Noise and Vibration Feasibility Study – Proposed Development at 930 and 1010 Somerset Street West, Ottawa Ontario

Final Report

February 11, 2025

Prepared for:
City of Ottawa Housing Solutions and Investment Services
Housing Solutions and Investment Services
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Limitations and Sign-off

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Associate, Team Lead – Noise, Vibration and Acoustics

Printed Name and Title

Executive Summary

Stantec Consulting Ltd. (Stantec) was retained by the City of Ottawa Housing Solutions and Investment Services (HSIS) to prepare a Noise and Vibration Feasibility study for the proposed development at 930 and 1010 Somerset West in Ottawa, Ontario (the Project). The Project involves the redevelopment of the existing lands at 930 and 1010 Somerset West into an urban mixed-use community, integrating residential, commercial, and institutional land use.

This noise and vibration feasibility study is intended to support concurrent Official Plan and Zoning By-law Amendment applications for the Project. The findings and recommendations in this feasibility study are consistent with level of information currently available for the Project development. As such, this study provides a preliminary assessment of noise and vibration impacts from surrounding transportation sources and noise impacts from stationary noise sources on the Project's sensitive receptors.

The development includes one-hectare expansion of Plouffe Park, a multi-storey elementary school, a future expansion to the Plant Recreation Centre, and mid to high-rise mixed-use development. The mid to high-rise mixed-use development is located in the northwest section of the Project Site and includes three high-rise residential buildings, referred to in this study as Residential A, B, and C. The current Project concept indicates a 25-storey tower for Residential A, a 20-storey tower for Residential B, and 15-storey tower for Residential C. Residential A and B share a 4-storey podium, with the first floor designated for commercial use. Residential C features a 4-storey podium, with all four storeys allocated for residential purposes. Additionally, there is a proposed 6-storey mid-rise building for Ottawa Community Housing. The mid-rise building includes a 3-storey podium with all 3-storeys assumed designated for residential use. East of the mid-rise building, a new 3-storey Recreation and Cultural Facility is proposed, with a multi-storey elementary school further south

The Project is surrounded by the Ottawa Light Rail Transit (OLRT) Trillium Line (O-Train Line 2) Corridor to the west, Somerset Street West to the north and the City of Ottawa Plant Recreation Centre and Plouffe Park to the east with Preston Street further east. The Gladstone Village subdivision is located to the south (currently under construction) with Gladstone Avenue further south.

Applicable criteria, assessment methods, and recommended mitigation considered in this study are based on the following guidelines:

- The Ontario Ministry of the Environment, Conservation and Parks (MECP) publication "Environmental Noise Guideline – Stationary and Transportation Source – Approval and Planning (NPC-300) " (MECP 2013)
- The City of Ottawa publication "Environmental Noise Control Guidelines" (The City of Ottawa 2016)
- The Federation of Canadian Municipalities and Railway Associate of Canada (FCM/RAC) publication "Guidelines for New Development in Proximity to Railway Operations" (FCM/RAC 2013)

This study is based on the Project concept plan dated May 3, 2024, and prepared by Hobin Architecture.

Transportation Noise

The transportation noise impact assessment evaluated the noise impact of surrounding roads and adjacent OLRT corridor on the Project. The assessment used prediction methods from the United States Federal Highway Administration (FHWA) Traffic Noise Model (TNM) for road and the Federal Transit Administration (FTA) method for rail. Local transportation traffic data was obtained from the City of Ottawa Environmental Noise Control Guidelines (ENCG), Ontario Ministry of Transportation (MTO), and OC-Transpo.

Preliminary analysis suggests that MECP noise criteria for transportation sources can be met with the installation of centralized air conditioning prior to occupancy, upgrading exterior walls and windows to STC-50 and STC-36 respectively, installing noise barriers for the assessed outdoor living areas (OLAs), minimum of brick veneer or masonry equivalent construction from the foundation to the rafters for Residential Building A and C, and including appropriate warning clauses in the development agreement. The potential OLA locations have been assumed for this assessment, as the actual OLAs for the Project have not yet been defined in the conceptual layout. The analysis recommends that, where possible, the actual OLA should be located to minimize exposure to the adjacent road and rail traffic corridors.

Once detailed design, including building floor plans, elevations and OLAs, is available for the development, the transportation noise impact assessment should be updated to confirm the necessary noise control measures and appropriate warning clauses to meet the applicable noise criteria.

Stationary Noise

A preliminary stationary noise impact assessment of the surrounding area on the Project was completed using the applicable MECP and ENCG Class 1 exclusion noise limits. Four facilities with stationary noise sources were identified in the vicinity of the site for this study based on the MECP Guideline D-6 (a guideline for land use compatibility between industrial facilities and sensitive land uses) (MOE 1995) and a desktop review of the surrounding area, supplemented with noise measurements and observations conducted by Stantec on November 8, 2024. The facilities considered for the stationary noise assessment in this study include:

- Ming Auto Shop – 55 Breezhill Avenue North
- Commercial Plaza – 250 City Centre Avenue
- Musca Wine Pressing & Supplies Ltd. (Musca Wine Shop) – 969 Somerset Street West
- On-site City of Ottawa Plant Recreation Centre – 930 Somerset Street West

Stationary noise levels were predicted using a predictive acoustic model developed using Cadna/A (Datakustik GmbH 2025), a noise modelling software implementing the ISO 9613-2 environmental sound propagation algorithms (ISO 1996).

Preliminary analysis suggests that stationary noise levels from the Ming Auto Shop and Commercial Plaza to meet applicable limits at the development. Based on the assumptions and inputs used in this

study, noise control measures may be required for the existing on-site Plant Recreation Centre and the off-site Musca Wine Shop to comply with Class 1 limits for stationary noise sources. A detailed stationary noise assessment is recommended to provide a more accurate evaluation and refine the necessary noise control measures.

Subject to the results of a detailed assessment, both on-site and off-site stationary noise controls can be considered for the Project. On-site noise controls include receptor-based measures, such as implementing inoperable/fixed windows for the development, in accordance with the MECP NPC-300 guideline. In accordance with the applicable guidelines, inoperable windows are not considered receptors and would not be subject to noise limits. Inoperable windows may be an acceptable “on building” noise control measure for windows that are not associated with noise-sensitive spaces and where the architectural design does not allow for conversion into a noise-sensitive space, for example, inoperable windows in a single-loaded corridor of a high-rise multi-unit building.

Potential noise controls for the City of Ottawa Plant Recreation Centre and Musca Wine Shop include typical source-based mitigation, such as silencers and acoustic enclosures. Implementing source-based mitigation at these sites is expected to be technically feasible and would require coordination between the City and Musca Wine Shop. Alternatively, a Class 4 designation for the proposed Development can be considered following the completion and findings of a detailed noise assessment. Notably, neighbouring properties 933 and 1030 Somerset Street West, as well as 951 Gladstone Avenue and 145 Loretta Avenue have a Class 4 classification per the City of Ottawa Noise By-law No. 2017-255.

Vibration Assessment

The vibration impacts from the adjacent OLRT were assessed for the development using the FCM/RAC guidelines. The analysis method provided in the United States FTA Transit Noise and Vibration Impact Manual (FTA Manual) for Ground Borne Vibration (GBV) was used to estimate the potential impact of GBV generated by rail traffic from the adjacent Trillium Line.

The assessment results show that vibration levels from the rail operations at the development meet the applicable FCM/RAC criteria. As such, no site-specific vibration mitigation is required for the proposed development.

Other

Noise generated by the Project to the surrounding area and to itself will need to comply with applicable noise criteria. At this stage, the Project’s architectural, mechanical, and electrical designs are not yet advanced enough to complete a detailed noise assessment of noise impacts from the Project to the surrounding area (off-site) and onto itself. Stantec recommends a detailed noise assessment be completed by the Project design team’s Acoustic Consultant prior to final building design. This will allow necessary noise mitigation measures to be integrated effectively into the Project.

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Acronyms / Abbreviations

AADT	Annual Average Daily Traffic
BPN	Building Practice Note
dBA	A-weighted Decibels
DMU	Diesel Multiple Unit
DTM	Digital Terrain Model
ENCG	Environmental Noise Control Guidelines
FCM/RAC	Federation of Canadian Municipalities and Railway Association of Canada
FHWA	Federal Highway Administration
FLIRT	Fast Light Intercity Regional Train
FTA	Federal Transit Administration
GBV	Ground Borne Vibration
HSIS	Housing Solutions and Investment Services
HVAC	Heating, Ventilation, and Air-conditioning
L_{eq-T}	Energy equivalent noise level over a specified time interval “T”.
LIDAR	Light Detection and Ranging
MECP	Ontario Ministry of the Environment, Conservations and Parks (formerly MOECC, Ontario Ministry of the Environment and Climate Change)
MTO	Ontario Ministry of Transportation
NPC	Noise Pollution Control
NRC	National Research Council
OBC	Ontario Building Code
OLA	Outdoor Living Area
OLRT	Ottawa Light Rail Transit
POR	Point of Reception
POW	Plane of Window
RMS	Root-mean-square
SLM	Sound Level Meter
Stantec	Stantec Consulting Ltd.
STC	Sound Transmission Class
TNM	Traffic Noise Model

1 Introduction

Stantec Consulting Ltd. (Stantec) was retained by the City of Ottawa Housing Solutions and Investment Services (HSIS) to prepare a Noise and Vibration Feasibility study for the proposed development at 930 and 1010 Somerset West in the City of Ottawa (the Project). The Project is a redevelopment of the existing lands at 930 and 1010 Somerset West as an urban mixed-use community including residential, commercial, and institutional land use.

The development includes one-hectare expansion of Plouffe Park, a multi-storey elementary school, a future expansion to the Plant Recreation Centre, and mid to high-rise mixed-use development. The Project is surrounded by Ottawa Light Rail Transit (OLRT) Trillium Line Corridor to the west, Somerset Street West to the north and the existing City of Ottawa Plant Recreation Centre and Plouffe Park to the east with Preston Street further east.

