R5	2	1	51.2	4.5	9.3	38.4	51.4	0.2	No Impact
R6	2	1	51.4	4.4	9.1	39.8	51.7	0.3	No Impact
R7	2	1	51.2	4.5	9.3	39.5	51.5	0.3	No Impact
R8	2	1	52.3	4.0	8.6	40	52.5	0.2	No Impact
R9	2	1	52.1	4.1	8.7	47.5	53.4	1.3	No Impact
R10	2	1	51.3	4.4	9.2	50.7	54.0	2.7	No Impact
R11	2	1	49.8	5.1	10.2	42.7	50.6	0.8	No Impact
R12	2	1	49.8	5.1	10.2	44.4	50.9	1.1	No Impact
R13	2	1	49.8	5.1	10.2	45.3	51.1	1.3	No Impact
R14	2	1	49.3	5.3	10.5	39.7	49.8	0.5	No Impact
R15	2	1	49.8	5.1	10.2	49.1	52.5	2.7	No Impact
R16	2	1	49.8	5.1	10.2	50.5	53.2	3.4	No Impact
R17	2	1	49.8	5.1	10.2	48.8	52.3	2.5	No Impact
R18	2	1	49.9	5.0	10.1	52.6	54.5	4.6	No Impact
R19	2	1	48.0	6.0	11.5	43.3	49.3	1.3	No Impact

Table C-1. Detailed Operational Noise Analysis Results Phase 1

Receptor	Land Use Category	Units	Existing (L_{dn}/L_{eq})	Impact Threshold Moderate	Impact Threshold Severe	Proposed Project (L_{dn}/L_{eq})	Proposed Project Cumulative (L_{dn}/L_{eq})	Increase (dB)	Impact Category
R20	2	1	48.0	6.0	11.5	42.6	49.1	1.1	No Impact
R21	2	1	48.0	6.0	11.5	38.1	48.4	0.4	No Impact
R22	2	1	48.0	6.0	11.5	42.9	49.2	1.2	No Impact
R23	2	1	47.1	6.5	12.2	41.6	48.2	1.1	No Impact
R24	2	1	48.0	6.0	11.5	46	50.1	2.1	No Impact
R25	2	1	47.1	6.5	12.2	47.6	50.4	3.3	No Impact
R26	2	1	48.0	6.0	11.5	43.9	49.4	1.4	No Impact
R27	2	1	48.0	6.0	11.5	49	51.5	3.5	No Impact
R28	2	1	48.0	6.0	11.5	50.4	52.4	4.4	No Impact
R29	2	1	47.9	6.1	11.6	51.5	53.1	5.2	No Impact
R30	2	1	46.9	6.6	12.3	48	50.5	3.6	No Impact
R31	2	1	46.6	6.8	12.6	48.5	50.7	4.1	No Impact
R32	2	1	46.4	6.9	12.7	49.9	51.5	5.1	No Impact
R33	2	1	46.1	7.1	13.0	49.3	51.0	4.9	No Impact
R34	2	1	47.9	6.1	11.6	46.4	50.2	2.3	No Impact
R35	2	1	47.5	6.3	11.9	47.7	50.6	3.1	No Impact
R36	2	1	47.1	6.5	12.2	50.7	52.3	5.2	No Impact
R37	2	1	46.8	6.7	12.4	44.7	48.9	2.1	No Impact
R38	2	1	46.6	6.8	12.6	47.7	50.2	3.6	No Impact

Table C-1. Detailed Operational Noise Analysis Results Phase 1

Receptor	Land Use Category	Units	Existing (L_{dn}/L_{eq})	Impact Threshold		Proposed Project (L_{dn}/L_{eq})	Proposed Project Cumulative (L_{dn}/L_{eq})	Increase (dB)	Impact Category
				Moderate	Severe				
R39	2	1	46.3	7.0	12.8	48.7	50.7	4.4	No Impact
R40	2	1	46.1	7.1	13.0	49.3	51.0	4.9	No Impact
R41	2	1	45.8	7.3	13.2	50.4	51.7	5.9	No Impact
R42	2	1	45.6	7.4	13.4	50.4	51.6	6.0	No Impact
R43	2	1	47.5	6.3	11.9	54.3	55.1	7.6	Moderate
R44	2	1	47.5	6.3	11.9	54.5	55.3	7.8	Moderate
R45	2	1	46.8	6.7	12.4	41.7	48.0	1.2	No Impact
R46	2	1	46.5	6.9	12.7	46.4	49.5	3.0	No Impact
R47	2	1	46.3	7.0	12.8	46	49.2	2.9	No Impact
R48	2	1	46.0	7.2	13.1	46.9	49.5	3.5	No Impact
R49	2	1	45.7	7.3	13.3	46.7	49.2	3.5	No Impact
R50	2	1	45.5	7.5	13.5	49.1	50.7	5.2	No Impact
R51	2	1	47.0	6.6	12.3	55.5	56.1	9.1	Moderate
R52	2	1	46.9	6.6	12.3	56.4	56.9	10.0	Moderate
R53	2	1	46.8	6.7	12.4	56.9	57.3	10.5	Moderate
R54	2	1	46.6	6.8	12.6	56.7	57.1	10.5	Moderate
R55	2	1	46.5	6.9	12.7	57.8	58.1	11.6	Moderate
R56	2	1	46.3	7.0	12.8	57.3	57.6	11.3	Moderate
R57	2	1	46.2	7.0	12.9	57.5	57.8	11.6	Moderate

