NOISE & VIBRATION EXISTING CONDITIONS & IMPACT ASSESSMENT REPORT

FINAL

Ontario Northland

Northlander Passenger Rail –
Timmins-Porcupine Station Transit and Rail Project Assessment Process

December 13, 2024

FIRM PROJECT NO.: 073613 | CLIENT NO.: 36424453

DOCUMENT NO.: GF-PLN-004-00062

Prepared for: Ontario Northland

GANNETT FLEMING

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Revision History

Version Number	Date	Purpose of Submittal	Comments
Draft A	April 9, 2024	Submitted for review.	
Rev 0	July 26, 2024	Revised final report to address project updates.	
Rev 1	December 13, 2024	Final revised report.	

This submission was completed and reviewed in accordance with the Quality Assurance Process for this project.

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EXECUTIVE SUMMARY

Introduction

As part of the Northland Passenger Rail (NPR) program, and as identified via the Updated Initial Business Case (UIBC) work, a new station in the City of Timmins is proposed. Terminating the Northlander service in the Timmins region will provide long-distance passenger rail service to the regional transportation hub and fifth largest municipality in Northern Ontario. The Timmins terminus station provides community and economic benefits by serving a relatively larger population center in Northern Ontario compared to other options previously studied to support the return of the Northlander rail service.

Report Purpose

The purpose of the report is to provide a summary of the noise and vibration existing conditions within the project study area as well as present the impact assessment results - as part of the Timmins-Porcupine Station Transit and Rail Project Assessment (TRPAP), located in Timmins, Ontario, Canada.

Existing Conditions

Timmins-Porcupine Station will be located along the existing railway corridor within the City of Timmins. The subject site does not currently include a railway station. The area around the future station is predominately residential. King Street is the dominant existing noise source as there is no existing railway traffic during the nighttime period; which is when Timmins-Porcupine Station will be used.

Existing vibration levels at the receptors are expected to be insignificant due to the distance between the railway and nearby residences and due to the very low train speeds.

A map of the Study Area is contained in **Figure 2** below.

Potential Impacts, Mitigation Measures & Monitoring, Activities

Noise and/or vibration impacts during the construction and operation of the project may result from the following components.

Operational Noise and Vibration from:

- trains using the station;
- and the station itself, consisting of buses and mechanical equipment needed to service the station.

Construction Noise and Vibration from:

- activities to build the station and associated trackwork.

The noise impact from train operations is predicted to be insignificant at Receptor 2. As such, mitigation measures are not required.

Based on the modelling analysis undertaken as part of the TRPAP at Receptor 1, station operations are expected to have a noise impact of up to 8 dBA. The noise from buses using and idling at the station are the most significant noise source associated with the station. Therefore:

- Mitigation measures should be considered. Mitigation measures could include noise barrier, alternative bus terminal design, or operational controls that may limit the number of buses using the station at any given time. The exact mitigation strategy will be confirmed during the detailed design phase when more detailed information is available, and the noise assessment will be updated accordingly. It is expected that

the station can be designed and operated to comply with the NPC-300 criteria using readily available and practical mitigation measures.
- Select mechanical and electrical equipment with the intent of minimizing sound levels and meeting NPC-300 criteria.
- All ancillary facilities, including station and bus terminal are to comply with NPC-300.

Future vibrations levels are predicted to be lower than the criteria of 0.14mm/s at the nearby receptors. Vibration mitigation measures are not required.

Commitments to Future Work

The following section summarizes Ontario Northland's commitments to future action post TRPAP during detail design and construction, as applicable.

- A detailed operational noise and vibration assessment should be completed to confirm any mitigation measures required (such as a noise barrier) for Receptor 1 as part of detailed design. A detailed review will be completed to confirm if this barrier is needed based on the final operational details of the station. If required, the height and extent of the barrier should be confirmed.
- Endeavour to minimize noise and vibration during construction by considering the mitigation measures outlined in **Sections 4.3.1** and **4.3.2**.
- Establish a Communications Protocol and a Complaints and Compliments Protocol to respond to issues that may arise during construction.

1.0 INTRODUCTION

The Ontario Northland Transportation Commission (Ontario Northland) is an agency of the Province of Ontario responsible for providing efficient, safe, and reliable transportation services in Northern Ontario. Current services include inter- community bus passenger and bus parcel delivery services, freight rail services that connect Northeastern Ontario to other markets across Canada and around the world, and passenger rail service on the Polar Bear Express. The Polar Bear Express provides rail service connecting Cochrane to Moosonee and the Indigenous Communities of the James Bay Coast since 1932. Previously, Ontario Northland operated the Northlander passenger rail service between Toronto and Cochrane, however, this service was discontinued in 2012.

Based on the Updated Initial Business Case, Ontario Northland is now reinstating the passenger rail service between Toronto (Union Station) and Timmins (including a rail connection to Cochrane) in Northeastern Ontario via the Northlander Passenger Rail (NPR) Project (see **Figure 1**). Currently, Ontario Northland is undertaking planning, engineering design and due diligence studies as part of the project.

Figure 1: Northlander Passenger Rail Key Map

1.1 Existing Services

The rail corridor between Toronto and Timmins (with a connection to Cochrane) is approximately 460 miles (740 km) long and consists of five (5) main railway subdivisions owned by Metrolinx, Ontario Northland, and Canadian National Railway (CN). CN operates freight rail services that connect to Class 1 railways and shortlines to ship goods across North America. Passenger rail operators include GO Transit, which operates the Richmond Hill commuter rail service. Ontario Northland operates passenger rail service as well as freight service between Cochrane and Moosonee.

Inter-community passenger transportation service in Northeastern Ontario is mainly provided by rail and bus routes operated by Ontario Northland. Passenger rail service currently consists of the Polar Bear Express between Moosonee and Cochrane, as well as operation of the Cochrane Station Inn at the departure point for the Polar Bear Express. Bus service consists of a network of bus routes serving major communities in Northern Ontario. This includes four (4) daily bus trips in each direction between Toronto and North Bay, serving local communities along the way. Ontario Northland also provides Bus Parcel Express service where customers can drop off their parcels at an Ontario Northland agency or station, and an agent will ensure the parcel is placed on the next available bus. When the parcel arrives at its destination, an agent will contact the receiver to arrange pick up.

1.1 Ontario Regulation 231/08: Transit and Rail Project Assessment Process (TRPAP)

The proposed Timmins-Porcupine Station is subject to *Ontario Regulation 231/08: Transit and Rail Project Assessment Process* (February 16, 2024).

2.0 PROJECT DESCRIPTION

2.1 TRPAP Scope

The proposed Timmins-Porcupine Station is situated along the NPR Corridor between Matheson Station and Cochrane Station, within the geographic Township of Whitney, now known as the City of Timmins. The site is approximately 1 hectare and is located just west of Bob's Lake. Falcon Street abuts the site to the north and west, King Street (Highway 101) to the south and an existing rail (currently not in use) to the east. The Whitney Multipurpose Court and a baseball diamond are located west of the site, with residential neighbourhoods extending further east and west. Refer to **Figure 2** below.

The proposed station area is within Ontario Northland's property. This station will connect Timmins to Toronto (Union Station) via the Northlander Passenger Rail.

Key design elements proposed as part of the Timmins-Porcupine Station are summarized in **Table 1** and are shown in **Figure 2**.