This noise and vibration feasibility study is intended to support concurrent Official Plan and Zoning By-law Amendment applications for the Project. The findings and recommendations in this feasibility study are consistent with level of information currently available for the Project development. As such, this study provides a preliminary assessment of noise and vibration impacts from surrounding transportation sources (road and rail), as well as noise impacts from stationary noise sources on the Project's sensitive receptors.

The applicable criteria, assessment method and recommended mitigation considered in this study are based on the following guidelines:

- The Ontario Ministry of the Environment, Conservation and Parks (MECP) publication "Environmental Noise Guideline – Stationary and Transportation Source – Approval and Planning (NPC-300) " (MECP 2013)
- The City of Ottawa publication "Environmental Noise Control Guidelines" (The City of Ottawa 2016)
- The Federation of Canadian Municipalities and Railway Associate of Canada (FCM/RAC) publication "Guidelines for New Development in Proximity to Railway Operations" (FCM/RAC 2013)

This feasibility study is based on the concept plan for the Project, dated May 3, 2024, and prepared by Hobin Architecture (Appendix A).

2 Proposed Development and Area Description

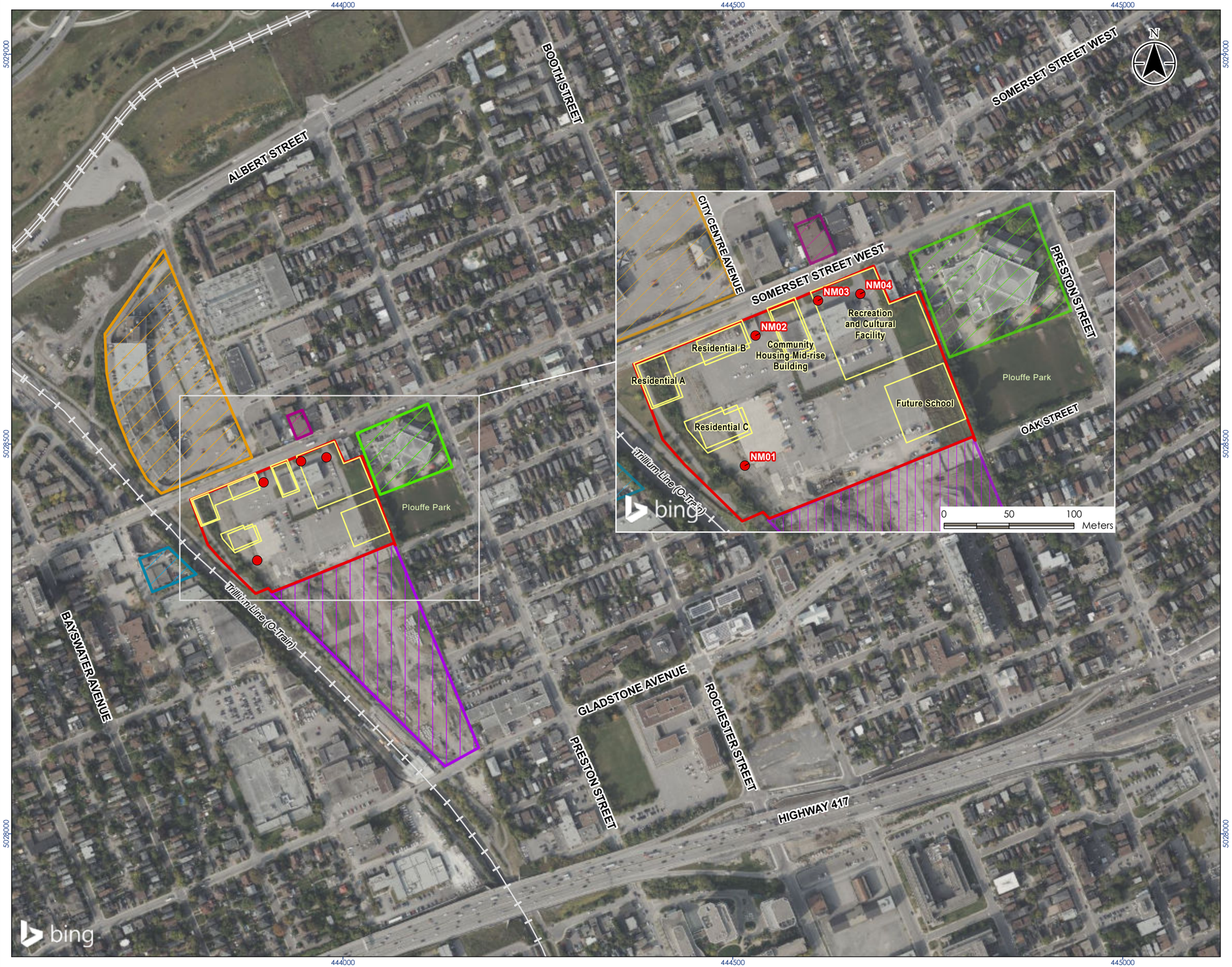
2.1 Project Site and Surrounding Area

The Project site is located at the southwest corner of Somerset Street West and Preston Street in the City of Ottawa. The Project is surrounded by:

- OLRT Trillium Line (O-Train Line 2) Corridor to the west
- Somerset Street West to the north
- The City of Ottawa Plant Recreation Centre and Plouffe Park to the east with Preston Street further east
- The Gladstone Village subdivision to the south (currently under construction) with Gladstone Avenue further south

A map of the Project site and surrounding area is provided in Figure 2-1.

Under the City of Ottawa Zoning By-law No.2008-250 (City of Ottawa 2008), the surrounding area is zoned for mixed land uses including industrial, commercial, recreational, and residential. A zoning map for the Project area is provided in Appendix B.



Stantec

Legend

- Project Site
- Noise Measurement Locations
- Ottawa Light Rail Transit (LRT) Corridor
- Gladstone Village Development
- Project Building Footprints

Stationary Noise Sites

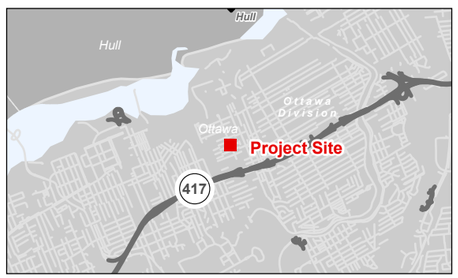
- City of Ottawa Plant Recreation Centre
- Commercial Plaza
- Ming Auto Shop
- Musca Wine Pressing and Supplies Ltd.

0 100 200 Meters

1:5,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 18N
2. Contains information licensed under the Open Government License – Ontario.
3. Orthoimagery © 2025 Microsoft Corporation © 2025 Maxar ©CNES (2025) Distribution Airbus DS. Date of imagery, unknown.
4. Railway data obtained from City of Ottawa Open Data, 2025; Contains information licensed under the Open Government License – City of Ottawa.



Project Location
City of Ottawa

160402067 REVA
Prepared by rparangat on 2025-01-24
Technical Review by JWH on 2025-01-15

Client/Project
CITY OF OTTAWA
NOISE AND VIBRATION FEASIBILITY STUDY – PROPOSED DEVELOPMENT AT 930 AND 1010 SOMERSET STREET WEST

Figure No.
2-1

Title
Project Area and Noise Measurement Locations

\\cd0217-prjfs01\01497\active\160402067\8_data\gis_cad\gis\mxds\Noise\160402067_NIA.aprx\160402067_NIA_Fig02-1_ProjectLocation Revised: 2025-01-24 By: rparangat

2.2 Proposed Development

The proposed development is a redevelopment of the lands at 930 and 1010 Somerset Street West as an urban mixed-use community. The urban mixed-use community includes one-hectare expansion of Plouffe Park, a multi-storey elementary school (Conseil des écoles publiques de l'Est de l'Ontario), a future expansion to the existing Plant Recreation Centre, and mid to high-rise mixed-use development. The concept plan also shows an on-site District Energy Plant with two location options.

The high-rise mixed-use development is located in the northwest section of the Project Site. There are three high-rise residential buildings referred to in this study as Residential A, B and C, and they are shown in Figure 2-1. The current Project concept indicates a 25-storey tower for Residential A, a 20-storey tower for Residential B, and 15-storey tower for Residential C. Residential A and B share a 4-storey podium where the first floor is for commercial use. Residential C has a 4-storey podium with all 4-storeys designated for residential use.

At the north-centre of the Project site, there is a proposed 6-storey mid-rise building for Ottawa Community Housing. The mid-rise building includes a 3-storey podium with all 3-storeys assumed designated for residential use. East of the mid-rise building, a new 3-storey Recreation and Cultural Facility is proposed, with a multi-storey elementary school further south.

The concept plan proposes site access from Somerset Street West, with a potential access to Oak Street for emergency access, service vehicles, and school bus use. The land at 1010 Somerset West is presently occupied by a two-storey office building and parking lot. The land at 930 Somerset Street West is occupied by the existing Plant Recreation Centre.

3 Noise and Vibration Guidelines and Criteria

The applicable environmental noise guidelines are the City of Ottawa Environmental Noise Control Guidelines (ENCG) and MECP NPC-300. Both these documents provide guidance and criteria for evaluating environmental noise impacts on noise-sensitive land uses in the context of land-use planning. Notably, the ENCG is based on the MECP NPC-300 guidelines and the City requires developments to be consistent with NPC-300. Therefore, this feasibility study follows the NPC-300 guidelines and criteria supplemented with specific guidance from the ENCG, as needed.

The MECP NPC-300 defines transportation and stationary noise, and evaluates them using separate criteria, which are discussed in the following subsections.