Table C-1. Detailed Operational Noise Analysis Results Phase 1

Receptor	Land Use Category	Units	Existing (L_{dn}/L_{eq})	Impact Threshold		Proposed Project (L_{dn}/L_{eq})	Proposed Project Cumulative (L_{dn}/L_{eq})	Increase (dB)	Impact Category
				Moderate	Severe				
R58	2	1	46.4	6.9	12.7	47.5	50.0	3.6	No Impact
R59	2	1	46.0	7.2	13.1	46.8	49.4	3.4	No Impact
R60	2	1	45.8	7.3	13.2	45.4	48.6	2.8	No Impact
R61	2	1	45.7	7.3	13.3	51.2	52.3	6.6	No Impact
R62	2	1	45.8	7.3	13.2	51	52.1	6.3	No Impact
R63	2	1	45.7	7.3	13.3	48	50.0	4.3	No Impact
R64	2	1	45.7	7.3	13.3	47.8	49.9	4.2	No Impact
R65	2	1	45.7	7.3	13.3	54.7	55.2	9.5	Moderate
R66	2	1	45.0	7.8	13.9	50.5	51.6	6.6	No Impact
R67	2	1	45.0	7.8	13.9	37.9	45.8	0.8	No Impact
R68	2	1	45.1	7.7	13.8	50.5	51.6	6.5	No Impact
R69	2	1	44.9	7.9	14.0	49.7	50.9	6.0	No Impact
R70	2	1	44.5	8.1	14.4	49.2	50.5	6.0	No Impact
R71	2	1	44.6	8.1	14.3	44.8	47.7	3.1	No Impact
R72	2	1	44.1	8.4	14.7	40.6	45.7	1.6	No Impact
R73	2	1	44.3	8.3	14.5	50.1	51.1	6.8	No Impact
R74	2	1	43.9	8.5	14.8	42.4	46.2	2.3	No Impact
R75	2	1	44.3	8.3	14.5	40.6	45.8	1.5	No Impact
R76	2	1	44.1	8.4	14.7	46.2	48.3	4.2	No Impact

Table C-1. Detailed Operational Noise Analysis Results Phase 1

Receptor	Land Use Category	Units	Existing (L_{dn}/L_{eq})	Impact Threshold		Proposed Project (L_{dn}/L_{eq})	Proposed Project Cumulative (L_{dn}/L_{eq})	Increase (dB)	Impact Category
				Moderate	Severe				
R77	2	1	44.2	8.3	14.6	48.2	49.7	5.5	No Impact
R78	2	1	43.6	8.8	14.9	43.8	46.7	3.1	No Impact
R79	2	1	43.7	8.7	14.8	48.7	49.9	6.2	No Impact
R80	2	1	43.9	8.5	14.8	51.3	52.0	8.1	No Impact
R81	2	1	48.9	5.5	10.8	48.6	51.8	2.9	No Impact
R82	2	1	49.0	5.5	10.7	42.6	49.9	0.9	No Impact
R83	2	1	49.2	5.4	10.6	44.7	50.5	1.3	No Impact
R84	2	1	44.9	7.9	14.0	50.1	51.2	6.3	No Impact
R85	2	1	44.8	7.9	14.1	49.7	50.9	6.1	No Impact
R86	2	1	44.8	7.9	14.1	50.2	51.3	6.5	No Impact
R87	2	1	50.3	4.9	9.8	51.9	54.2	3.9	No Impact
R88	2	1	49.8	5.1	10.2	47.2	51.7	1.9	No Impact
R89	2	1	48.8	5.6	10.9	48	51.4	2.6	No Impact
R90	2	1	49.2	5.4	10.6	47.5	51.4	2.2	No Impact
R91	2	1	49.4	5.3	10.5	43.7	50.4	1.0	No Impact
R92	2	1	49.5	5.2	10.4	48.1	51.9	2.4	No Impact
R93	2	1	49.6	5.2	10.3	46.4	51.3	1.7	No Impact
R94	2	1	49.8	5.1	10.2	47.7	51.9	2.1	No Impact
R95	2	1	49.9	5.0	10.1	50.4	53.2	3.3	No Impact

Table C-1. Detailed Operational Noise Analysis Results Phase 1

Receptor	Land Use Category	Units	Existing (L_{dn}/L_{eq})	Impact Threshold Moderate	Impact Threshold Severe	Proposed Project (L_{dn}/L_{eq})	Proposed Project Cumulative (L_{dn}/L_{eq})	Increase (dB)	Impact Category
R96	2	1	48.9	5.5	10.8	44.9	50.4	1.5	No Impact
R97	2	1	49.0	5.5	10.7	46.6	51.0	2.0	No Impact
R98	2	1	49.2	5.4	10.6	47	51.2	2.0	No Impact
R99	2	1	49.2	5.4	10.6	47.1	51.3	2.1	No Impact
R100	2	1	49.4	5.3	10.5	39.8	49.9	0.5	No Impact
R101	2	1	50.0	5.0	10.0	48.8	52.5	2.5	No Impact
R102	2	1	50.0	5.0	10.0	47.4	51.9	1.9	No Impact
R103	2	1	50.1	5.0	10.0	47.1	51.9	1.8	No Impact
R104	2	1	50.3	4.9	9.8	47.9	52.3	2.0	No Impact
R105	2	1	50.5	4.8	9.7	47.7	52.3	1.8	No Impact
R106	2	1	50.7	4.7	9.6	48.8	52.9	2.2	No Impact
R107	2	1	51.2	4.5	9.3	54.7	56.3	5.1	Moderate
R108	2	1	51.2	4.5	9.3	53.3	55.4	4.2	No Impact
R109	2	1	50.9	4.6	9.4	52	54.5	3.6	No Impact
R110	2	1	50.8	4.6	9.5	53.6	55.4	4.6	No Impact
R111	2	1	50.7	4.7	9.6	50.9	53.8	3.1	No Impact
R112	2	1	50.6	4.7	9.6	51.1	53.9	3.3	No Impact
R113	2	1	51.8	4.2	8.9	53	55.5	3.7	No Impact
R114	2	1	51.6	4.3	9.0	50.8	54.2	2.6	No Impact