Table 1: Summary of Proposed Infrastructure Elements: Timmins-Porcupine Station

Project Component	Location	Description
Train Station Platform	The train platform is located on the east side of the station building.	Train platform material will consist of concrete. Platform features will include tactile warning strips, platform edge, and areas for Accessibility Vehicles to park at the north and south ends of the platform.
Station Building	Station building is surrounded by various station elements, includes	Features in the station building may include: • Wicket for Travel Tickets and information;

Project Component	Location	Description
	access to Ontario Northland bus bays, the train platform, and the parking lot.	• Wicket for parcel drop-off/pick-up; • Station waiting area; • Station washroom; • Breakroom for crews and station staff; and, • Staff washroom and utility spaces.
Station Parking Facilities	Parking facilities will be located adjacent to the proposed Timmins-Porcupine Station. Station building, bus stops, and train platform are in proximity to the parking spaces.	Parking facilities at the station will contain a variety of features designated to accommodate accessibility, ride-share/taxi stalls, drop off/pick up, general parking, employee parking, etc.
Station Pedestrian Walkway	Station pedestrian walkway proposed on all sides of the station building. There is access to areas for accessibility, bus stops, and train platform.	Station pedestrian walkway is built around the station building, providing access to various station elements.
Track Works	Minimal track work to occur near the train station platform. New bumping post will be located east of King Street on the existing tracks.	Minimal track work will be required to allow the passenger train to safely approach the station and for passengers to safely enter/exit the train from the station platform. Ontario Northland will install a new bumping post at the end of the alignment.
Ontario Northland Bus Bays	Bus bays will be adjacent to the station building with accessible walkway from station building/platform.	Bus bays to be provided for a seamless connection to Ontario Northland motor coach services.
Bus Storage & Maintenance Facility	The potential Bus Storage & Maintenance Facility will be located east of the station building and platform.	The TRPAP has considered for the approximate area of land that may be required for the potential/future construction of a Bus Storage & Maintenance Facility. Additional impact assessment studies and consultation will need to be undertaken by ONTC in the future, as/if applicable, as part of an EPR Addendum process. Components and features of the proposed Bus Storage and Maintenance Facility may include: • Replacement of the old facility currently in use in Timmins (currently located at 895 Monta Ave., Timmins); • Two (2) parking bays, one (1) bus wash bay, and one (1) service and fueling bay, and the capacity to service four (4) buses at any time; • Regular maintenance activities including wash bays and service bays;

Project Component	Location	Description
		• Employee washrooms, locker rooms, and a lunchroom, as well as bus and employee parking; and, • An approximate size of 1,200 m^2.

2.2 TRPAP Study Area

The Study Area for the TRPAP is defined as the area where the station components are proposed to be constructed plus a conservative 50m buffer area to allow for completeness of data collection associated with technical and environmental study investigations. Refer to **Figure 2**.

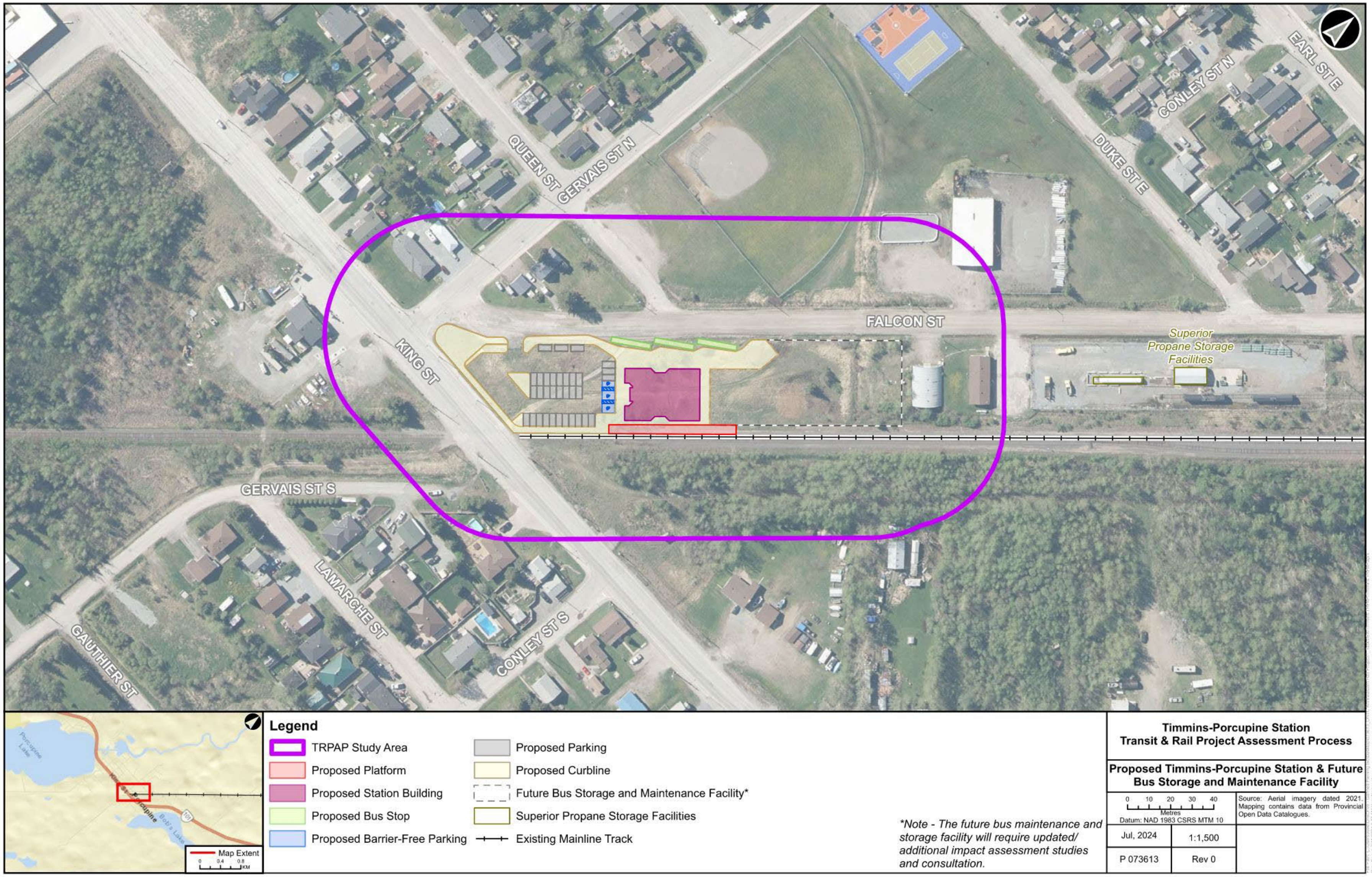

Figure 2: Timmins-Porcupine Station Study Area

2.3 Report Purpose

The purpose of this Noise and Vibration Existing Conditions and Impact Assessment Report is two-fold:

- **Section 3.0 –** provides a review of and outlines the existing noise and vibration conditions within and surrounding the Timmins-Porcupine Station Transit and Rail Project Assessment Project (TRPAP) Study Area; and,
- **Section 4.0 –** provides an assessment of potential Noise and Vibration impacts, proposed mitigation measures and monitoring activities based on the currently proposed NPR infrastructure components.

3.0 NOISE AND VIBRATION EXISTING CONDITIONS

3.1 Purpose

The purpose of **Section 3.0** is to document the Noise and Vibration Existing Conditions within the TRPAP Study Area.

3.2 Methodology

3.2.1 Review of Background Information

Available secondary source background information was be collected from available sources and reviewed. This includes, but is not limited to, air photographs, historical information, data obtained from regulatory authorities, any publicly available information from municipalities and the province, and open-source GIS data, as follows:

- Aerial photography and orthoimagery (i.e., Google Earth); and,
- City of Timmins Zoning By-law.

3.2.2 Review of Applicable Legislation/Guidance Documents

A review of applicable legislation and guidance documents was undertaken and included the following:

- *Environmental Noise Guideline - Stationary and Transportation Sources - Approval and Planning*, 2013
  - NPC-300 (2013)
- *MOEE/GO Transit Noise and Vibration Protocol*, 1995
  - Draft Protocol for Noise and Vibration (1995)

3.2.3 Field Investigations

No field investigations were undertaken as part of the TRPAP to document existing conditions. As described throughout **Section 3.2**, data was collected through review of background information and aerial photography.