3.1 MECP Guideline D-6

The MECP (formerly MOE) Guideline D-6 (MOE 1995) is used to assess the compatibility between sensitive land uses within the proposed development and surrounding industries. According to Guideline D-6, in the absence of site-specific studies, this guideline should be applied when a sensitive land use encroaches on an existing industrial land use or vice versa. The guideline specifies separation distances for the influence area and recommends minimum separation distances based on the type of industry and is considered in identifying surround industrial facilities with stationary noise sources for this feasibility study.

Industrial facilities are categorized into three classes under the guideline, determined by the objectionable nature of their emissions, physical size/scale, production volumes, and the intensity and schedule of their operations. The potential influence area setbacks and the recommended minimum separation distances are based on these classifications.

The potential influence area and recommended minimum separation distance as set out in the guideline, are summarized in Table 3-1.

Table 3-1 Separation Distance (MECP Guideline D-6)

Category	Potential Influence Area (m) [a]	Minimum Separation Distance (m) [b]
Class I	70	20
Class II	300	70
Class III	1000	300

Notes:

a. Adverse effects may be experienced within potential influence area
b. No incompatible development should occur within minimum separation distance

If the minimum separation distance cannot be maintained, a detailed noise study is required to confirm that the nearby noise-sensitive land uses are not impacted by the high noise levels from the proposed

industrial land use. The potential influence area setback distances outlined in MECP Guideline D-6 are used to identify surrounding stationary noise facilities that could potentially impact the proposed development.

3.2 Transportation Noise

Transportation noise limits are expressed as a 16-hour energy equivalent noise level ($L_{eq-16hr}$) for daytime (07:00 to 23:00) and an 8-hour energy equivalent noise level (L_{eq-8hr}) for nighttime (23:00 to 07:00) in NPC-300. These limits are defined separately for road and rail, as summarized in Table 3-2. Transportation noise limits are applied at Outdoor Living Areas (OLA) locations based on combined sound levels from road and rail, while limits for indoor living spaces are assessed independently for road and rail, as noted in Table 3-2.

Table 3-2 Transportation Noise Limits

Type of Space	Period	Noise Limits L_{eq} (dBA)
Outdoor Living Areas (OLA)	Daytime (07:00 to 23:00)	55 (road and rail assessed combined) [a]
Indoor Living Areas, such as living/dining/den areas of residences, hospitals, nursing homes, schools, daycare centres, etc.	Daytime (07:00 to 23:00)	45 (road)/ 40 (rail) assessed independently
Indoor Living Areas, such as living/dining/den areas of residences, hospitals, nursing homes, schools, etc. except schools or daycare centres,	Nighttime (23:00 to 07:00)	45 (road)/ 40 (rail) assessed independently
Indoor Sleeping Quarters	Daytime (07:00 to 23:00)	45 (road) / 40 (rail) assessed independently
Indoor Sleeping Quarters	Nighttime (23:00 to 07:00)	40 (road) / 35 (rail) assessed independently

Note:

a. Where the combined predicted transportation noise level at the OLA exceeds 60 dBA, excesses of up to 5 dB higher (i.e. +60 dBA) may be considered acceptable with noise mitigation and/or warning clause, provided achieving the 55 dBA objective per NPC-300 is not feasible.

MECP NPC-300 defines an OLA is part of a noise sensitive land use that is intended and designed for the quiet enjoyment of the environment, and readily accessible from the building. The OLA includes backyards, front yards, terraces, and common outdoor living areas associated with high-rise multi-unit buildings. Balconies and elevated terraces are OLAs provided they have a minimum depth of 4 m, not enclosed, and are the only OLA for the occupant.

For OLAs at grade, the assessment is typically conducted 3 m from the subject façade at 1.5 m above grade, while for elevated OLAs the assessment is conducted at the middle of the OLA at 1.5 m above grade or floor level.

3.2.1 Noise Control Measures

Noise control measures are required when transportation noise levels exceed defined noise limits at the plane of window (POW) and OLA of noise-sensitive spaces, as per NPC-300. The applicable noise limits and noise controls for transportation noise are discussed further below and summarized in terms of outdoor noise controls in Table 3-3, ventilation requirements in Table 3-4, and building components in Table 3-5.

Table 3-3 Noise Control Requirements for Outdoor Living Areas

Predicted OLA Noise Level, $L_{eq\text{-}16hr}$ (dBA)	**Required Noise Control Measures (Transportation Noise)**
Daytime (07:00 to 23:00)	
Less than or equal to 55	No noise controls required.
Greater than 55 and less than or equal to 60	Noise controls may be applied to reduce the transportation noise level to 55 dBA. If measures are not provided, prospective purchasers or tenants should be informed of potential noise problems by a warning clause Type A.
Greater than 60	Noise control measures should be implemented to reduce the transportation noise level to 55 dBA. OLA noise level excesses of up to 5 dB higher with a warning clause Type B may be considered acceptable, provided achieving the 55 dBA objective is not technically, economically or administratively feasible.

Table 3-4 Plane of Window – Ventilation Requirements

Predicted POW Noise Level, $L_{eq\text{-}16hr}$/$L_{eq\text{-}8hr}$ (dBA)		**Required Noise Control Measures (Transportation Noise)**
Daytime (07:00 to 23:00)	**Nighttime (23:00 to 07:00)**	
Less than or equal to 55	Less than or equal to 50	No noise controls required
Greater than 55 and less than or equal to 65	Greater than 50 and less than or equal to 60	Provision for air conditioning (A/C) with a warning clause Type C.
Greater than 65	Greater than 60	Central A/C or other ventilation system installed prior to occupancy with a warning clause Type D.

Table 3-5 Indoor Living Areas – Building Component Requirements

Predicted POW Noise Level - Road, $L_{eq-16hr}/L_{eq-8hr}$ (dBA)		**Predicted POW Noise Level - Rail, $L_{eq-16hr}/L_{eq-8hr}$ (dBA)**		**Building Component Requirements (Transportation Noise)**
Daytime (07:00 to 23:00)	**Nighttime (23:00 to 07:00)**	**Daytime (07:00 to 23:00)**	**Nighttime (23:00 to 07:00)**	
Less than or equal to 65	Less than or equal to 60	Less than or equal to 60	Less than or equal to 55	No specific acoustic rating is required for building components, beyond compliance with the Ontario Building Code (OBC)
Greater than 65	Greater than 60	Greater than 60	Greater than 55	Building component should be designed so that the indoor sound level meets the applicable noise limits in Table 3-2.

OLA Noise Control Measures: Acoustic walls are a typical mitigation measure for OLAs, which are sometimes referred to as noise barriers or fences. MECP NPC-300 requires the daytime noise level in the OLA must be attenuated to 60 dBA or less by using measures such as noise barriers. Reductions can also be achieved by considering adjustments to the layout of the development.

Provision for Air Conditioning: MECP NPC-300 notes that units with this requirement must be designed to allow future occupants to install central air conditioning, which will provide alternative ventilation if windows must be closed to reduce interior noise levels.

Central air conditioning: Central air conditioning is required where POW noise levels exceed the applicable limits in Table 3-4, so that windows may be closed to provide effective noise attenuation.

Building components designed to achieve indoor sound level criteria: Special wall and window construction above minimum Ontario Building Code (OBC) requirements may be required as determined by Sound Transmission Class (STC) if nighttime outdoor noise level at a sleeping quarter plane of window is greater than 60 dBA for road noise sources and/or 55 dBA for rail noise sources. During the daytime, the noise limits for building component design requirements are reduced by 5 dB.

3.3 Stationary Noise

MECP NPC-300 establishes noise limits from stationary sources at points of reception (PORs) on noise sensitive land uses such as:

- a property of a person that accommodates a dwelling and includes a legal non-conforming residential use

- a property of a person that accommodates a building used for noise sensitive commercial purposes, such as hotels and motels
- a property of a person that accommodates a building used for noise sensitive institutional purposes, such as hospitals, schools and long-term care

Inoperable windows and outdoor locations associated with a noise sensitive institutional purpose (i.e., school) are not considered PORs for a stationary noise impact assessment under NPC-300.

The noise limits are expressed in terms of a one-hour equivalent sound level $L_{eq\text{-}1hr}$ at the POR. The higher of the applicable exclusion limit in NPC-300 and the background sound level (ambient) at the POR is the applicable criteria for stationary noise.

Based on site observations and noise measurements, as well as a review of local aerial imagery, the acoustic environment of the Project is representative of a MECP Class 1 Area. The MECP defines a Class 1 area as an area with an acoustical environment typical of a major population centre, where background sound level is dominated by the activities of people, usually road traffic, often referred to as “urban hum”. The MECP Class 1 exclusion limits outlined in NPC-300 are used for this assessment and are summarized in Table 3-6.

Table 3-6 MECP Exclusion Limits – Class 1 Area

Point of Reception Type	Period	$L_{eq\text{-}1hr}$ (dBA)
POW	Daytime (07:00 to 19:00)	50
	Evening (19:00 to 23:00)	50
	Nighttime (23:00 to 07:00)	45
Outdoor	Daytime (07:00 to 19:00)	50
	Evening (19:00 to 23:00)	50
	Nighttime (23:00 to 07:00)	N/A

The City of Ottawa Noise By-law No.2017-255 (City of Ottawa 2017) set out noise limits for certain stationary noise sources in the City including heating ventilation and air conditioning (HVAC) equipment, chillers, cooling towers, exhaust systems and other similar types of equipment. The Noise By-law specifies a 50 dBA noise limit when measured at a POR.

3.4 Vibration

There are no formal vibration regulations or guidelines developed for the City of Ottawa's land use planning process. This study evaluates ground-borne vibration (GBV) impacts on the Project based on the FCM/RAC publication "Guidelines for New Development in Proximity to Railway Operations".

The FCM/RAC guideline identifies a vibration limit of 0.14 mm/s between 4 Hz to 200 Hz for human comfort in indoor spaces. The vibration limit is expressed as a root-mean-square (RMS) vibration amplitude over a 1-second averaging period.