Table C-1. Detailed Operational Noise Analysis Results Phase 1

Receptor	Land Use Category	Units	Existing (L_{dn}/L_{eq})	Impact Threshold Moderate	Impact Threshold Severe	Proposed Project (L_{dn}/L_{eq})	Proposed Project Cumulative (L_{dn}/L_{eq})	Increase (dB)	Impact Category
R115	2	1	51.3	4.4	9.2	49	53.3	2.0	No Impact
R116	2	1	51.1	4.5	9.3	49.5	53.4	2.3	No Impact
R117	2	1	51.0	4.6	9.4	47.2	52.5	1.5	No Impact
R118	2	1	50.3	4.9	9.8	45.7	51.6	1.3	No Impact
R119	2	1	50.0	5.0	10.0	48.5	52.3	2.3	No Impact
R120	2	1	49.8	5.1	10.2	43.6	50.7	0.9	No Impact
R121	2	1	49.8	5.1	10.2	44.2	50.9	1.1	No Impact
R122	2	1	50.0	5.0	10.0	48.9	52.5	2.5	No Impact
R123	2	1	50.1	5.0	10.0	48.8	52.5	2.4	No Impact
R124	2	1	50.2	4.9	9.9	49.1	52.7	2.5	No Impact
R125	2	1	41.5	10.0	15.0	48.6	49.4	7.9	No Impact
R126	2	1	41.9	10.0	15.0	47.9	48.9	7.0	No Impact
R127	2	1	42.0	10.0	15.0	40.9	44.5	2.5	No Impact
R128	2	1	41.5	10.0	15.0	31.3	41.9	0.4	No Impact
R129	2	1	41.2	10.0	15.0	30.3	41.5	0.3	No Impact
R130	2	1	41.0	10.0	15.0	31.5	41.5	0.5	No Impact
R131	2	1	40.7	10.0	15.0	33.9	41.5	0.8	No Impact
R132	2	1	40.5	10.0	15.0	34.6	41.5	1.0	No Impact
R133	2	1	49.2	5.4	10.6	37.9	49.5	0.3	No Impact

Table C-1. Detailed Operational Noise Analysis Results Phase 1

Receptor	Land Use Category	Units	Existing (L_{dn}/L_{eq})	Impact Threshold		Proposed Project (L_{dn}/L_{eq})	Proposed Project Cumulative (L_{dn}/L_{eq})	Increase (dB)	Impact Category
				Moderate	Severe				
R134	2	1	49.1	5.4	10.7	43.7	50.2	1.1	No Impact
R135	2	1	40.2	10.0	15.0	32	40.8	0.6	No Impact
R136	2	1	40.4	10.0	15.0	31.3	40.9	0.5	No Impact
R137	2	1	40.5	10.0	15.0	31.1	41.0	0.5	No Impact
R138	2	1	40.7	10.0	15.0	30.2	41.1	0.4	No Impact
R139	2	1	40.8	10.0	15.0	30.1	41.2	0.4	No Impact
R140	2	1	41.0	10.0	15.0	29.9	41.3	0.3	No Impact
R141	2	1	41.2	10.0	15.0	29.4	41.5	0.3	No Impact
R142	2	1	41.4	10.0	15.0	29.3	41.7	0.3	No Impact
R143	2	1	41.5	10.0	15.0	29.2	41.7	0.2	No Impact
R144	2	1	41.8	10.0	15.0	30.2	42.1	0.3	No Impact
R145	2	1	42.3	10.0	15.0	21.6	42.3	0.0	No Impact
R146	2	12	47.9	6.1	11.6	25.8	47.9	0.0	No Impact
R147	2	12	48.6	5.7	11.0	26.2	48.6	0.0	No Impact
R148	2	12	47.4	6.3	11.9	28.8	47.5	0.1	No Impact
R149	2	12	49.0	5.5	10.7	27	49.0	0.0	No Impact
R150	2	1	50.4	4.8	9.8	28.1	50.4	0.0	No Impact
R153	2	1	48.0	6.0	11.5	27.9	48.0	0.0	No Impact
R155	2	1	50.7	4.7	9.6	29.7	50.7	0.0	No Impact

Table C-1. Detailed Operational Noise Analysis Results Phase 1

Receptor	Land Use Category	Units	Existing (L_{dn}/L_{eq})	Impact Threshold Moderate	Impact Threshold Severe	Proposed Project (L_{dn}/L_{eq})	Proposed Project Cumulative (L_{dn}/L_{eq})	Increase (dB)	Impact Category
R157	2	1	48.1	5.9	11.4	29.4	48.2	0.1	No Impact
R158	2	1	48.6	5.7	11.0	33.2	48.7	0.1	No Impact
R159	2	1	47.7	6.2	11.7	27.4	47.7	0.0	No Impact
R161	2	1	46.6	6.8	12.6	37.3	47.1	0.5	No Impact
R164	2	1	43.7	8.7	14.8	41	45.6	1.9	No Impact
R165	2	1	49.0	5.5	10.7	38.2	49.3	0.3	No Impact
R166	2	1	49.8	5.1	10.2	37.1	50.0	0.2	No Impact
R167	2	4	53.0	3.8	8.2	40.7	53.2	0.2	No Impact
R168	2	4	53.0	3.8	8.2	37.1	53.1	0.1	No Impact
R169	2	4	49.9	5.0	10.1	41.3	50.5	0.6	No Impact
R170	2	8	49.0	5.5	10.7	46.3	50.9	1.9	No Impact
R171	2	1	56.5	2.8	6.4	41.6	56.6	0.1	No Impact
R172	2	1	57.8	2.5	5.8	42	57.9	0.1	No Impact
R173	2	1	57.1	2.6	6.1	40.4	57.2	0.1	No Impact
R174	2	1	58.0	2.4	5.8	36.9	58.0	0.0	No Impact
R175	2	1	59.4	2.1	5.2	36.8	59.4	0.0	No Impact
R176	2	21	52.2	4.1	8.6	57.1	58.3	6.1	Moderate
R177	2	16	52.5	4.0	8.5	44.2	53.1	0.6	No Impact
R178	2	16	53.3	3.7	8.0	39.8	53.5	0.2	No Impact