3.2.4 Mapping

Available mapping data and other information was collected from the following sources and reviewed to identify existing noise and vibration sensitive receptors:

- City of Timmins Zoning By-law; and,
- Google Earth Imagery.

Data collected was captured within a GIS database and detailed mapping was prepared (refer to mapping included in **Section 3.3** below).

3.2.5 Consultation with Regulatory Authorities

The following methods of data collection were undertaken to supplement the review of background information available online, and to collect primary source data as part of describing existing conditions within the study area:

- Reviewing aerial photography; and,
- Contact with City of Timmins staff.

3.3 Summary of Existing Conditions

3.3.1 Existing Sensitive Receptors

The proposed Timmins-Porcupine station site is bounded by Falcon Street to the north, Falcon Street and Gervais Street North to the west, King Street (Highway 101) to the south and an existing rail to the east. There are residential neighbourhoods beyond in all directions.

The closest residential receptors to the site are summarized in **Table 2** below and shown in **Figure 3**. Receptor 1 (located to the north) and Receptor 2 (located to the south) are the closest to both the station and railway operations near the station. Meeting the guidelines at these receptors would mean that the guidelines would also be met at the other nearby receptors due to increased setback distance and/or higher ambient sound levels.

Table 2: Sensitive Receptors

Receptor	Description
R1	Low-rise Residential
R2	Low-rise Residential

As per the applicable protocols and guidelines, the sound levels for the station operation noise analysis are to be evaluated at both the facades of a sensitive receptor during the daytime and nighttime and at the outdoor living areas during the daytime and evening periods. The outdoor living area could be any location on a receptor's property within 30m from a façade. Depending on the receptors, the outdoor point of reception is often the most critical during the daytime and evening periods.

As the NPR trains operate only during the nighttime period (23:00 - 7:00 hours), the sound levels from train operations are evaluated at the plane of a window of the receptors.

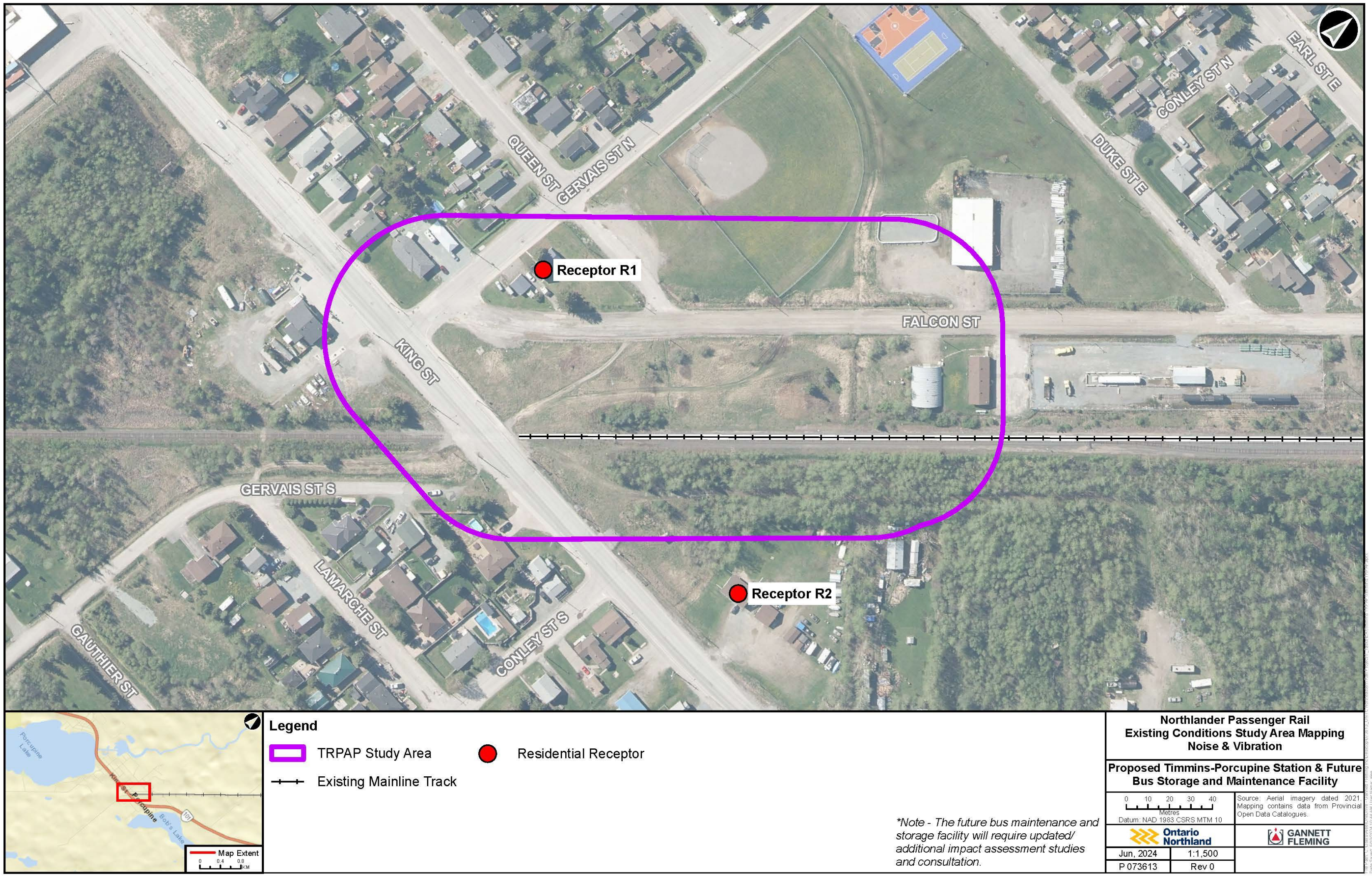

Figure 3: Representative Sensitive Receptors Near Timmins-Porcupine Station

3.3.2 Existing Noise and Vibration Levels

Road traffic noise dominates the existing sound levels as the existing rail traffic is relatively insignificant and not present at all during the nighttime. Existing average annual daily traffic (AADT) provided by the City of Timmins and Ministry of Transportation are summarized in **Table 3** below.

Table 3: Roadway Traffic Volumes

Road	Year	AADT	Speed (km/h)
King Street	2023	7,020	50
Gervais Street North	2023	960	40
Falcon Street	2023	240	50

The existing sound levels at the receptors are summarized in the **Table 4** below.

Table 4: Existing Sound Levels

Receptor	Existing Sound Levels	
	Daytime (dBA $L_{eq,16hr}$)	Nighttime (dBA $L_{eq,8hr}$)
R1	50	44
R2	50	43

Ambient vibration levels at the exiting receptors are expected to be insignificant as the exiting rail is currently not in use during the nighttime period. During the daytime, railway traffic is limited as the line terminates within the study area and railway traffic would otherwise be very infrequent and operate at low speeds.

4.0 IMPACT ASSESSMENT

4.1 Methodology

The impact assessment process was based on the key steps described in the following subsections.

4.1.1 Establish Impact Assessment Criteria

4.1.1.1 Operational Noise Criteria

The Noise and Vibration Impact Assessment evaluates the project's noise and vibration effects for the following components:

1. Station Operations Noise (station, buses); and,
2. Train Operations Noise and Vibration (arrival and departure of trains and train idling).

The noise and vibration from the stationary sources and the trains are assessed based on the criteria and guidance documents summarized below.