The FCM/RAC guidelines advise that a 75-meter vibration influence area from a railway corridor should be used to assess if a development could be impacted by vibration. The Project site is located within 75 m of the OLRT Trillium corridor, and therefore, vibration impacts are evaluated using the FCM/RAC limits.

4 Existing Acoustic Environment

A site visit was conducted by Stantec staff on November 8, 2024, to review the surrounding area and collect samples of existing noise levels at four locations within the Project footprint. Measurement locations NM01 through NM04 are shown in Figure 2-1. A Larson Davis model LxT sound level meter (SLM) was used to complete noise level measurements during a 5-minute to 10-minute sampling period. Notable noise sources observed during the measurements were continuous and intermittent construction activities from 1040 Somerset Street West and the Gladstone Village development, as well as road traffic from Somerset Street West. A summary of the measured noise levels is presented in Table 4-1 in terms of the minimum 1-minute noise level ($L_{eq\text{-}1min}$) and corresponding 1-minute L_{90}. The L_{90} value represents the noise level that was exceeded 90% of the time during the 1-minute measurement and is therefore less sensitive to intermittent contributions from construction noise.

Table 4-1 Noise Measurement Results Summary

Measurement Location ID	Approximate Measurement Duration (minutes)	Minimum 1-minute Equivalent Noise Level, $L_{eq\text{-}1min}$ [a] (dBA)	Noise Level Exceeded 90% of the time during the 1-minute measurement, $L_{90\text{-}1min}$ [b] (dBA)
NM01	5	59	56
NM02	5	61	56
NM03	10	57	55
NM04	8	60	56

Notes:

a. Refers to the minimum measured $L_{eq\text{-}1min}$

b. Refers to the L_{90} measured during the same period as the minimum $L_{eq\text{-}1min}$

Due to the influence of construction noise, the values presented in Table 4-1 likely overestimate road and stationary source levels at the Project footprint during the sampling period. Notwithstanding this, the measured noise levels are consistent with what would be expected for an urban environment.

5 Assessment Methods

5.1 Transportation Noise

The MECP is currently in the process of updating the noise prediction methods used for assessing road and rail traffic. The new guideline NPC-306 is proposed to ensure that proponents use up to date noise prediction methods when determining noise levels caused by road and rail traffic. This will result in more accurate noise predictions compared to the 1995 methods that are currently in place. The MECP has confirmed in its letter (dated December 6, 2021) to stakeholders that a permission to use the latest noise model for any project is no longer required. MECP recommends using the most current version of the United States Federal Highway Administration (FHWA) Traffic Noise Model (TNM) for road and US Federal Transit Administration (FTA) method for rail.

5.1.1 Road Traffic

Following MECP recommendations for road noise modelling, this feasibility study uses the US FHWA TNM version 3.2 to predict road traffic noise levels for the Project. The TNM considers acoustical parameters, including road traffic volumes and speed, roadway geometry, pavement type, ground absorption, local topography, and shielding from intervening obstacles. The TNM for this study considers shielding from the intervening buildings within the Project site and noise barriers along Highway 417. Building heights were calculated based on an assumed floor-to-floor height of 3 m. The noise barriers along Highway 417 were identified from aerial imagery and from a review of public information centre (PIC) data on various and local noise barrier retrofits planned by the Ontario Ministry of Transportation (MTO) (reference Project WP 4088-07-01). A summary of key TNM parameters used in this study is provided in Table 5-1.

Table 5-1 Key Road Traffic Noise Model Parameters

Parameter	Value/Setting	Rationale
Ground Type	Pavement	Models an acoustically hard surface between the Project site and modelled roadways, consistent with a typical urban area.
Ground Type	Lawn	Models an acoustically soft ground within the Project site assuming the majority of the Project site will be landscaped with grass, trees, etc. "Lawn" is the TNM default setting for ground type.
Pavement Type	Average	Consistent with street level imagery, site observations, and is also the TNM default setting.
Temperature	10°C	Ontario Standard Conditions
Relative Humidity	70%	Ontario Standard Conditions
Noise Barrier Height - Highway 417	5 m	MTO typically uses 5 m for noise barriers for provincial highways/freeways

Key roads for this assessment include both municipal roads and provincial Highway 417. As per the ENCG, traffic data for municipal roads were obtained from ENCG Appendix B and that for Highway 417 were obtained from the Ontario Ministry of Transportation (MTO).

Relevant traffic parameters for predicting road traffic noise levels include the annual average daily traffic (AADT), traffic composition, and posted speed limit. The roads and traffic data considered for this study are summarized in Table 5-2. The road traffic data used in this feasibility study reflects the mature state of development for the Project in accordance with the ENCG. Other local roadways not listed are expected to have negligible contribution to overall road traffic noise levels based on their exposure to the Project and/or the traffic volume associated with those roads.

Table 5-2 Road Traffic Data

Road Name	Road Jurisdiction [a, b]	Road Classification [c]	AADT	Traffic Split as a Percentage of AADT (%)				Posted Speed Limit (km/h)
				Day	Night	Medium Trucks	Heavy Trucks	
Somerset Street West	Municipal	Arterial	15000	92	8	7	5	50 [d]
Preston Street	Municipal	Arterial	15000	92	8	7	5	50 [d]
Gladstone Avenue	Municipal	Major Collector	12000	92	8	7	5	40
Highway 417	Provincial	Provincial Highway	245400	92	8	1.5	4.5	100

Notes:

a. Road traffic data for Municipal Roadways obtained from Appendix B of the ENCG.

b. AADT for Highway 417 was obtained from MTO and supplemented with daytime/nighttime traffic volume percentages for Provincial Roadways from Appendix B of the ENCG. The Highway 417 road traffic data reflect an ultimate AADT for an 8 through-lane configuration and an overall truck percentage of 6%. Medium and heavy truck percentages were established based on the MTO Environmental Guide for Noise (MTO 2022).

c. Road classification per the City of Ottawa Official Plan, Schedule C5 – Downtown Core Road Network.

d. The posted speed limit was not identified from a review of street level imagery and was therefore assumed to be 50 km/h consistent with the "unless otherwise posted speed limit" in the City of Ottawa.

5.1.2 Rail Traffic

Rail traffic noise from OLRT Trillium Line was predicted using the commercially available software package Cadna/A (Datakustik GmbH 2024). The Cadna/A noise model was configured to implement the rail noise prediction method outlined in the US FTA Transit Noise and Vibration Impact Assessment Manual (US FTA 2018). The rail noise model accounts for similar noise attenuation factors as the road

traffic noise model. A summary of key rail noise model parameters considered in the model is provided in Table 5-3.

Table 5-3 Key Rail Traffic Noise Model Parameters

Parameter	Value/Setting	Rationale
Ground Absorption	0.2	Models an acoustically hard surface between the Project site and modelled roadways, consistent with an urban area.
Ground Type	0.8	Models an acoustically soft ground within the Project site assuming the majority of the Project site will be landscaped with grass, trees, etc.
Diesel Powered Car Noise Emission	FTA Commuter Diesel Multiple Unit (DMU)	The Trillium Line trains are DMU train sets with a single diesel-powered car. The diesel-powered car noise emission is based on the sound exposure level for Commuter DMU identified in the FTA Transit Noise and Vibration Impact Assessment Manual.
Diesel Powered Car Throttle	8	Throttle setting considers the noise emission from the vehicle accelerating in accordance with FTA guidance. This is a conservative setting since trains may not always accelerate in the vicinity of the Project given the maximum train speeds and proximity to neighboring train stations.
Rail Car (not powered) Noise Emission	FTA Commuter Car	The rail car noise emission is based on the sound exposure level for Commuter Rail Cars as described in the US FTA Noise and Vibration Impact Assessment Manual
Temperature	10°C	Ontario Standard Conditions
Relative Humidity	70%	Ontario Standard Conditions

The local topography for both road and rail noise models was obtained from the publicly available Ontario Digital Terrain Model (DTM) from the Ontario Ministry of Natural Resources and Forestry. The DTM is a bare-earth model derived from Light detection and ranging (LIDAR) data for the Ottawa-Gatineau area. OC Transpo provided rail traffic data for the Trillium Line located west of the Project. Key traffic parameters for rail noise prediction are the rail traffic volumes, train composition, and maximum speeds. Rail traffic volumes were forecast to the year 2043[1] using a 2.5% annual growth rate to reflect a mature state of development for the Project in accordance with the ENCG.

[1] The year 2043 is 15 years after an assumed 2028 construction completion year for the Project.

It is understood the Trillium Line trains are predominantly Stadler Fast Light Intercity and Regional Trains (FLIRT). The Stadler FLIRT is a Diesel Multiple Unit (DMU) train comprising of four passive cars and one diesel powered car that drives the motors. The maximum train speed at the Somerset Street overpass is 25 km/h in the northbound direction and 65 km/h in the southbound direction. No at-grade crossings were identified in the vicinity of the Project site and therefore, train whistle noise contributions were not included in the rail noise predictions.

This feasibility study uses the 25 km/h speed for rail noise predictions as a conservative approach. The US FTA modelling approach predicts higher rail traffic noise levels with a train speed of 25 km/h compared to 65 km/h.

A summary of the rail traffic data used for this assessment is provided in Table 5-4.

Table 5-4 Rail Traffic Data

Service Line	Type of Train	2043 Train Volumes [a]		Train Composition		Maximum Speed (km/h)	Annual Volume Growth Rate (%)	Growth Period Used (Years)
		Day	Night	Number of Diesel-powered Cars	Number of passive Cars			
OLRT Trillium Line	Diesel Multiple Unit (DMU)	246	38	1	4	25 [b]	2.5	15

Notes:

a. 2043 train volumes derived from existing volumes provided by OC Transpo, adjusted using the annual traffic growth rate.

b. Although the maximum speed for rail in the Project area is 65 km/h for southbound trains, the 25 km/h northbound maximum speed was used for this study as it yields higher rail noise predictions under the modelling approach used for rail.