Table C-1. Detailed Operational Noise Analysis Results Phase 1

Receptor	Land Use Category	Units	Existing (L_{dn}/L_{eq})	Impact Threshold		Proposed Project (L_{dn}/L_{eq})	Proposed Project Cumulative (L_{dn}/L_{eq})	Increase (dB)	Impact Category
				Moderate	Severe				
R179	2	16	50.5	4.8	9.7	41.9	51.1	0.6	No Impact
R180	2	1	52.5	4.0	8.5	34.6	52.6	0.1	No Impact
R197	2	21	54.4	3.3	7.4	47.7	55.2	0.8	No Impact
R198	3	1	46.2	7.0	12.9	56.4	56.8	10.6	Moderate
R199	4	1	46.2	7.0	12.9	48	50.2	4.0	No Impact
R200	5	1	46.2	7.0	12.9	57.4	57.7	11.5	Moderate
R201	6	1	46.2	7.0	12.9	57.2	57.5	11.3	Moderate

Notes:
dB=decibel; L_{eq}=equivalent noise level; L_{dn}=day-night average sound level

Table C-2. Detailed Operational Noise Analysis Results Later Phases

Receptor	Land Use Category	Units	Existing (L_{dn}/L_{eq})	Impact Threshold		Proposed Project (L_{dn}/L_{eq})	Proposed Project Cumulative (L_{dn}/L_{eq})	Increase (dB)	Impact Category
				Moderate	Severe				
R1	2	1	51.3	4.4	9.2	37.4	51.5	0.2	No Impact
R2	2	1	52.9	3.8	8.2	37.8	53.0	0.1	No Impact
R3	2	1	51.3	4.4	9.2	37.9	51.5	0.2	No Impact
R4	2	1	52.7	3.9	8.3	39.0	52.9	0.2	No Impact
R5	2	1	51.2	4.5	9.3	40.7	51.6	0.4	No Impact
R6	2	1	51.4	4.4	9.1	42.1	51.9	0.5	No Impact
R7	2	1	51.2	4.5	9.3	41.9	51.7	0.5	No Impact
R8	2	1	52.3	4.0	8.6	42.3	52.7	0.4	No Impact
R9	2	1	52.1	4.1	8.7	49.6	54.0	1.9	No Impact
R10	2	1	51.3	4.4	9.2	52.8	55.1	3.8	No Impact
R11	2	1	49.8	5.1	10.2	44.6	51.0	1.2	No Impact
R12	2	1	49.8	5.1	10.2	46.4	51.4	1.6	No Impact
R13	2	1	49.8	5.1	10.2	47.2	51.7	1.9	No Impact
R14	2	1	49.3	5.3	10.5	41.8	50.0	0.7	No Impact
R15	2	1	49.8	5.1	10.2	51.3	53.6	3.8	No Impact
R16	2	1	49.8	5.1	10.2	52.4	54.3	4.5	No Impact
R17	2	1	49.8	5.1	10.2	50.8	53.4	3.6	No Impact
R18	2	1	49.9	5.0	10.1	54.6	55.9	6.0	Moderate
R19	2	1	48.0	6.0	11.5	44.7	49.7	1.7	No Impact

Table C-2. Detailed Operational Noise Analysis Results Later Phases

Receptor	Land Use Category	Units	Existing (L_{dn}/L_{eq})	Impact Threshold		Proposed Project (L_{dn}/L_{eq})	Proposed Project Cumulative (L_{dn}/L_{eq})	Increase (dB)	Impact Category
				Moderate	Severe				
R20	2	1	48.0	6.0	11.5	44.9	49.7	1.7	No Impact
R21	2	1	48.0	6.0	11.5	40.6	48.7	0.7	No Impact
R22	2	1	48.0	6.0	11.5	45.5	49.9	1.9	No Impact
R23	2	1	47.1	6.5	12.2	43.5	48.7	1.6	No Impact
R24	2	1	48.0	6.0	11.5	48.2	51.1	3.1	No Impact
R25	2	1	47.1	6.5	12.2	49.3	51.4	4.3	No Impact
R26	2	1	48.0	6.0	11.5	46.5	50.3	2.3	No Impact
R27	2	1	48.0	6.0	11.5	51.2	52.9	4.9	No Impact
R28	2	1	48.0	6.0	11.5	52.5	53.8	5.8	No Impact
R29	2	1	47.9	6.1	11.6	53.6	54.6	6.7	Moderate
R30	2	1	46.9	6.6	12.3	49.9	51.7	4.8	No Impact
R31	2	1	46.6	6.8	12.6	49.9	51.6	5.0	No Impact
R32	2	1	46.4	6.9	12.7	50.1	51.7	5.3	No Impact
R33	2	1	46.1	7.1	13.0	50.7	52.0	5.9	No Impact
R34	2	1	47.9	6.1	11.6	48.5	51.2	3.3	No Impact
R35	2	1	47.5	6.3	11.9	49.6	51.7	4.2	No Impact
R36	2	1	47.1	6.5	12.2	52.4	53.5	6.4	No Impact
R37	2	1	46.8	6.7	12.4	46.8	49.8	3.0	No Impact
R38	2	1	46.6	6.8	12.6	48.2	50.5	3.9	No Impact