MOEE/GO Transit Draft Protocol

The operations noise from the train operations is based on the MOEE/GO Transit Draft Protocol for Noise and Vibration. Ontario Northland does not have its own protocol and the MOEE/GO Transit Draft Protocol would be the most representative. As per the MOEE/GO Transit Draft Protocol, rail service is considered to include the operations of trains on the rail line and the operations of trains inside commuter stations. As such, idling of trains inside commuter stations is considered part of the operation.

The MOEE/GO Transit Draft Protocol states the following:

1. The sound levels of future rail service operations should not exceed the higher of existing rail activity combined with the ambient sound level or 55 dBA $L_{eq,16hr}$, during the daytime period (07:00 – 23:00); and
2. The sound levels of future rail service operations should not exceed the higher of existing rail activity combined with the ambient sound level or 50 dBA $L_{eq,8hr}$, during the nighttime period (23:00 – 07:00).

The MOEE/GO Transit Protocol classifies excesses above the target criteria such as when the future project sound levels exceed the existing ambient or 55 dBA during the daytime and/or 50 dBA during the nighttime as the adjusted noise impact. **Table 5** summarizes the range of adjusted noise impact ratings:

Table 5: MOEE/GO Transit Protocol Impact Ratings

Adjusted Impact Level	Impact Rating
0 – 2.99 dB	Insignificant
3 – 4.99 dB	Noticeable
5 – 9.99 dB	Significant
10 dB +	Very Significant

When a significant or very significant noise impact is expected, mitigation needs to be evaluated based on administrative, operational, economic, and technical feasibility.

Where mitigation is considered, the objective is to mitigate the sound levels to the higher of their pre-project or exclusionary guideline levels (55 dB $L_{eq,16hr}$ or 50 dB $L_{eq, 8hr}$).

NPC-300

The proposed Timmins-Porcupine Station including the bus operations would be considered a stationary noise source and would be assessed in accordance with the MECP's NPC-300 guidelines. As per NPC-300 the station is located in a Class 2 (suburban) area.

As per NPC-300, for a Class 2 area the hourly equivalent ($L_{eq,1hr}$) sound level from stationary sources is compared to the $L_{eq,1hr}$ of the ambient sound or the minimum exclusion criteria (50 dBA daytime and 45 dBA evening and nighttime), whichever is greater. The ambient sound level consists of the noise generated from roadway sources and excludes sources such as lightly used railways and aircraft passbys. For the evaluation of stationary noise sources, heavily used railways with at least 40 trains per day and 20 trains per night can be included in the ambient, after a -10 dB adjustment. The noise assessment is to be cumulative, combining all sources of stationary noise that can reasonably be expected to operate at the same time. Typically, the quietest ambient sound level period or the exclusion criteria are used as an evaluation of the worst-case situation. If the facility's sound level can remain below the quietest ambient sound level or exclusion criteria during that period, then the facility is likely to meet the guidelines during all periods of the day.

Under NPC-300, stationary sources of noise that operate for emergencies are exempt from the noise guidelines. The periodic testing of emergency equipment is required to be assessed. Due to the infrequent nature of such testing, the noise from such activities may be assessed separately from the other noise sources from a given facility. The noise from testing of emergency equipment is also permitted to generate an additional 5 dB of noise above the ambient or the minimum exclusion criteria before noise control measures are required.

Layover facilities are referenced in both the MOEE/GO Transit Draft Protocol and *NPC-300*. Similar to stationary sources, layovers are evaluated based on a comparison of the layover facility noise to the higher of 55 dBA $L_{eq,1hr}$ or the ambient hourly equivalent sound level. The proposed Timmins-Porcupine Station is not expected to function as a layover facility.

Where the facility exceeds the guidelines, noise control needs to be implemented, as per *NPC-300*. Unlike operational noise, there is no allowable excess above the stationary noise criteria. The noise from facilities is required to meet the above sound level limits.

4.1.1.2 Operational Vibration Criteria

Ontario Northland does not have its own protocol for vibration and the MOEE/GO Transit Draft Protocol would be the most representative. Operational vibration will be evaluated based on the MOEE/GO Noise and Vibration Protocol. The MOEE/GO Noise and Vibration Protocol states that the vibration velocity produced by a project should not exceed 0.14mm/s at the point of assessment. If the vibration from existing operations exceeds 0.14mm/s then the objective is to not exceed the existing vibration level.

4.1.1.3 Construction Noise Criteria

The Ministry of the Environment, conservation and Parks (MECP) does promulgate construction noise or vibration limits at receptors. While construction-related items are typically addressed through the local by-laws, Ontario Northland, as a crown corporation and agency of the Province of Ontario, is exempt from municipal by-laws.

Instead of receptor-based limits, MECP provides equipment based limits in NPC-115 and NPC-118. These documents outline sound level requirements for individual pieces of construction equipment.

4.1.1.4 Construction Vibration Criteria

Similar to noise, MECP does promulgate construction vibration limits at receptors. There are no specific construction vibration criteria applicable to this project as there are similarly no City of Timmins vibration limits. Best practice guidelines are provided.

4.1.2 Approach

Sound levels have been calculated using the CadnaA computer program which allows for 3D acoustical modelling using a variety of prediction procedures. Operational sound levels were calculated using the Federal Transit Administration (FTA) algorithm implemented in CadnaA. Station operations sound levels were calculated using the ISO 9613-2 procedure implemented in CadnaA.

4.1.3 Carry Out Impact Assessment

The impact assessment process followed the steps outlined below:

- **Step 1 –** Identify potential effects (positive and negative) resulting from the construction and/or operation of the Project infrastructure;
- **Step 2 –** Establish avoidance/mitigation/compensation measures to eliminate or minimize potential negative effects (as required);
- **Step 3 –** Carry out consultation with stakeholders/regulatory authorities; update impact assessment results and/or proposed mitigation measures as appropriate; and,
- **Step 4 –** Document impact assessment results.

Potential environmental impacts were generally characterized as follows:

Table 6: Types of Potential Effects

Potential Effect	Description/Examples
Operations and Maintenance Effects	• Potential permanent effects on existing Study Area features (i.e., displacement or removal) or receptors due to operation of the Project (e.g., operation of the new trains and station, etc.).
Construction Effects	• Potential short-term effects (e.g., disruption/disturbance) on sensitive noise receptors due to construction activities associated with the Project (e.g., noise generated from construction equipment, construction of station and platform, etc.).

4.1.4 Updated Mapping

Mapping was updated to help inform the assessment of impacts and for reporting purposes (refer to mapping included in **Section 4.3 and 4.4** below).

4.2 Operations and Maintenance Effects

4.2.1 Operational Noise

4.2.1.1 Scope

The operational noise and vibration assessment reviews the following project components:

1. Train operations noise and vibration from the trains including idling at the station.
2. Station operations noise, including mechanical equipment on the station and buses using the bus terminal.

Maintenance activities for the station and associated trackwork are not expected to be a significant source of vibration. However, maintenance of the infrastructure is an important element in minimizing operational noise and vibration levels throughout the life of the project. The commitment to future work (as noted in **Table 10** of this report) is to complete regular maintenance inspections and implement corrective measures wherever needed to minimize noise and vibration. This ongoing maintenance will help ensure the facility continues to operate within the applicable noise and vibration criteria.

4.2.1.2 Noise Sources

The future train timetable in the UIBC indicates that one train would depart and arrive during the nighttime period (23:00 – 07:00). There are no proposed arrivals or departures during the daytime period (07:00 – 23:00). Noise from the idling train is included under operational noise. There will be no maintenance work performed on the train when idling at the station. The chimes from the train doors opening and closing are included under station operations. The train characteristics used in the assessment are summarized in **Table 7** below.