5.2 Stationary Noise

This feasibility study evaluates stationary noise impacts from the existing on-site Plant Recreation Centre and off-site facilities. Stationary noise impacts from the Project onto itself and the surrounding area are not assessed in this study as supporting assessment details were not available at this stage of the Project development. Further discussion on the Project's noise impact to the surrounding area and to itself is provided in Section 7 and Section 8, respectively.

The significant stationary noise sources identified in the vicinity of the site are Heating, Ventilation and Air-Conditioning (HVAC) units associated with the plaza and recreation centre and other industrial noise sources in the area.

Four facilities with stationary noise sources have been identified in the vicinity of the Project for this feasibility study, based on the MECP Guideline D-6 and a review of aerial imagery, supplemented with

noise measurements and observations made during the site visit. These facilities are listed below and shown in Figure 2-1 and Figure 5-1.

- Ming Auto Shop to east of the development – 55 Breezhill Avenue North
- Commercial Plaza to the northwest of the development – 250 City Centre Avenue
- Musca Wine Pressing & Supplies Ltd. (Musca Wine Shop) to the northeast of the development – 969 Somerset Street West
- On-site Plant Recreation Centre to the east of the development – 930 Somerset Street West

Noise modelling of these facilities was completed using the commercially available software package Cadna/A (Datakustik GmbH 2025) to predict stationary noise levels at the PORs. The Cadna/A noise model implements ISO 9613-2 noise propagation algorithms (ISO 1996) and accounts for noise attenuation factors such as:

- Geometrical divergence (noise attenuation due to distance)
- Barrier effects (noise shielding) of the intervening structures/buildings and topography
- Atmospheric absorption
- Ground absorption
- Local topography

The DTM described in the previous section (Section 5.1.2) was also used to model the local topography for the stationary noise assessment.

The stationary noise model conservatively considers a downwind condition, in which the wind direction is always oriented from each noise source location to each receptor. A summary of key acoustic model parameters used in the model is provided in Table 5-5.

Table 5-5 Key Stationary Noise Model Parameters

Parameter	Value/Setting	Rationale
Ground Absorption	0.2	Models an acoustically hard surface between the Project site and modelled roadways, consistent with an urban area.
Ground Type	0.8	Models an acoustically soft ground within the Project site assuming the majority of the Project site will be landscaped with grass, trees, etc.
Temperature	10°C	Ontario standard conditions
Relative Humidity	70%	Ontario standard conditions
Max. Order of Reflection	2	Accounts for building/barrier reflections

The following subsections detail the stationary noise modelling scenario and noise sources considered in this study.

5.2.1 Modelling Scenarios

In accordance with NPC-300 guidelines, the basis of the noise assessment is the predictable worst-case hour. The predictable worst-case hour is the hour when stationary noise levels are highest relative to the applicable MECP noise level limit (Table 3-6).

A predictable worst-case hour was evaluated for each stationary noise facility identified in this assessment. Each modelling scenario evaluates a single stationary noise facility with its identified noise sources operating continuously and simultaneously during a worst-case hour in the daytime, evening and nighttime, as appropriate. Ming Auto Shop is understood to operate during the daytime only and was assessed accordingly.

5.2.2 Noise Sources

For each facility considered in this stationary noise assessment, noise sources were primarily identified through a desktop review of aerial imagery, with site observations used to supplement this review. Noise measurements were limited due to third-party site accessibility constraints and noise interference from construction activities at 1040 Somerset Street West, just west of the Project.

The main types of noise sources identified for these facilities are rooftop HVAC units, which are assumed to range from 5 to 15 tons based on their observed size from the desktop review. Other identified noise source includes open bay doors and ventilation exhaust for the Ming Auto Shop. For this assessment, it is assumed that the bay doors at the Ming Auto Shop are considered to be open, generating noise to the outdoors.

The stationary noise sources considered in this assessment are summarized in Table 5-6 and shown in Figure 5-1. The noise source summary includes the source sound power level and relevant acoustic characteristics as per MECP Publication NPC-104 (MOE 1978). The source sound power levels, used as input into the stationary noise prediction model, were obtained from Stantec's database, which comprises field measurements and manufacturer sound data for similar equipment. The spectral sound power data used in the assessment is provided in Appendix C.

MECP Publication NPC-104 (MOE 1978) prescribes adjustments for sources with special qualities or characteristics of sound. These are punitive adjustments which apply to noise sources with subjectively annoying characteristics, including tonal sounds, quasi-impulsive sounds and beating sounds (sounds with cyclically varying amplitudes). The sources considered in this assessment are not expected to exhibit such characteristics. Therefore, the source sound power levels in this assessment do not include adjustments for NPC-104 sound characteristics.

The sources in Table 5-6 are existing on-site and off-site noise sources. The Project itself may introduce new noise sources to the environment including but not limited to mechanical equipment associated with the Plant Recreation expansion, District Energy Plant and mechanical penthouses for the on-site buildings. Information on these noise sources was not available at the time of this study given the early stage of Project design. Therefore, additional noise sources introduced by the Project will need to be evaluated for compliance with applicable ENCG and provincial noise criteria as part of a future noise study.

Table 5-6 Stationary Noise Source Summary

Facility Name and Location	Noise Source Description	Noise Source ID [a]	Overall Sound Power Level (dBA)	Source Location [b]	Identified Existing Noise Controls [c]	Sound Characteristics [d]
Ming Auto Shop – 55 Breezhill Avenue North	Auto Shop Open Bay Door North	S1-01	99	O	U	S
	Auto Shop Open Bay Door South	S1-02	99	O	U	S
	Auto Shop Exhaust Stack	S1-03	90	O	U	S
Commercial Plaza – 250 City Centre Avenue	Commercial Plaza HVAC Unit 01	S2-01	81	O	U	S
	Commercial Plaza HVAC Unit 02	S2-02	79	O	U	S
	Commercial Plaza HVAC Unit 03	S2-03	79	O	U	S
	Commercial Plaza HVAC Unit 04	S2-04	79	O	U	S
	Commercial Plaza HVAC Unit 05	S2-05	83	O	U	S
	Commercial Plaza HVAC Unit 06	S2-06	81	O	U	S
	Commercial Plaza HVAC Unit 07	S2-07	81	O	U	S
	Commercial Plaza HVAC Unit 08	S2-08	83	O	U	S
	Commercial Plaza HVAC Unit 09	S2-09	81	O	U	S
	Commercial Plaza HVAC Unit 10	S2-10	83	O	U	S
	Commercial Plaza HVAC Unit 11	S2-11	79	O	U	S
	Commercial Plaza HVAC Unit 12	S2-12	79	O	U	S
	Commercial Plaza Cooling Tower - Single Cell	S2-13	99	O	B	S
Musca Wine Pressing & Supplies Ltd. - 969 Somerset Street West	Wine Shop Chiller - single fan	S3-01	82	O	U	S
	Wine Shop Chiller - 2 fans	S3-02	85	O	U	S
	Wine Shop Chiller - 2 fans	S3-03	85	O	U	S

Facility Name and Location	Noise Source Description	Noise Source ID [a]	Overall Sound Power Level (dBA)	Source Location [b]	Identified Existing Noise Controls [c]	Sound Characteristics [d]
Plant Recreation Centre - 930 Somerset Street West [e]	Plant Rec Centre HVAC Unit 01	S4-01	79	O	U	S
	Plant Rec Centre AHU 01	S4-02	87	O	U	S
	Plant Rec Centre HVAC Unit 02	S4-03	83	O	U	S
	Plant Rec Centre AHU 02	S4-04	87	O	U	S
	Plant Rec Centre 8-fan Chiller 01	S4-05	98	O	U	S
	Plant Rec Centre HVAC Unit 03	S4-06	83	O	U	S
	Plant Rec Centre HVAC Unit 04	S4-07	79	O	U	S
	Plant Rec Centre HVAC Unit 05	S4-08	87	O	U	S
	Plant Rec Centre AHU 03	S4-09	87	O	U	S
	Plant Rec Centre AHU 04	S4-10	87	O	U	S
	Plant Rec Centre HVAC Unit 06	S4-11	87	O	U	S

Notes:

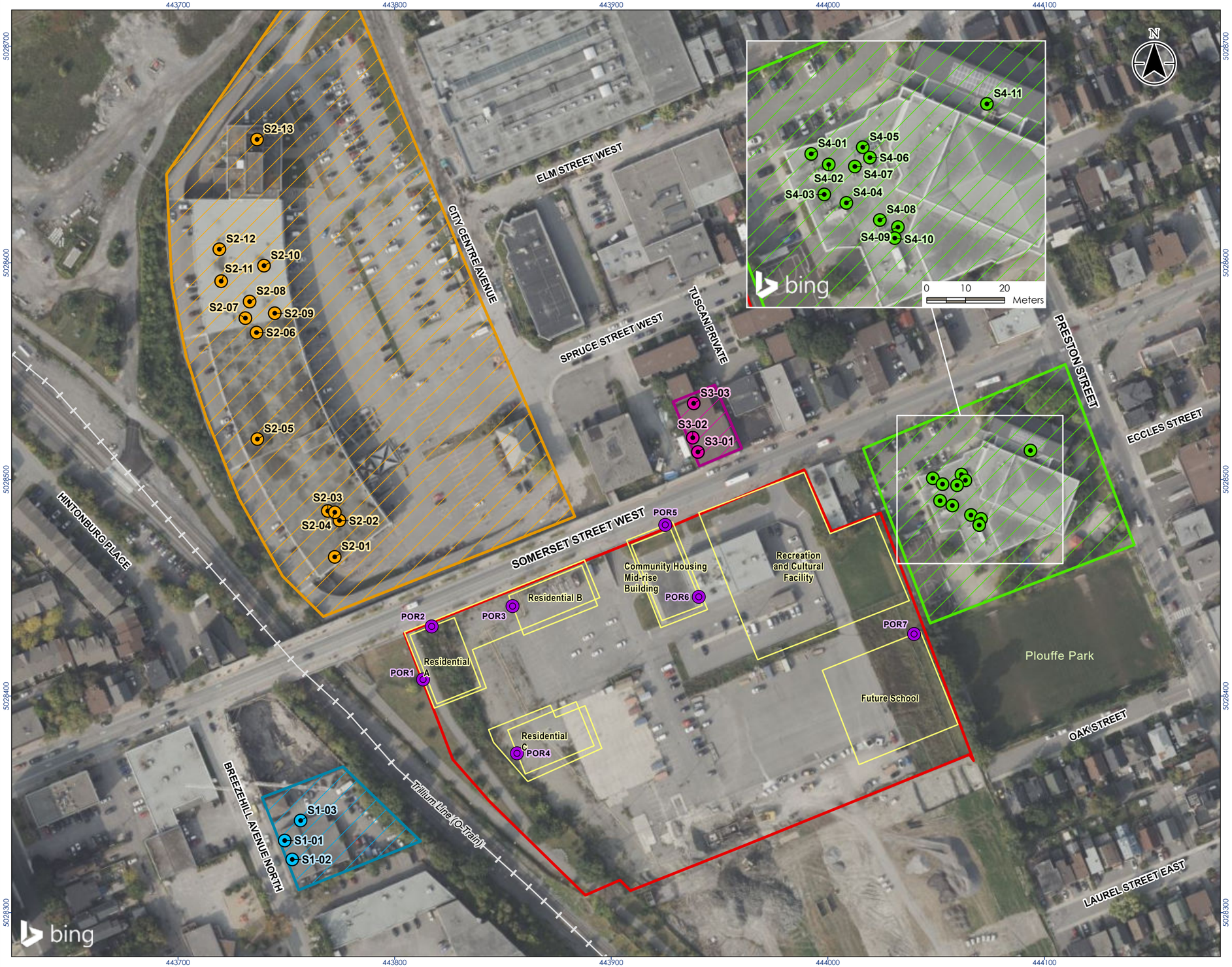
a. Noise Sources and their IDs are shown in Figure 5-1

b. " O" indicates Outdoor

c. "U" indicates Uncontrolled; "B" indicates Noise Barrier

d. Sound Characteristics per NPC-104: S = Steady

e. This feasibility study considers only noise sources identified for the existing Plant Recreation Centre. Noise sources associated with the Plant Recreation Centre expansion have not been considered as that level of design information was not available at the time of this study.



Stantec

Legend

- Project Site
- Modelled Stationary Noise Sources – Commerical Plaza
- Modelled Stationary Noise Sources – Ming Auto Shop
- Modelled Stationary Noise Sources – Musca Wine Pressing & Supplies Ltd.
- Modelled Stationary Noise Sources – Plant Recreation Centre
- Points of Reception – Stationary Noise
- Ottawa Light Rail Transit (LRT) Corridor
- Project Building Footprint

Stationary Noise Sites

- City of Ottawa Plant Recreation Centre
- Commercial Plaza
- Ming Auto Shop
- Musca Wine Pressing and Supplies Ltd.

0 50 100 Meters

1:1,800 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 18N
2. Contains information licensed under the Open Government License – Ontario.
3. Orthoimagery © 2025 Microsoft Corporation © 2025 Maxar ©CNES (2025) Distribution Airbus DS. Date of imagery, unknown.
4. Railway data obtained from City of Ottawa Open Data, 2025; Contains information licensed under the Open Government License – City of Ottawa.

Project Location
City of Ottawa

160402067 REVA
Prepared by rparangat on 2025-01-24
Technical Review by JWH on 2025-01-17

Client/Project
CITY OF OTTAWA
NOISE AND VIBRATION FEASIBILITY STUDY – PROPOSED DEVELOPMENT AT 930 AND 1010 SOMERSET STREET WEST

Figure No.
5-1

Title
Modelled Stationary Noise Sources and Points of Reception

5.3 Vibration

As the OLRT Trillium Lines is not yet operational, vibration assessment of its rail operations is conducted through a desktop study. The nearest vibration-sensitive point on the proposed development to the Trillium Line is the southwest corner of the Residential A development footprint, located approximately 30 m from the adjacent rail corridor. Vibration levels typically decrease with distance, so the vibration impact on other vibration sensitive spaces beyond the assessment point is expected to be lower.

For this assessment, the prediction of vibration impacts from adjacent rail activities follows the general vibration assessment procedure for Ground Borne Vibration (GBV) outlined in the US FTA Manual.

The basic approach for the general vibration assessment is to utilize a base curve that predicts the overall GBV as a function of distance from the source, as follows:

$$L_v = 92.28 + 14.81\log(D) - 14.17\log(D)^2 + 1.651\log(D)^3$$

Where:

L_v = vibration velocity level, VdB (ref. 1 micro-in/sec)

D = slope distance between closest track and building foundation, ft

Adjustments to the curve are then applied to account for factors such as locomotive type, vehicle speed, geological conditions, building type, and receiver location within the building.

A source adjustment factor for speed is applied to the above GBV equation for vehicle speeds different from the reference speed of 80 km/hr. For the purposes of this assessment, the trains were considered to be travelling at 65 km/h which is the maximum speed for northbound rail traffic. Southbound rail traffic would be travelling at slower speeds and generate lower vibration levels.

Additional adjustment factors, such as train and rail type, were applied according to the US FTA Manual. The applied parameters and assumptions used in this analysis are summarized as below:

- Train Type: DMU. The base vibration curve for this type of train was obtained by applying a -5 dB adjustment to the curve for Locomotive Powered Freight Train, as advised in the US FTA Manual.
- Train Speed: the maximum train speed of 65 km/hr was used since vibration levels generally increase with speed.
- Rail Type: Continuous Welded Rail
- Efficient vibration propagation in the soil was not considered or expected due to the rail corridor being in an open-cut near the Project.
- No special track work was considered

6 Assessment Results

6.1 Transportation Noise

6.1.1 Plane of Window

The noise models described in Section 5.2 were used to predict transportation (road and rail) noise levels at the worst-case receptors. The receptors representing indoor spaces are located at the facades of the Project residential and school buildings where the highest predicted transportation noise levels occur. The modelled receptors are shown in Figure 6-1.

A summary of the predicted POW transportation noise levels at the representative receptors is presented in Table 6-1. This summary includes requirements for building components and air conditioning to comply with the applicable noise criteria. The results predict transportation noise levels reaching up to 70 dBA during the daytime, and up to 63 dBA during the nighttime. These levels exceed applicable limits, warranting noise control measures and the inclusion of warning clauses for the development, which are further discussed in Section 6.2. Road noise modelling tables and sample rail noise calculations are provided in Appendix D

Stantec

Legend

- Project Site
- Receptors – Transportation Noise
- Ottawa Light Rail Transit (LRT) Corridor
- Gladstone Village Development
- Project Building Footprint

Stationary Noise Sites

- City of Ottawa Plant Recreation Centre
- Commercial Plaza
- Ming Auto Shop
- Musca Wine Pressing and Supplies Ltd.

0 40 80 Meters

1:1,500 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 18N
2. Contains information licensed under the Open Government License – Ontario.
3. Orthoimagery © 2025 Microsoft Corporation © 2025 Maxar ©CNES (2025) Distribution Airbus DS. Date of imagery, unknown.
4. Railway data obtained from City of Ottawa Open Data, 2025; Contains information licensed under the Open Government License – City of Ottawa.

Project Location
City of Ottawa

160402067 REVA
Prepared by rparangat on 2025-01-24
Technical Review by JWH on 2025-01-17

Client/Project
CITY OF OTTAWA
NOISE AND VIBRATION FEASIBILITY STUDY – PROPOSED DEVELOPMENT AT 930 AND 1010 SOMERSET STREET WEST

Figure No.
6-1

Title
Modelled Receptors and Buildings

Table 6-1 Transportation Noise Assessment Results – Plane of Window

Building	Façade	Receptor ID [a]	Daytime						Nighttime					
			Predicted Noise Level, $L_{eq-16hr}$ (dBA)			Exceeds 65 dBA limit for Building Component Specification? (Y/N)	Exceeds 60 dBA limit for Building Component Specification? (Y/N)	Exceeds 65 dBA limit for Mandatory Ventilation Noise Control? (Y/N)	Predicted Noise Level, L_{eq-8hr} (dBA)			Exceeds 60 dBA limit for Building Component Specification? (Y/N)	Exceeds 55 dBA limit for Building Component Specification? (Y/N)	Exceeds 60 dBA limit for Mandatory Ventilation Noise Control? (Y/N)
			Road	Rail	Total	Road	Rail	Total	Road	Rail	Total	Road	Rail	Total
Tower A	West	A_WFS_4	60	68	69	N	**Y**	**Y**	53	62	63	N	**Y**	**Y**
	North	A_NF_2	69	62	70	**Y**	**Y**	**Y**	62	56	63	**Y**	**Y**	**Y**
	East	A_EF_25	60	58	62	N	N	N	52	52	55	N	N	N
	South	A_SF_4	53	66	67	N	**Y**	**Y**	45	61	61	N	**Y**	**Y**
Tower B	West	B_WF_10	60	61	63	N	**Y**	N	53	55	57	N	N	N
	North	B_NF_2	67	59	68	**Y**	N	**Y**	60	53	61	N	N	**Y**
	East	B_EF_6	60	55	61	N	N	N	53	49	54	N	N	N
	South	B_SF_15	57	60	62	N	N	N	50	54	55	N	N	N
Tower C	West	C_WF_4	55	68	68	N	**Y**	**Y**	48	62	62	N	**Y**	**Y**
	North	C_NF_6	52	62	63	N	**Y**	N	44	56	57	N	**Y**	N
	East	C_EF_15	59	58	62	N	N	N	51	52	55	N	N	N
	South	C_SF_4	57	66	66	N	**Y**	**Y**	49	60	60	N	**Y**	N
Mid-rise	West	MR_WF_2	63	58	65	N	N	N	56	52	58	N	N	N
	North	MR_NF_2	67	57	68	**Y**	N	**Y**	60	51	60	N	N	N
	East	MR_EF_2	62	53	63	N	N	N	55	47	55	N	N	N
	South	MR_SF_6	57	58	61	N	N	N	49	53	54	N	N	N
Future School [b]	West	FS_WF_2	55	58	59	N	N	N	N/A	N/A	N/A	N/A	N/A	N/A
	North	FS_NF_2	56	51	57	N	N	N	N/A	N/A	N/A	N/A	N/A	N/A
	East	FS_EF_2	60	47	60	N	N	N	N/A	N/A	N/A	N/A	N/A	N/A
	South	FS_SF_2	59	57	61	N	N	N	N/A	N/A	N/A	N/A	N/A	N/A

Notes:

a. Receptor locations are shown in Figure 6-1

b. Only daytime transportation noise levels are presented for the future school, as the school is only expected to be occupied during the daytime. As such, nighttime transportation noise levels and limits for the future school are listed as N/A (not applicable).