Table C-2. Detailed Operational Noise Analysis Results Later Phases

Receptor	Land Use Category	Units	Existing (L_{dn}/L_{eq})	Impact Threshold		Proposed Project (L_{dn}/L_{eq})	Proposed Project Cumulative (L_{dn}/L_{eq})	Increase (dB)	Impact Category
				Moderate	Severe				
R39	2	1	46.3	7.0	12.8	49.2	51.0	4.7	No Impact
R40	2	1	46.1	7.1	13.0	50.3	51.7	5.6	No Impact
R41	2	1	45.8	7.3	13.2	50.9	52.1	6.3	No Impact
R42	2	1	45.6	7.4	13.4	50.5	51.7	6.1	No Impact
R43	2	1	47.5	6.3	11.9	56.9	57.3	9.8	Moderate
R44	2	1	47.5	6.3	11.9	57.1	57.5	10.0	Moderate
R45	2	1	46.8	6.7	12.4	45.1	49.0	2.2	No Impact
R46	2	1	46.5	6.9	12.7	48.5	50.6	4.1	No Impact
R47	2	1	46.3	7.0	12.8	48.9	50.8	4.5	No Impact
R48	2	1	46.0	7.2	13.1	49.0	50.8	4.8	No Impact
R49	2	1	45.7	7.3	13.3	48.9	50.6	4.9	No Impact
R50	2	1	45.5	7.5	13.5	49.4	50.9	5.4	No Impact
R51	2	1	47.0	6.6	12.3	57.4	57.8	10.8	Moderate
R52	2	1	46.9	6.6	12.3	57.7	58.0	11.1	Moderate
R53	2	1	46.8	6.7	12.4	57.5	57.9	11.1	Moderate
R54	2	1	46.6	6.8	12.6	57.4	57.8	11.2	Moderate
R55	2	1	46.5	6.9	12.7	57.5	57.8	11.3	Moderate
R56	2	1	46.3	7.0	12.8	57.2	57.5	11.2	Moderate
R57	2	1	46.2	7.0	12.9	57.2	57.5	11.3	Moderate

Table C-2. Detailed Operational Noise Analysis Results Later Phases

Receptor	Land Use Category	Units	Existing (L_{dn}/L_{eq})	Impact Threshold		Proposed Project (L_{dn}/L_{eq})	Proposed Project Cumulative (L_{dn}/L_{eq})	Increase (dB)	Impact Category
				Moderate	Severe				
R58	2	1	46.4	6.9	12.7	50.3	51.8	5.4	No Impact
R59	2	1	46.0	7.2	13.1	49.9	51.4	5.4	No Impact
R60	2	1	45.8	7.3	13.2	48.6	50.4	4.6	No Impact
R61	2	1	45.7	7.3	13.3	50.0	51.4	5.7	No Impact
R62	2	1	45.8	7.3	13.2	51.0	52.2	6.4	No Impact
R63	2	1	45.7	7.3	13.3	50.5	51.7	6.0	No Impact
R64	2	1	45.7	7.3	13.3	50.2	51.5	5.8	No Impact
R65	2	1	45.7	7.3	13.3	53.5	54.1	8.4	Moderate
R66	2	1	45.0	7.8	13.9	50.4	51.5	6.5	No Impact
R67	2	1	45.0	7.8	13.9	41.1	46.5	1.5	No Impact
R68	2	1	45.1	7.7	13.8	51.7	52.5	7.4	No Impact
R69	2	1	44.9	7.9	14.0	50.9	51.8	6.9	No Impact
R70	2	1	44.5	8.1	14.4	50.4	51.4	6.9	No Impact
R71	2	1	44.6	8.1	14.3	47.0	49.0	4.4	No Impact
R72	2	1	44.1	8.4	14.7	42.3	46.3	2.2	No Impact
R73	2	1	44.3	8.3	14.5	50.2	51.2	6.9	No Impact
R74	2	1	43.9	8.5	14.8	44.6	47.3	3.4	No Impact
R75	2	1	44.3	8.3	14.5	43.1	46.7	2.4	No Impact
R76	2	1	44.1	8.4	14.7	46.3	48.3	4.2	No Impact

Table C-2. Detailed Operational Noise Analysis Results Later Phases

Receptor	Land Use Category	Units	Existing (L_{dn}/L_{eq})	Impact Threshold Moderate	Impact Threshold Severe	Proposed Project (L_{dn}/L_{eq})	Proposed Project Cumulative (L_{dn}/L_{eq})	Increase (dB)	Impact Category
R77	2	1	44.2	8.3	14.6	48.2	49.6	5.4	No Impact
R78	2	1	43.6	8.8	14.9	43.9	46.8	3.2	No Impact
R79	2	1	43.7	8.7	14.8	48.8	50.0	6.3	No Impact
R80	2	1	43.9	8.5	14.8	50.1	51.0	7.1	No Impact
R81	2	1	48.9	5.5	10.8	48.0	51.5	2.6	No Impact
R82	2	1	49.0	5.5	10.7	45.3	50.5	1.5	No Impact
R83	2	1	49.2	5.4	10.6	46.9	51.2	2.0	No Impact
R84	2	1	44.9	7.9	14.0	48.6	50.1	5.2	No Impact
R85	2	1	44.8	7.9	14.1	48.7	50.2	5.4	No Impact
R86	2	1	44.8	7.9	14.1	49.4	50.7	5.9	No Impact
R87	2	1	50.3	4.9	9.8	50.6	53.5	3.2	No Impact
R88	2	1	49.8	5.1	10.2	47.9	52.0	2.2	No Impact
R89	2	1	48.8	5.6	10.9	48.3	51.5	2.7	No Impact
R90	2	1	49.2	5.4	10.6	47.8	51.6	2.4	No Impact
R91	2	1	49.4	5.3	10.5	45.9	51.0	1.6	No Impact
R92	2	1	49.5	5.2	10.4	47.7	51.7	2.2	No Impact
R93	2	1	49.6	5.2	10.3	47.7	51.8	2.2	No Impact
R94	2	1	49.8	5.1	10.2	48.1	52.0	2.2	No Impact
R95	2	1	49.9	5.0	10.1	48.9	52.4	2.5	No Impact