Table 7: Train Characteristics

Time Period	Number of Trains	Train Configuration	Speed (km/h)	Throttle Setting
Nighttime	Depart – 1 Arrive – 1	1 Locomotive 3 Cars	20	Depart – 8 Arrive – 0

The noise from buses using and idling at the station are considered stationary noise sources. For the worst-case scenario a maximum of 3 buses will idle at the station for a given hourly period. The station is assumed to have one roof top unit for ventilation purposes based on experience from past projects. The exact type of unit and its sound level will need to be confirmed during subsequent design phases.

4.2.1.3 Potential Impacts

Train Operations Noise Impacts

The future train operations sound levels and impacts are summarized in **Table 8** below. As the pre-project nighttime ambient levels are less than 50 dBA L_{eq}, the guideline limit of 50 dBA L_{eq} is used as per the MOEE/GO Noise and Vibration Protocol.

Mitigation measures are not required as the project train operations do not generate a significant or very significant noise impact.

Table 8: Train Operations Nighttime Sound Levels

Receptor	Future Nighttime Sound Levels	Nighttime Guideline Limit	Adjusted Impact Level	Adjusted Impact Rating
R1	50	50	0	Insignificant
R2	52	50	2	Insignificant

Station Operations Noise Impacts

Due to the anticipated noise from the idling buses and the close setback to the subject site, there is an 8 dB and a 5 dB impact anticipated at Receptor 1 during the evening and nighttime, respectively[1]. The noise at Receptor 2 is much lower due to increased distance to the bus terminal/buses as well as some shielding provided by the station building itself. As a result, mitigation measures should be considered. Mitigation measures could include noise barrier, alternative bus terminal design, or operational controls that may limit the number of buses using the station at any given time. The exact mitigation strategy will be confirmed during the detailed design phase when more detailed information is available, and the noise assessment will be updated accordingly. It is expected that the station can be designed and operated to comply with the NPC-300 criteria using readily available and practical mitigation measures.

Table 9 below provides the sound levels from the station operations. The minimum exclusion criteria have been used as the guideline limits at both receptors. For the evening periods, the assessment has been completed at the OLA closest to the subject site, within 30m of the receptor façade. The OLA's have been used to assess the worst-case scenario for the evening periods as they are located closer to the subject site than the façades of the dwellings. For the nighttime period as per NPC-300 the assessment was completed at the plane of window closest to the subject site.

Due to the noise from the idling buses and the close setback to the subject site, there is an 8 dB and a 5 dB impact at Receptor 1 during the evening and nighttime, respectively. Mitigation measures are discussed in the following section. The noise at Receptor 2 is much lower due to increased distance to the bus terminal/buses as well as some shielding provided by the station building itself, and does not warrant mitigation.

[1] The predicted sound levels at Receptor 1 are 53 dBA Leq,1hr (with reference to 45 dBA Leq,1hr limit) and 50 dBA Leq,1hr (with reference to 45 dBA Leq,1hr limit) during the evening and nighttime, respectively.

Table 9: Station Operations Sound Levels

Receptor	Evening (19:00 – 23:00)		Nighttime (23:00 – 7:00)	
	Predicted Sound Levels at OLA	Guideline Limits	Predicted Sound Levels at Facade	Guideline Limits
R1	**53**	45	**50**	45
R2	40	45	38	45

4.2.1.4 Mitigation Measures

The impact at Receptor 1 is due to the noise from the buses idling at the station. As a result, mitigation measures should be considered. Mitigation measures could include noise barriers, alternative bus terminal design, or operational controls to limit the number of buses using the station at any given time. The exact mitigation measures should be confirmed during a subsequent design phase when more detailed information is available. It is expected that the station can be designed and operated to comply with the NPC-300 criteria.

4.2.2 Operational Vibration Impacts

Receptor 2 is the closest to the tracks and is located more than 60m away. Based on the Federal Transit Administration's (FTA) Transit Noise and Vibration Impact Assessment Manual, the vibration levels at this receptor are predicted to be approximately 0.06 mm/s. Due to the larger setback distance, vibration levels at all other nearby receptors would also be lower than 0.14 mm/s.

Vibration mitigation measures are not recommended/required as the vibration levels are predicted to be below the limit of 0.14 mm/s per the MOEE/GO Transit protocol.

4.3 Construction Noise and Vibration Effects

The potential impact of construction noise and vibration on nearby receptors has been reviewed qualitatively. For projects such as this, and given the stage of design, a more detailed quantitative review has not been completed. General mitigation measures are provided to reduce the impact of construction noise and vibration on nearby sensitive receptors.

4.3.1 Construction Noise Impacts

Construction is inherently a noisier than usual activity. As MECP does not enforce construction noise and vibration limits, construction-related items are typically addressed through the local by-laws. Efforts will be made to follow the by-law requirements and minimize inconvenience to the public.

To limit the impacts of construction noise, some general possible mitigation measures and approaches that should be considered and employed are outlined below:

- Construction equipment noise levels should be in compliance with the limits set in NPC-115 and NPC-118.
- Construction activity on site should adhere to local municipal noise by-laws wherever possible and practical.
- Ensure the equipment continues to operate within specifications and ensure that modifications have not been made to the equipment's silencing or noise reducing features (such as access panels.).
- Construction equipment should consider using broadband backup alarms rather than their tonal counterparts. Tonal backup alarms can be considered a nuisance.

- The tailgate banging of dump trucks and other impulsive noises should be managed to reduce noise propagation. Ensuring smooth surfaces throughout the construction zones will help reduce these types of noises.
- Schedule noisy activities during the day wherever possible.
- Connect equipment to permanent power wherever possible and minimise the use of portable generators.
- Provide clear communication on upcoming noisy activities and their duration. If nighttime construction is proposed, the details of such construction should be clearly communicated to nearby residences and institutions. This communication will allow some preparation of the nearby residents for periods of expected noise.
- The tailgate banging of dump trucks and other impulsive noises should be managed to reduce noise propagation. Ensuring smooth surfaces throughout the construction zones will help reduce these types of noises.
- Establish a Communications Protocol and a Complaints Protocol to respond to issues that develop during construction.

4.3.2 Construction Vibration Impacts

Similar to noise, MECP does not enforce construction vibration limits at the nearby receptors. Once details of construction methods and equipment are known, it is recommended that a construction vibration assessment be completed during detailed design to confirm vibration levels, and to minimize, mitigate, and/or monitor construction vibration.

The following are general mitigation measures recommended for the construction activities to reduce the impacts of construction vibration:

- Advance notice of timing and duration of construction activity should be provided to nearby businesses and residences when construction activity is likely to occur during periods of nighttime work.
- Schedule vibration intensive activities during the daytime periods wherever possible.
- The speed of construction equipment in general should be limited, as fast-moving tracked equipment has been shown to produce significant vibration levels.
- If hydraulic breakers and vibratory compactors are used, consideration should be given to using lower settings on these types of equipment when operating in close proximity to structures and buildings.
- Avoid high vibration equipment such as impact or vibratory pile drivers.
- Where possible, smaller breakers or jackhammers should be used.
- Similar to noise, bumps or inconsistencies in the surface can generate higher vibration levels as heavy equipment travels over. Maintaining smooth surfaces would minimize vibration levels from such activity.
- Establish a Communications Protocol and a Complaints Protocol to respond to issues that develop during construction.

5.0 SUMMARY OF POTENTIAL IMPACTS, MITIGATION MEASURES AND MONITORING ACTIVITIES

Table 10 provides a summary of the key project components/activities, potential effects, mitigation measures, and proposed monitoring activities associated with the Project.