6.1.2 Outdoor Living Areas

The current Project concept does not identify OLAs. For the purposes of this feasibility study, two OLA locations (OLA1 and OLA2) have been assumed and are shown in Figure 6-1. OLA1 is located at grade in between the residential A + B podium and the residential C podium. OLA2 is located on the rooftop of the 4th floor residential A + B podium. A summary of the predicted daytime noise level at each OLA location is provided in Table 6-2.

Table 6-2 Transportation Noise Assessment Results – Outdoor Living Areas

Receptor Description [a]	Receptor ID [b]	Predicted Noise Level, $L_{eq-16hr}$ (dBA)	Exceeds 55 dBA Outdoor Noise Objective? (Y/N)
		Total	
Outdoor Amenity Area - At Grade	OLA1	60	**Y**
Outdoor Amenity Area – Elevated (4th floor rooftop)	OLA2	60	**Y**

Notes:

a. The OLA locations assessed in this study were assumed for the purposes of the preliminary noise assessment, as OLA details for the Project were not available at the time of this study.

b. Receptor locations are shown in Figure 6-1

The predicted total noise level (road and rail) at the OLA1 and OLA2 exceed the 55 dBA objective. Following MECP NPC-300, noise controls may be applied to reduce transportation noise levels to the 55 dBA objective and a warning clause is recommended in the tenant's agreement. Noise controls for the assumed OLAs are further discussed in Section 6.2.3.

6.2 Transportation Noise Controls

6.2.1 Ventilation Requirements

The predicted transportation noise levels at the residential buildings exceed the NPC-300 noise limits, triggering the requirement for mandatory air-conditioning. The ventilation requirements in NPC-300 can be met by installing centralized air-conditioning for the Project's residential buildings prior to occupancy.

Transportation noise levels as high as 61 dBA were predicted at the future school during daytime. At these levels, only a provision for air conditioning is required to meet NPC-300 criteria, along with an appropriate warning clause. Examples of applicable warning clauses are discussed in Section 6.2.4.

6.2.2 Building Components

As shown in Table 6-1, predicted road and/or rail noise levels for the residential buildings warrant upgrades to building components (e.g., walls and windows) beyond the OBC requirements, while the future school does not require such upgrades. Therefore, building components for the residential

buildings should be upgraded for indoor noise levels comply with the MECP criteria, as noted in Table 3-2. This study specifies preliminary acoustical performance requirements for wall and window components in terms of STC. Balconies and exterior door components, such as sliding doors for noise-sensitive spaces, have not been identified at this stage of Project, and therefore, these components have not been included in this preliminary analysis for this feasibility study.

Calculations have been performed to determine preliminary STC requirements for wall and window building components for compliance with the applicable noise limits. The calculations follow the methods described in Building Practice Note (BPN) 56 (Quirt 1985) published by the National Research Council (NRC). This analysis is based on the worst-case road and rail noise levels predicted at the POW receptors, as well as the assumed area of the exterior wall and window components relative to the floor area of the adjacent room. Floor plans were not available at the time of this feasibility study; therefore, a 50 % exterior window and wall to floor area was assumed for this analysis. A summary of the preliminary STCs requirements for each residential building is presented in Table 6-3.

Table 6-3 Building Component Specification – Preliminary STC Requirements

Building	STC [a]	
	Wall	Window
Tower A	50	36
Tower B	47	32
Tower C	50	35
Mid-rise	47	29

Note:

a. STC requirements are based on a corner unit with two façades exposed to rail and road noise level. A 50 % exterior window and wall to floor area was assumed for this preliminary analysis. Balconies and exterior door components, such as sliding doors for noise-sensitive spaces, have not been identified for the Project and have not been considered for this preliminary analysis.

The STC requirements in Table 6-3 are expected to be feasible and they apply to the noted building/towers including podiums. The calculated STC values are based on the worst-case road and rail traffic noise levels predicted in this study, as well as the building component assumptions outlined earlier in this section. When detailed floor plans and elevations are available for the Project, the building component requirements should be updated, as needed.

Additionally, NPC-300 specifies that the first row of dwellings adjacent to railway tracks are to be constructed with a minimum of brick veneer or masonry equivalent construction from the foundation to the rafters when the rail traffic $L_{eq\text{-}24hr}$ sound level exceeds 60 dBA at a nighttime receptor locations and the first row of dwellings are within 100 m of the tracks. Residential buildings A and C meet these conditions, requiring brick veneer or masonry equivalent construction.

6.2.3 Outdoor Living Areas

As shown in Table 6-2, the predicted transportation noise levels at the modelled OLAs exceed the 55 dBA objective. For the purposes of this preliminary analysis, conceptual mitigation has been investigated to reduce transportation noise levels to 55 dBA at these assumed OLAs. The conceptual noise mitigation investigated for these assumed OLAs are listed below and shown in Figure 6-2:

- A 4 m high noise barrier along the southwest Project site boundary, connecting Residential buildings A and C, to mitigate noise level at OLA1
- 2 m high parapet along the north and south sides of the Residential A and B Podium roof to mitigate noise level at OLA2

With the above mitigation measures in place, the predicted transportation noise levels are within 55 dBA limits at both OLA1 and OLA2. The results demonstrate that it is technically feasible to achieve the outdoor noise objective with the conceptual noise barriers modelled in this assessment.

It is acknowledged that noise barriers are not the preferred noise control method for OLAs per the ENCG. To the extent possible, the Project OLAs should be located to reduce exposure to noise from the railway corridor and notable road traffic noise sources, such as Highway 417 and Somerset Street West. Stantec recommends the OLA assessment be updated when actual OLAs for the Project have been defined to confirm outdoor noise impacts and mitigation requirements.

It is also noted that allowances of up to 5 dB exceedance of the noise level objective are permissible under MECP NPC-300, provided there is an appropriate warning clause included in the agreements of Offers of Purchase and Sale, lease/rental agreements and condominium declarations related to the Project. Examples of applicable warning clauses are discussed in Section 6.2.4.

Stantec

Legend

- Receptors – Transportation Noise
- Conceptual Noise Barrier
- Ottawa Light Rail Transit (LRT) Corridor
- Project Building Footprint

0 25 50 Meters

1:1,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 18N
2. Contains information licensed under the Open Government License – Ontario.
3. Orthoimagery © 2025 Microsoft Corporation © 2025 Maxar ©CNES (2025) Distribution Airbus DS. Date of imagery, unknown.
4. Railway data obtained from City of Ottawa Open Data, 2025; Contains information licensed under the Open Government License – City of Ottawa.

Project Location
City of Ottawa

160402067 REVA
Prepared by rparangat on 2025-01-24
Technical Review by JWH on 2025-01-17

Client/Project
CITY OF OTTAWA
NOISE AND VIBRATION FEASIBILITY STUDY – PROPOSED DEVELOPMENT AT 930 AND 1010 SOMERSET STREET WEST

Figure No.
6.2

Title
Investigated Noise Barriers for Outdoor Amenity Areas

6.2.4 Warning Clauses

Based on the current transportation noise level predictions, warning clauses are recommended to be included in agreements of Offers of Purchase and Sale, lease/rental agreements and condominium declarations related to the Project. Although the MECP provides warning clauses Type A through D for land use planning purposes, this section presents warning clauses provided in the ENCG since those are more relevant to this Project.

The ENCG provides example text to be adapted for a warning clause (s) addressing surface transportation noise. The example text is based on the type of living space and noise control measures considered for the development. The ENCG warning clause examples of type “Generic” and type “Extensive mitigation of indoor and outdoor amenity area” are listed below for reference. The warning clauses would need to be adapted to reflect site-specific conditions of the Project. The ENCG notes that final wording of any warning clause is to be approved by the City.

Sample Surface Transportation Warning Clause – Generic:

“Purchasers/tenants are advised that sound levels due to increasing road/rail/Light Rail/transitway traffic may occasionally interfere with some outdoor activities as the sound levels may exceed the sound level limits of the City and the Ministry of the Environment [2].

To help address the need for sound attenuation this development has been designed so as to provide an outdoor amenity area that is within provincial guidelines. Measures for sound attenuation include:

- *A setback of buildings from the noise source and*
- *An acoustic barrier.*

To ensure that provincial sound level limits are not exceeded it is important to maintain sound attenuation features.

The acoustic barrier shall be maintained and kept in good repair by the property owner. Any maintenance, repair or replacement is the responsibility of the owner and shall be with the same material or to the same standards, having the same colour, appearance and function of the original.

Additionally, this development includes trees and shrubs to screen the source of noise from occupants. “

[2] The MECP was previously known as the Ministry of the Environment

Sample Surface Transportation Warning Clause – Extensive mitigation of indoor and outdoor amenity area:

"*Purchasers/tenants are advised that despite the inclusion of noise control features in the development and within the building units sound levels due to increasing road/rail/Light Rail/transitway traffic may, on occasion, interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the City and the Ministry of the Environment.*

To help address the need for sound attenuation this development includes:

- *multi-pane glass;*
- *double brick veneer;*
- *an earth berm; and*
- *an acoustic barrier*

To ensure that provincial sound level limits are not exceeded it is important to maintain these sound attenuation features.