Table C-2. Detailed Operational Noise Analysis Results Later Phases

Receptor	Land Use Category	Units	Existing (L_{dn}/L_{eq})	Impact Threshold		Proposed Project (L_{dn}/L_{eq})	Proposed Project Cumulative (L_{dn}/L_{eq})	Increase (dB)	Impact Category
				Moderate	Severe				
R96	2	1	48.9	5.5	10.8	45.7	50.6	1.7	No Impact
R97	2	1	49.0	5.5	10.7	46.1	50.8	1.8	No Impact
R98	2	1	49.2	5.4	10.6	46.2	51.0	1.8	No Impact
R99	2	1	49.2	5.4	10.6	45.9	50.9	1.7	No Impact
R100	2	1	49.4	5.3	10.5	43.9	50.5	1.1	No Impact
R101	2	1	50.0	5.0	10.0	48.3	52.3	2.3	No Impact
R102	2	1	50.0	5.0	10.0	48.7	52.4	2.4	No Impact
R103	2	1	50.1	5.0	10.0	49.0	52.6	2.5	No Impact
R104	2	1	50.3	4.9	9.8	48.7	52.6	2.3	No Impact
R105	2	1	50.5	4.8	9.7	48.8	52.8	2.3	No Impact
R106	2	1	50.7	4.7	9.6	49.3	53.1	2.4	No Impact
R107	2	1	51.2	4.5	9.3	52.7	55.0	3.8	No Impact
R108	2	1	51.2	4.5	9.3	52.3	54.8	3.6	No Impact
R109	2	1	50.9	4.6	9.4	51.6	54.3	3.4	No Impact
R110	2	1	50.8	4.6	9.5	52.0	54.5	3.7	No Impact
R111	2	1	50.7	4.7	9.6	50.7	53.7	3.0	No Impact
R112	2	1	50.6	4.7	9.6	51.5	54.1	3.5	No Impact
R113	2	1	51.8	4.2	8.9	52.2	55.0	3.2	No Impact
R114	2	1	51.6	4.3	9.0	50.8	54.2	2.6	No Impact

Table C-2. Detailed Operational Noise Analysis Results Later Phases

Receptor	Land Use Category	Units	Existing (L_{dn}/L_{eq})	Impact Threshold		Proposed Project (L_{dn}/L_{eq})	Proposed Project Cumulative (L_{dn}/L_{eq})	Increase (dB)	Impact Category
				Moderate	Severe				
R115	2	1	51.3	4.4	9.2	50.6	54.0	2.7	No Impact
R116	2	1	51.1	4.5	9.3	50.8	54.0	2.9	No Impact
R117	2	1	51.0	4.6	9.4	49.7	53.4	2.4	No Impact
R118	2	1	50.3	4.9	9.8	49.4	52.9	2.6	No Impact
R119	2	1	50.0	5.0	10.0	49.6	52.8	2.8	No Impact
R120	2	1	49.8	5.1	10.2	44.3	50.9	1.1	No Impact
R121	2	1	49.8	5.1	10.2	45.3	51.1	1.3	No Impact
R122	2	1	50.0	5.0	10.0	48.4	52.3	2.3	No Impact
R123	2	1	50.1	5.0	10.0	49.7	52.9	2.8	No Impact
R124	2	1	50.2	4.9	9.9	49.2	52.7	2.5	No Impact
R125	2	1	41.5	10.0	15.0	50.6	51.1	9.6	No Impact
R126	2	1	41.9	10.0	15.0	51.5	51.9	10.0	Moderate
R127	2	1	42.0	10.0	15.0	48.7	49.6	7.6	No Impact
R128	2	1	41.5	10.0	15.0	37.9	43.1	1.6	No Impact
R129	2	1	41.2	10.0	15.0	37.8	42.8	1.6	No Impact
R130	2	1	41.0	10.0	15.0	37.6	42.6	1.6	No Impact
R131	2	1	40.7	10.0	15.0	39.4	43.1	2.4	No Impact
R132	2	1	40.5	10.0	15.0	39.4	43.0	2.5	No Impact
R133	2	1	49.2	5.4	10.6	41.2	49.8	0.6	No Impact