Table 10: Summary of Noise and Vibration Potential Impacts, Mitigation and Monitoring Commitments

Project Component	Project Activities	Potential Effect	Mitigation Measures/ Commitments	Monitoring/Future Work Commitments
Proposed Timmins-Porcupine Station	• Operations and Maintenance	• For Receptor 1 - Environmental noise may cause annoyance and, disturb sleep and other activities.	• Mitigation measures should be considered. Mitigation measures could include noise barrier, alternative bus terminal design, or operational controls that may limit the number of buses using the station at any given time. The exact mitigation strategy will be confirmed during the detailed design phase when more detailed information is available, and the noise assessment will be updated accordingly. It is expected that the station can be designed and operated to comply with the NPC-300 criteria using readily available and practical mitigation measures. • Select mechanical and electrical equipment with the intent of minimizing sound levels and meeting NPC-300 criteria. • All ancillary facilities, including station and bus terminal are to comply with NPC-300.	• Complete regular maintenance inspections and implement corrective measures wherever needed to minimize noise and vibration. • During detailed design, review and update the Noise assessment in order to review and refine the final noise mitigation strategy.
	• Construction Noise	• Construction noise may cause annoyance and, disturb sleep and other activities.	• Construction equipment noise levels should be in compliance with the limits set in NPC-115 and NPC-118. • Construction activity on site should adhere to local municipal noise by-laws, wherever possible and practical. • Ensure the equipment continues to operate within specifications and ensure that modifications have not been made to the equipment's silencing or noise reducing features (such as access panels.). • Construction equipment should consider using broadband backup alarms rather than their tonal counterparts. Tonal backup alarms can be considered a nuisance. • The tailgate banging of dump trucks and other impulsive noises should be managed to reduce noise propagation. Ensuring smooth surfaces throughout the construction zones will help reduce these types of noises. • Schedule noisy activities during the day wherever possible. • Connect equipment to permanent power wherever possible and minimize the use of portable generators. • Provide clear communication to surrounding residents on upcoming noisy activities and their duration. If nighttime construction is proposed, the details of such construction should be clearly communicated to nearby residences and institutions. This communication will allow some preparation of the nearby residents for periods of expected noise. • The tailgate banging of dump trucks and other impulsive noises should be managed to reduce noise propagation. Ensuring smooth surfaces throughout the construction zones will help reduce these types of noises.	• Develop and implement a Complaints and Compliments Protocol to respond to complaints from surrounding residents that may arise during construction.
	• Construction Vibration	• Construction vibration may cause annoyance and, disturb sleep and other activities.	• Complete a construction vibration assessment during detailed design to confirm vibration levels, and to minimize, mitigate, and/or monitor construction vibration. • Advance notice of timing and duration of construction activity should be provided to nearby businesses and residences when construction activity is likely to occur during periods of nighttime work. • Schedule vibration intensive activities during the daytime periods wherever possible. • The speed of construction equipment in general should be limited, as fast-moving tracked equipment has been shown to produce significant vibration levels. • If hydraulic breakers and vibratory compactors are used, consideration should be given to using lower settings on these types of equipment when operating in close proximity to structures and buildings. • Avoid high vibration equipment such as impact or vibratory pile drivers. • Where possible, smaller breakers or jackhammers should be used. • Bumps or inconsistencies in the ground surface can generate higher vibration levels as heavy equipment travels over. Maintaining smooth surfaces would minimize vibration levels from such activity.	• Develop and implement a Complaints and Compliments Protocol to respond to complaints from surrounding residents that may arise during construction.

6.0 PERMITS AND APPROVALS

A preliminary assessment of potential permits and approvals that may be required during subsequent design and implementation phases of the Project have been summarized below.

6.1 Federal

Federal permits related to noise and vibration are not expected to be required.

6.2 Provincial

Provincial permits related to noise and vibration are not expected to be required.

6.3 Municipal

Municipal permits related to noise and vibration are not expected to be required as Ontario Northland is not required to abide by the City of Timmins's noise-law. As such, noise exemption permits for construction activity outside the permitted hours is not required.

7.0 FUTURE WORK

During the TRPAP, Ontario Northland worked with various stakeholders to discuss issues/concerns raised in relation to the design and implementation of the proposed NPR project. Recognizing that not all issues can be resolved prior to the detailed design stage, the following section summarizes Ontario Northland's commitments to future action during detail design, as well as future project phases as applicable.

- A detailed operational noise and vibration assessment should be completed to confirm any mitigation measures required (such as a noise barrier). Based on the preliminary analysis completed as part of the TRPAP, a noise barrier is needed to control station operations noise. A detailed review should be completed to confirm if this barrier is needed based on the final operational details of the station. If required, the height and extent of the barrier should be confirmed.
- Endeavour to minimize noise and vibration during construction by considering the mitigation measures outlined in **Sections 4.3.1** and **4.3.2**.
- Establish a Communications Protocol and a Complaints and Compliments Protocol to respond to issues that may arise during construction.

APPENDIX A

Data and Sample Calculations

GANNETT FLEMING

Receiver
Name: POR 1 - Train Operations at Facade
ID:
X: 182046.75 m
Y: 5374265.86 m
Z: 1.50 m

Point Source, ISO 9613, Name: "Train Idling", ID: "Train_"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
2	182175.64	5374292.70	2.00	0	N	500	105.0	0.0	-4.3	0.0	0.0	53.4	0.3	-1.2	0.0	0.0	0.0	0.0	0.0	48.3

Railway, FTA/FRA, Name: "Train FRA", ID: "Train_"													
Nr.	X	Y	Z	Refl.	DEN	Lw	Ageo	Aangle	Agr	Ashield	RL	Lr
	(m)	(m)	(m)			dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
4	182101.85	5374211.48	3.65	0	N	58.1	7.1	10.1	1.1	0.0	0.0	40.5
6	182117.81	5374229.53	3.65	0	N	58.1	7.1	10.3	1.2	0.0	0.0	40.0
7	182136.97	5374251.20	3.65	0	N	58.1	7.1	10.0	1.2	8.4	0.0	29.4
8	182159.32	5374276.47	3.65	0	N	58.1	7.1	11.8	1.2	7.5	0.0	28.7
9	182194.47	5374316.23	3.65	0	N	58.1	7.1	11.2	1.1	0.0	0.0	39.3
10	182242.43	5374370.48	3.65	0	N	58.1	7.1	14.3	1.0	0.0	0.0	36.3
11	182101.85	5374211.48	0.90	0	N	37.8	7.1	10.1	1.1	0.0	0.0	20.2
12	182117.81	5374229.53	0.90	0	N	37.8	7.1	10.3	1.3	0.0	0.0	19.7
15	182194.47	5374316.23	0.90	0	N	37.8	7.1	11.2	1.2	0.0	0.0	19.0
16	182242.43	5374370.48	0.90	0	N	37.8	7.1	14.3	1.0	0.0	0.0	16.1

Receiver
Name: POR 2 - Train Operations at Facade
ID:
X: 182209.56 m
Y: 5374233.80 m
Z: 1.50 m

Point Source, ISO 9613, Name: "Train Idling", ID: "Train_"																					
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
1	182175.64	5374292.70	2.00	0	N	500	105.0	0.0	-4.3	0.0	0.0	47.6	0.1	3.1	0.0	0.0	0.0	0.0	0.0	49.9

Railway, FTA/FRA, Name: "Train FRA", ID: "Train_"												
Nr.	X	Y	Z	Refl.	DEN	Lw	Ageo	Aangle	Agr	Ashield	RL	Lr
	(m)	(m)	(m)			dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
3	182095.92	5374204.77	3.65	0	N	58.1	6.4	20.3	1.6	5.9	0.0	21.9
5	182108.49	5374218.99	3.65	0	N	58.1	6.4	11.9	2.5	0.0	0.0	36.9
17	182129.54	5374242.80	3.65	0	N	58.1	6.4	9.9	3.2	0.0	0.0	37.4
18	182150.60	5374266.62	3.65	0	N	58.1	6.4	8.4	3.1	0.0	0.0	39.0
19	182171.66	5374290.43	3.65	0	N	58.1	6.4	8.5	3.0	0.0	0.0	39.2
20	182192.71	5374314.24	3.65	0	N	58.1	6.4	10.0	2.4	0.0	0.0	39.0
21	182213.77	5374338.06	3.65	0	N	58.1	6.4	12.1	2.1	0.0	0.0	37.4
22	182245.35	5374373.78	3.65	0	N	58.1	6.4	11.8	1.9	0.0	0.0	38.1
24	182108.49	5374218.99	0.90	0	N	37.8	6.4	11.9	2.6	0.0	0.0	16.9
25	182129.54	5374242.80	0.90	0	N	37.8	6.4	9.9	3.4	0.0	0.0	17.6
26	182150.60	5374266.62	0.90	0	N	37.8	6.4	8.4	3.3	0.0	0.0	19.2
27	182171.66	5374290.43	0.90	0	N	37.8	6.4	8.5	3.2	0.0	0.0	19.3
28	182192.71	5374314.24	0.90	0	N	37.8	6.4	10.0	2.5	0.0	0.0	18.9
29	182213.77	5374338.06	0.90	0	N	37.8	6.4	12.1	2.3	0.0	0.0	17.3
30	182245.35	5374373.78	0.90	0	N	37.8	6.4	11.8	2.0	0.0	0.0	18.0

Receiver
Name: POR 1 - Stations Operation OLA
ID:
X: 182067.88 m
Y: 5374267.99 m
Z: 1.50 m

Point Source, ISO 9613, Name: "RTU", ID: "fu_"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
1	182118.95	5374256.89	6.50	0	DEN	500	80.0	0.0	0.0	0.0	0.0	45.4	0.1	-2.7	0.0	0.0	0.0	0.0	0.0	37.2

Point Source, ISO 9613, Name: "Bus Idling", ID: "fu_"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
11	182097.14	5374264.71	2.00	0	N	500	94.0	0.0	-6.0	0.0	0.0	40.4	0.1	-2.5	0.0	0.0	0.0	0.0	0.0	50.0

Point Source, ISO 9613, Name: "Bus Idling", ID: "fu_"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
14	182108.68	5374278.35	2.00	0	N	500	94.0	0.0	-6.0	0.0	0.0	43.5	0.1	-2.4	0.0	0.0	0.0	0.0	0.0	46.8

Point Source, ISO 9613, Name: "Bus Idling", ID: "fu_*"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
15	182121.52	5374292.88	2.00	0	N	500	94.0	0.0	-6.0	0.0	0.0	46.4	0.1	-2.2	0.0	0.0	0.0	0.0	0.0	43.7

Line Source, ISO 9613, Name: "Bus Movement", ID: "fu_"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
16	182103.48	5374269.42	2.00	0	N	500	68.8	12.3	0.0	0.0	0.0	42.0	0.1	-2.5	0.0	0.0	0.0	0.0	0.0	41.5
17	182093.51	5374260.48	2.00	0	N	500	68.8	10.0	0.0	0.0	0.0	39.5	0.1	-2.5	0.0	0.0	0.0	0.0	0.0	41.7
18	182115.63	5374283.12	2.00	0	N	500	68.8	12.9	0.0	0.0	0.0	45.0	0.1	-2.4	0.0	0.0	0.0	0.0	0.0	39.0
19	182125.26	5374293.56	2.00	0	N	500	68.8	9.5	0.0	0.0	0.0	47.0	0.1	-2.4	0.0	0.0	0.0	0.0	0.0	33.6
22	182132.66	5374302.02	2.00	0	N	500	68.8	7.0	0.0	0.0	0.0	48.3	0.1	-2.4	0.0	0.0	0.0	0.0	0.0	29.8
25	182130.11	5374298.18	2.00	0	N	500	68.8	6.5	0.0	0.0	0.0	47.8	0.1	-2.4	0.0	0.0	0.0	0.0	0.0	29.8

Point Source, ISO 9613, Name: "Chimes", ID: "fu_"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
20	182124.50	5374234.04	1.50	0	N	500	105.0	0.0	-29.0	0.0	0.0	47.4	0.1	-2.2	0.0	0.0	0.0	0.0	0.0	30.7

Point Source, ISO 9613, Name: "Chimes", ID: "fu_"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
21	182135.37	5374246.75	1.50	0	N	500	105.0	0.0	-29.0	0.0	0.0	48.0	0.1	-2.2	0.0	0.0	15.6	0.0	0.0	14.4

Point Source, ISO 9613, Name: "Chimes", ID: "fu_"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
28	182146.99	5374259.35	1.50	0	N	500	105.0	0.0	-29.0	0.0	0.0	49.0	0.2	-2.0	0.0	0.0	15.8	0.0	0.0	13.0

Receiver
Name: POR 1 - Station Operations at Facade
ID:
X: 182046.75 m
Y: 5374265.86 m
Z: 1.50 m

Point Source, ISO 9613, Name: "RTU", ID: "fu_"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
2	182118.95	5374256.89	6.50	0	DEN	500	80.0	0.0	0.0	0.0	0.0	48.3	0.1	-1.4	0.0	0.0	0.0	0.0	0.0	33.0

Point Source, ISO 9613, Name: "Bus Idling", ID: "fu_"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
4	182097.14	5374264.71	2.00	0	N	500	94.0	0.0	-6.0	0.0	0.0	45.0	0.1	-1.0	0.0	0.0	0.0	0.0	0.0	43.8

Point Source, ISO 9613, Name: "Bus Idling", ID: "fu_"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
5	182108.68	5374278.35	2.00	0	N	500	94.0	0.0	-6.0	0.0	0.0	47.0	0.1	-0.3	0.0	0.0	0.0	0.0	0.0	41.2

Point Source, ISO 9613, Name: "Bus Idling", ID: "fu_*"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
7	182121.52	5374292.88	2.00	0	N	500	94.0	0.0	-6.0	0.0	0.0	49.0	0.2	0.1	0.0	0.0	0.0	0.0	0.0	38.7

Line Source, ISO 9613, Name: "Bus Movement", ID: "fu_"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
9	182103.48	5374269.42	2.00	0	N	500	68.8	12.3	0.0	0.0	0.0	46.1	0.1	-0.8	0.0	0.0	0.0	0.0	0.0	35.7
12	182093.51	5374260.48	2.00	0	N	500	68.8	10.0	0.0	0.0	0.0	44.5	0.1	-1.2	0.0	0.0	0.0	0.0	0.0	35.4
24	182115.63	5374283.12	2.00	0	N	500	68.8	12.9	0.0	0.0	0.0	48.0	0.1	-0.3	0.0	0.0	0.0	0.0	0.0	33.8
27	182125.26	5374293.56	2.00	0	N	500	68.8	9.5	0.0	0.0	0.0	49.4	0.2	-0.1	0.0	0.0	0.0	0.0	0.0	28.8
36	182132.66	5374302.02	2.00	0	N	500	68.8	7.0	0.0	0.0	0.0	50.4	0.2	-0.5	0.0	0.0	0.0	0.0	0.0	25.7
39	182130.11	5374298.18	2.00	0	N	500	68.8	6.5	0.0	0.0	0.0	50.0	0.2	-0.1	0.0	0.0	0.0	0.0	0.0	25.2

Point Source, ISO 9613, Name: "Chimes", ID: "fu_"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
30	182124.50	5374234.04	1.50	0	N	500	105.0	0.0	-29.0	0.0	0.0	49.5	0.2	-1.3	0.0	0.0	0.0	0.0	0.0	27.6

Point Source, ISO 9613, Name: "Chimes", ID: "fu_"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
32	182135.37	5374246.75	1.50	0	N	500	105.0	0.0	-29.0	0.0	0.0	50.1	0.2	-1.1	0.0	0.0	14.6	0.0	0.0	12.1