Table C-2. Detailed Operational Noise Analysis Results Later Phases

Receptor	Land Use Category	Units	Existing (L_{dn}/L_{eq})	Impact Threshold		Proposed Project (L_{dn}/L_{eq})	Proposed Project Cumulative (L_{dn}/L_{eq})	Increase (dB)	Impact Category
				Moderate	Severe				
R134	2	1	49.1	5.4	10.7	43.4	50.1	1.0	No Impact
R135	2	1	40.2	10.0	15.0	37.7	42.1	1.9	No Impact
R136	2	1	40.4	10.0	15.0	37.2	42.1	1.7	No Impact
R137	2	1	40.5	10.0	15.0	37.6	42.3	1.8	No Impact
R138	2	1	40.7	10.0	15.0	37.0	42.3	1.6	No Impact
R139	2	1	40.8	10.0	15.0	37.3	42.4	1.6	No Impact
R140	2	1	41.0	10.0	15.0	37.6	42.6	1.6	No Impact
R141	2	1	41.2	10.0	15.0	37.9	42.9	1.7	No Impact
R142	2	1	41.4	10.0	15.0	38.5	43.2	1.8	No Impact
R143	2	1	41.5	10.0	15.0	38.7	43.3	1.8	No Impact
R144	2	1	41.8	10.0	15.0	39.5	43.8	2.0	No Impact
R145	2	1	42.3	10.0	15.0	26.6	42.4	0.1	No Impact
R146	2	12	47.9	6.1	11.6	31.8	48.0	0.1	No Impact
R147	2	12	48.6	5.7	11.0	32.2	48.7	0.1	No Impact
R148	2	12	47.4	6.3	11.9	35.5	47.7	0.3	No Impact
R149	2	12	49.0	5.5	10.7	31.7	49.1	0.1	No Impact
R150	2	1	50.4	4.8	9.8	34.3	50.5	0.1	No Impact
R153	2	1	48.0	6.0	11.5	34.6	48.2	0.2	No Impact
R155	2	1	50.7	4.7	9.6	36.0	50.8	0.1	No Impact

Table C-2. Detailed Operational Noise Analysis Results Later Phases

Receptor	Land Use Category	Units	Existing (L_{dn}/L_{eq})	Impact Threshold		Proposed Project (L_{dn}/L_{eq})	Proposed Project Cumulative (L_{dn}/L_{eq})	Increase (dB)	Impact Category
				Moderate	Severe				
R157	2	1	48.1	5.9	11.4	36.2	48.4	0.3	No Impact
R158	2	1	48.6	5.7	11.0	41.5	49.4	0.8	No Impact
R159	2	1	47.7	6.2	11.7	36.7	48.0	0.3	No Impact
R161	2	1	46.6	6.8	12.6	39.0	47.3	0.7	No Impact
R164	2	1	43.7	8.7	14.8	42.0	45.9	2.2	No Impact
R165	2	1	49.0	5.5	10.7	47.3	51.2	2.2	No Impact
R166	2	1	49.8	5.1	10.2	46.2	51.4	1.6	No Impact
R167	2	4	53.0	3.8	8.2	48.0	54.2	1.2	No Impact
R168	2	4	53.0	3.8	8.2	44.2	53.5	0.5	No Impact
R169	2	4	49.9	5.0	10.1	47.1	51.7	1.8	No Impact
R170	2	8	49.0	5.5	10.7	55.5	56.4	7.4	Moderate
R171	2	1	56.5	2.8	6.4	44.4	56.8	0.3	No Impact
R172	2	1	57.8	2.5	5.8	45.3	58.0	0.2	No Impact
R173	2	1	57.1	2.6	6.1	46.3	57.4	0.3	No Impact
R174	2	1	58.0	2.4	5.8	42.6	58.1	0.1	No Impact
R175	2	1	59.4	2.1	5.2	42.0	59.5	0.1	No Impact
R176	2	21	52.2	4.1	8.6	58.7	59.6	7.4	Moderate
R177	2	16	52.5	4.0	8.5	46.4	53.5	1.0	No Impact
R178	2	16	53.3	3.7	8.0	43.5	53.7	0.4	No Impact

Table C-2. Detailed Operational Noise Analysis Results Later Phases

Receptor	Land Use Category	Units	Existing (L_{dn}/L_{eq})	Impact Threshold		Proposed Project (L_{dn}/L_{eq})	Proposed Project Cumulative (L_{dn}/L_{eq})	Increase (dB)	Impact Category
				Moderate	Severe				
R179	2	16	50.5	4.8	9.7	45.1	51.6	1.1	No Impact
R180	2	1	52.5	4.0	8.5	37.1	52.6	0.1	No Impact
R197	2	21	54.4	3.3	7.4	51.6	56.2	1.8	No Impact
R198	3	1	46.2	7.0	12.9	54.4	55.1	8.9	Moderate
R199	4	1	46.2	7.0	12.9	50.5	51.9	5.7	No Impact
R200	5	1	46.2	7.0	12.9	55.3	55.8	9.6	Moderate
R201	6	1	46.2	7.0	12.9	55.6	56.0	9.8	Moderate

Notes:
dB=decibel; L_{eq}=equivalent noise level; L_{dn}=day-night average sound level

Table C-3. Construction Noise Analysis Results

Receptor	Distance to Construction (feet)	FTA Daytime Guideline (dBA L_{eq})	Highest Construction Noise Level (all Phases) dBA L_{eq}	Exceeds FTA Daytime Guideline?
R1	512	80	71	No
R2	471	80	71	No
R3	478	80	71	No
R4	428	80	72	No
R5	440	80	72	No
R6	376	80	73	No
R7	322	80	75	No
R8	316	80	75	No
R9	270	80	76	No
R10	231	80	78	No
R11	550	80	70	No
R12	466	80	71	No
R13	397	80	73	No
R14	422	80	72	No
R15	327	80	75	No
R16	301	80	75	No
R17	265	80	76	No
R18	235	80	77	No
R19	655	80	69	No
R20	622	80	69	No
R21	578	80	70	No
R22	532	80	70	No
R23	598	80	69	No
R24	478	80	71	No
R25	554	80	70	No
R26	455	80	72	No
R27	438	80	72	No
R28	383	80	73	No
R29	356	80	74	No
R30	491	80	71	No
R31	525	80	70	No
R32	556	80	70	No
R33	592	80	69	No
R34	329	80	75	No
R35	368	80	74	No