Point Source, ISO 9613, Name: "Chimes", ID: "fu_"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
49	182146.99	5374259.35	1.50	0	N	500	105.0	0.0	-29.0	0.0	0.0	51.0	0.2	-1.0	0.0	0.0	15.3	0.0	0.0	10.5

Receiver
Name: POR 2 - Stations Operations OLA
ID:
X: 182200.26 m
Y: 5374250.21 m
Z: 1.50 m

Point Source, ISO 9613, Name: "RTU", ID: "fu_"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
31	182118.95	5374256.89	6.50	0	DEN	500	80.0	0.0	0.0	0.0	0.0	49.2	0.2	3.6	0.0	0.0	0.0	0.0	0.0	27.0

Point Source, ISO 9613, Name: "Bus Idling", ID: "fu_*"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
33	182121.52	5374292.88	2.00	0	N	500	94.0	0.0	-6.0	0.0	0.0	50.0	0.2	3.7	0.0	0.0	0.0	0.0	0.0	34.1

Point Source, ISO 9613, Name: "Bus Idling", ID: "fu_"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
34	182108.68	5374278.35	2.00	0	N	500	94.0	0.0	-6.0	0.0	0.0	50.6	0.2	3.6	0.0	0.0	11.0	0.0	0.0	22.6

Point Source, ISO 9613, Name: "Bus Idling", ID: "fu_"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
37	182097.14	5374264.71	2.00	0	N	500	94.0	0.0	-6.0	0.0	0.0	51.4	0.2	3.7	0.0	0.0	11.3	0.0	0.0	21.4

Line Source, ISO 9613, Name: "Bus Movement", ID: "fu_"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
40	182112.15	5374279.21	2.00	0	N	500	68.8	9.6	0.0	0.0	0.0	50.3	0.2	3.7	0.0	0.0	10.7	0.0	0.0	13.4
41	182118.63	5374286.49	2.00	0	N	500	68.8	10.2	0.0	0.0	0.0	50.0	0.2	3.8	0.0	0.0	0.0	0.0	0.0	25.0
42	182103.48	5374269.42	2.00	0	N	500	68.8	12.3	0.0	0.0	0.0	50.9	0.2	3.8	0.0	0.0	12.6	0.0	0.0	13.6
45	182125.26	5374293.56	2.00	0	N	500	68.8	9.5	0.0	0.0	0.0	49.8	0.2	3.8	0.0	0.0	0.0	0.0	0.0	24.6
46	182093.51	5374260.48	2.00	0	N	500	68.8	10.0	0.0	0.0	0.0	51.6	0.2	3.7	0.0	0.0	11.9	0.0	0.0	11.3
50	182132.66	5374302.02	2.00	0	N	500	68.8	7.0	0.0	0.0	0.0	49.6	0.2	3.8	0.0	0.0	0.0	0.0	0.0	22.2
51	182130.11	5374298.18	2.00	0	N	500	68.8	6.5	0.0	0.0	0.0	49.6	0.2	3.8	0.0	0.0	0.0	0.0	0.0	21.7

Point Source, ISO 9613, Name: "Chimes", ID: "fu_"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
43	182146.99	5374259.35	1.50	0	N	500	105.0	0.0	-29.0	0.0	0.0	45.7	0.1	6.4	0.0	0.0	0.0	0.0	0.0	23.8

Point Source, ISO 9613, Name: "Chimes", ID: "fu_"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
44	182135.37	5374246.75	1.50	0	N	500	105.0	0.0	-29.0	0.0	0.0	47.3	0.1	7.0	0.0	0.0	0.0	0.0	0.0	21.6

Point Source, ISO 9613, Name: "Chimes", ID: "fu_"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
47	182124.50	5374234.04	1.50	0	N	500	105.0	0.0	-29.0	0.0	0.0	48.8	0.1	7.5	0.0	0.0	0.0	0.0	0.0	19.6

Receiver
Name: POR 2 - Station Operations at Facade
ID:
X: 182209.56 m
Y: 5374233.80 m
Z: 1.50 m

Point Source, ISO 9613, Name: "RTU", ID: "fu_"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
3	182118.95	5374256.89	6.50	0	DEN	500	80.0	0.0	0.0	0.0	0.0	50.4	0.2	2.5	0.0	0.0	0.0	0.0	0.0	26.9

Point Source, ISO 9613, Name: "Bus Idling", ID: "fu_*"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
6	182121.52	5374292.88	2.00	0	N	500	94.0	0.0	-6.0	0.0	0.0	51.5	0.2	2.7	0.0	0.0	0.0	0.0	0.0	33.5

Point Source, ISO 9613, Name: "Bus Idling", ID: "fu_"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
8	182108.68	5374278.35	2.00	0	N	500	94.0	0.0	-6.0	0.0	0.0	51.8	0.2	2.8	0.0	0.0	12.3	0.0	0.0	20.8

Point Source, ISO 9613, Name: "Bus Idling", ID: "fu_"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
10	182097.14	5374264.71	2.00	0	N	500	94.0	0.0	-6.0	0.0	0.0	52.3	0.2	2.8	0.0	0.0	12.2	0.0	0.0	20.5

Line Source, ISO 9613, Name: "Bus Movement", ID: "fu_"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
13	182112.46	5374279.56	2.00	0	N	500	68.8	10.0	0.0	0.0	0.0	51.6	0.2	2.9	0.0	0.0	12.0	0.0	0.0	12.0
23	182118.93	5374286.84	2.00	0	N	500	68.8	9.8	0.0	0.0	0.0	51.4	0.2	2.9	0.0	0.0	0.0	0.0	0.0	24.1
26	182103.48	5374269.42	2.00	0	N	500	68.8	12.3	0.0	0.0	0.0	52.0	0.2	2.9	0.0	0.0	12.8	0.0	0.0	13.3
38	182125.26	5374293.56	2.00	0	N	500	68.8	9.5	0.0	0.0	0.0	51.3	0.2	2.8	0.0	0.0	0.0	0.0	0.0	24.0
48	182093.51	5374260.48	2.00	0	N	500	68.8	10.0	0.0	0.0	0.0	52.5	0.2	2.7	0.0	0.0	12.8	0.0	0.0	10.5
53	182132.66	5374302.02	2.00	0	N	500	68.8	7.0	0.0	0.0	0.0	51.2	0.2	2.8	0.0	0.0	0.0	0.0	0.0	21.6
54	182130.11	5374298.18	2.00	0	N	500	68.8	6.5	0.0	0.0	0.0	51.2	0.2	2.8	0.0	0.0	0.0	0.0	0.0	21.0

Point Source, ISO 9613, Name: "Chimes", ID: "fu_"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
29	182146.99	5374259.35	1.50	0	N	500	105.0	0.0	-29.0	0.0	0.0	47.6	0.1	6.1	0.0	0.0	0.0	0.0	0.0	22.2

Point Source, ISO 9613, Name: "Chimes", ID: "fu_"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
35	182135.37	5374246.75	1.50	0	N	500	105.0	0.0	-29.0	0.0	0.0	48.5	0.1	6.4	0.0	0.0	0.0	0.0	0.0	20.9

Point Source, ISO 9613, Name: "Chimes", ID: "fu_"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
52	182124.50	5374234.04	1.50	0	N	500	105.0	0.0	-29.0	0.0	0.0	49.6	0.2	6.4	0.0	0.0	0.0	0.0	0.0	19.8

AADT TRAFFIC DATA

AADT	North Road	South Road	East Road	West Road
Gervais	720	960	-	-
Falcon	-	-	240	0
Total North-South			Total East-West	
Gervais	960		Falcon	240

AADT	North Road	South Road	East Road	West Road
King	-	-	6360	6950
Gervais	960	0	-	-
Total North-South			Total East-West	
Gervais	960		King	7020