Table C-3. Construction Noise Analysis Results

Receptor	Distance to Construction (feet)	FTA Daytime Guideline (dBA L_{eq})	Highest Construction Noise Level (all Phases) dBA L_{eq}	Exceeds FTA Daytime Guideline?
R36	412	80	73	No
R37	449	80	72	No
R38	477	80	71	No
R39	522	80	70	No
R40	553	80	70	No
R41	582	80	70	No
R42	614	80	69	No
R43	319	80	75	No
R44	297	80	75	No
R45	382	80	73	No
R46	408	80	73	No
R47	442	80	72	No
R48	480	80	71	No
R49	512	80	71	No
R50	539	80	70	No
R51	278	80	76	No
R52	268	80	76	No
R53	256	80	77	No
R54	247	80	77	No
R55	243	80	77	No
R56	235	80	77	No
R57	222	80	78	No
R58	354	80	74	No
R59	391	80	73	No
R60	420	80	72	No
R61	398	80	73	No
R62	367	80	74	No
R63	344	80	74	No
R64	329	80	75	No
R65	307	80	75	No
R66	604	80	69	No
R67	674	80	68	No
R68	692	80	68	No
R69	754	80	67	No
R70	811	80	67	No

Table C-3. Construction Noise Analysis Results

Receptor	Distance to Construction (feet)	FTA Daytime Guideline (dBA L_{eq})	Highest Construction Noise Level (all Phases) dBA L_{eq}	Exceeds FTA Daytime Guideline?
R71	752	80	67	No
R72	784	80	67	No
R73	729	80	68	No
R74	793	80	67	No
R75	686	80	68	No
R76	724	80	68	No
R77	826	80	67	No
R78	814	80	67	No
R79	762	80	67	No
R80	697	80	68	No
R81	816	80	67	No
R82	768	80	67	No
R83	692	80	68	No
R84	533	80	70	No
R85	501	80	71	No
R86	477	80	71	No
R87	445	80	72	No
R88	554	80	70	No
R89	762	80	67	No
R90	671	80	68	No
R91	634	80	69	No
R92	610	80	69	No
R93	588	80	69	No
R94	567	80	70	No
R95	538	80	70	No
R96	754	80	67	No
R97	732	80	68	No
R98	701	80	68	No
R99	684	80	68	No
R100	646	80	69	No
R101	491	80	71	No
R102	496	80	71	No
R103	480	80	71	No
R104	454	80	72	No
R105	416	80	72	No

Table C-3. Construction Noise Analysis Results

Receptor	Distance to Construction (feet)	FTA Daytime Guideline (dBA L_{eq})	Highest Construction Noise Level (all Phases) dBA L_{eq}	Exceeds FTA Daytime Guideline?
R106	374	80	73	No
R107	282	80	76	No
R108	287	80	76	No
R109	327	80	75	No
R110	343	80	74	No
R111	358	80	74	No
R112	389	80	73	No
R113	204	80	79	No
R114	230	80	78	No
R115	285	80	76	No
R116	313	80	75	No
R117	343	80	74	No
R118	471	80	71	No
R119	522	80	70	No
R120	581	80	70	No
R121	574	80	70	No
R122	535	80	70	No
R123	505	80	71	No
R124	498	80	71	No
R125	465	80	71	No
R126	410	80	73	No
R127	413	80	73	No
R128	490	80	71	No
R129	550	80	70	No
R130	599	80	69	No
R131	633	80	69	No
R132	667	80	68	No
R133	699	80	68	No
R134	725	80	68	No
R135	755	80	67	No
R136	715	80	68	No
R137	695	80	68	No
R138	641	80	69	No
R139	612	80	69	No
R140	569	80	70	No

Table C-3. Construction Noise Analysis Results

Receptor	Distance to Construction (feet)	FTA Daytime Guideline (dBA L_{eq})	Highest Construction Noise Level (all Phases) dBA L_{eq}	Exceeds FTA Daytime Guideline?
R141	527	80	70	No
R142	474	80	71	No
R143	448	80	72	No
R144	359	80	74	No
R145	1741	80	60	No
R146	764	80	67	No
R147	774	80	67	No
R148	590	80	69	No
R149	652	80	69	No
R150	568	80	70	No
R151	504	80	71	No
R152	424	80	72	No
R153	368	80	74	No
R154	430	80	72	No
R155	495	80	71	No
R156	365	80	74	No
R157	310	80	75	No
R158	263	80	76	No
R159	197	80	79	No
R161	130	80	83	Yes
R163	204	80	79	No
R164	260	80	77	No
R165	239	80	77	No
R166	287	80	76	No
R167	190	80	79	No
R168	213	80	78	No
R169	237	80	77	No
R170	164	80	81	Yes
R171	387	80	73	No
R172	441	80	72	No
R173	400	80	73	No
R174	434	80	72	No
R175	476	80	71	No
R176	144	80	82	Yes
R177	167	80	80	No

Table C-3. Construction Noise Analysis Results

Receptor	Distance to Construction (feet)	FTA Daytime Guideline (dBA L_{eq})	Highest Construction Noise Level (all Phases) dBA L_{eq}	Exceeds FTA Daytime Guideline?
R178	235	80	77	No
R179	189	80	79	No
R180	512	80	71	No
R197	292	80	76	No
R198	192	80	79	No
R199	254	80	77	No
R200	204	80	79	No
R201	194	80	79	No

Notes:

dBA=A-weighted decibel; L_{eq}=equivalent sound level