To ensure that provincial sound level limits are not exceeded it is important to maintain these sound attenuation features.

The acoustic barrier shall be maintained and kept in good repair by the property owner. Any maintenance, repair or replacement is the responsibility of the owner and shall be with the same material or to the same standards, having the same colour, appearance and function of the original.

This dwelling unit has also been designed with the provision for adding central air conditioning at the occupant's discretion. Installation of central air conditioning will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the City and the Ministry of the Environment."

6.3 Stationary Noise

The noise model described in Section 5.2 was used to predict preliminary stationary noise levels at the representative PORs based on the site plan provided for feasibility purposes. These PORs were identified as those with the highest predicted noise level relative the applicable stationary noise limit (Table 3-6). The PORs modelled for the stationary noise assessment are shown in Figure 5-1.

A summary of the preliminary stationary noise assessment results for feasibility purposes is provided in Table 6-4. The results show estimated stationary noise levels from the Ming Auto Shop and Commercial Plaza are predicted to meet the MECP noise limits at the modelled PORs. Therefore, no additional noise control measures are expected to be required for these facilities to comply with MECP stationary noise criteria. However, predicted stationary noise levels from the Musca Wine Shop and the on-site Plant Recreation Centre have the potential to exceed MECP noise limits at the Mid-rise building (POR5 and POR6) and future school (POR7) based on the estimated levels. The Musca Wine Shop noise level is predicted to exceed the nighttime noise limit by 3 dB at the Mid-rise building (POR5) based on the

modelled scenario. The existing Plant Recreation Centre noise level exceeds the nighttime noise limit by 5 dB at the Mid-rise building (POR6) and the daytime noise limit by 4 dB at the future school (POR7).

Noise control measures for the on-site Plant recreation centre are expected to be administratively feasible, as it is owned by the City. However, the City may need to coordinate noise control implementation at the Musca Wine Shop with third-party stakeholders. Noise control measures for these facilities are further discussed in the following section.

Table 6-4 Stationary Noise Assessment Results

POR ID [a]	POR Description	Noise Level Limit, L_{eq-1hr} (dBA) [b]			Ming Auto Shop						Commercial Plaza						Musca Wine Pressing & Supplies Ltd.						Plant Recreation Centre					
					Predicted Noise Level, L_{eq-1hr} (dBA)			Meets Noise Level Limit? (Y/N)			Predicted Noise Level, L_{eq-1hr} (dBA)			Meets Noise Level Limit? (Y/N)			Predicted Noise Level, L_{eq-1hr} (dBA)			Meets Noise Level Limit? (Y/N)			Predicted Noise Level, L_{eq-1hr} (dBA)			Meets Noise Level Limit? (Y/N)		
		Day	Eve	Night	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night
POR1	Tower A - West Facade - 4th floor	50	50	45	45	45	45	Y	Y	Y	40	40	40	Y	Y	Y	13	13	13	Y	Y	Y	18	18	18	Y	Y	Y
POR2	Tower A - North Facade - 14th floor	50	50	45	32	32	32	Y	Y	Y	45	45	45	Y	Y	Y	36	36	36	Y	Y	Y	28	28	28	Y	Y	Y
POR3	Tower B - West Facade - 16th floor	50	50	45	29	29	29	Y	Y	Y	45	45	45	Y	Y	Y	27	27	27	Y	Y	Y	23	23	23	Y	Y	Y
POR4	Tower C - West Facade - 13th floor	50	50	45	43	43	43	Y	Y	Y	40	40	40	Y	Y	Y	11	11	11	Y	Y	Y	21	21	21	Y	Y	Y
POR5	Mid-rise - North Facade - 3rd floor	50	50	45	25	25	25	Y	Y	Y	39	39	39	Y	Y	Y	48	48	48	Y	Y	**N**	30	30	30	Y	Y	Y
POR6	Mid-rise - West Facade - 6th floor	50	50	45	26	26	26	Y	Y	Y	22	22	22	Y	Y	Y	43	43	43	Y	Y	Y	50	50	50	Y	Y	**N**
POR7	Future School - North Facade - 2nd floor	50	N/A	N/A	25	N/A	N/A	Y	N/A	N/A	26	N/A	N/A	Y	N/A	N/A	20	N/A	N/A	Y	N/A	N/A	54	N/A	N/A	**N**	N/A	N/A
OLA1	Outdoor Amenity Area - At Grade	50	50	N/A	38	38	N/A	Y	Y	N/A	28	28	N/A	Y	Y	N/A	15	15	N/A	Y	Y	N/A	26	26	N/A	Y	Y	N/A
OLA2	Outdoor Amenity Area - Elevated	50	50	N/A	31	31	N/A	Y	Y	N/A	42	42	N/A	Y	Y	N/A	31	31	N/A	Y	Y	N/A	23	23	N/A	Y	Y	N/A

Notes:

a. POR locations and ID's shown in Figure 6-1

b. Noise Level limits used for this assessment are the MECP Class 1 Exclusion Limits from Table 3-6.

c. Day: refers to the Daytime period from 07:00 to 19:00
Eve: refers to the Evening period from 19:00 to 23:00
Night: refers to the Nighttime period from 23:00 to 07:00

6.4 Stationary Noise Control Options

Based on the preliminary assessment results in Section 6.3, stationary noise levels from the on-site Plant Recreation Centre and off-site Musca Wine Shop have the potential to exceed the applicable nighttime noise limit at the proposed development. This section discusses preliminary noise control options to address the stationary noise impacts, including on-site and off-site noise control, as well as the potential for a Class 4 designation for the Project. However, these controls should be determined and implemented based on a detailed stationary noise assessment further discussed in Section 6.6.

Source-based Mitigation

Based on this preliminary noise assessment, noise control measures may be required for the Musca Wine Shop and existing Plant Recreation Centre to meet the MECP noise criteria (Table 3-6) at the modelled PORs. The noise controls must reduce the overall noise level from the Musca Wine Shop by 3 dB and from the existing Plant Recreation Centre by 5 dB. Achieving these noise reductions technically feasible using typical source-based mitigation, such as silencers and/or acoustic enclosures. The source mitigation should focus on equipment contributing the highest noise levels. For both the Musca Wine Shop and Plant Recreation Centre, the highest noise contributions are from the rooftop chillers.

On-Site Mitigation

During the design of new noise sensitive land uses, on-site noise controls such as inoperable windows can be considered to address stationary noise impacts, per the ENCG and MECP NPC-300. In accordance with these guidelines, inoperable windows are not considered receptors and would not be subject to noise limits, and may be an acceptable “on building” noise control measure for windows that are not associated with noise sensitive spaces and where the architectural design does not allow for conversion into a noise-sensitive, for example, inoperable windows in a single-loaded corridor of a high-rise multi-unit building.

The inoperable windows must be designed to remain permanent for as long as the subject stationary noise source(s) operate.

Other on-site noise controls such as acoustic barriers provide noise attenuation when there is an obstructed line of sight between the PORs and stationary noise sources. Given the height of the mid to high-rise building PORs in the current Project design, an on-site acoustic barrier to mitigate stationary noise is not expected to be technically feasible.

Class 4 Designation for the Project

Due to noise level exceedance from the off-site facility, a Class 4 designation for the Project Development can be considered. Per the ENCG, Class 4 is defined as an area or a specific site that would otherwise be defined as a Class 1 or Class 2 and which:

- is an area intended for development with new noise sensitive land use(s) that are not yet built

- is in proximity to existing, lawfully established stationary source(s)
- has formal confirmation (designation) from the City of the Class 4 area classification through Council approval.

This classification may not be applied retroactively. Existing noise sensitive land use(s) cannot be classified as Class 4 areas until these land uses are replaced, redeveloped or rebuilt. Class 4 is only applied on a property-by-property basis and, if the noise source is removed (i.e. the Provincial Environmental Compliance approval is removed or lapses), the classification will revert to be consistent with that of the adjacent lands (either Class 1 or 2). Finally, lands adjacent to undeveloped industrially zoned properties or areas defined as employment lands in the Official Plan may not be classified Class 4.

Based on the current Project concept and surrounding land use, the development is expected to qualify for Class 4 consideration. It is also worth noting that nearby properties 933 and 1030 Somerset Street West, as well as 951 Gladstone Avenue and 145 Loretta Avenue have a Class 4 classification per the City of Ottawa Noise By-law No. 2017-255. The ENCG notes that lands can only be classified as Class 4 through a City or Ontario Municipal Board approval of a Planning Act application and accompanying noise study.

Compared to the Class 1 stationary noise limits used in this assessment, the Class 4 limits are 10 dB higher for POW receptors and 5 dB higher for outdoor receptors. Based on this preliminary assessment, the Musca Wine Shop and the Plant Recreation Centre would feasibly meet the Class 4 stationary noise limits without additional mitigation measures.

6.5 Vibration

The vibration assessment was conducted at the southwest corner of Residential Building A, the closest building to the adjacent OLRT Trillium Line. The outdoor GBV was predicted at this location at-grade level. The GBV level without mitigation measures was predicted to be 0.10 mm/s RMS, which is below the impact threshold of 0.14 mm/s RMS. Therefore, no site-specific mitigation for rail vibration is anticipated to be required for the Project.

6.6 Recommendations for Future Work

The stationary noise assessment is primarily based on a desktop review and assessment of potential impacts onto the Project from existing sources.

Based on the results of this feasibility study, it is recommended that a detailed stationary noise assessment be conducted for the Project to refine the results and confirm the level of mitigation required for compliance with applicable stationary noise limits. The detailed study, where feasible, should include sound level measurements of the significant stationary noise sources, including those located on third party properties. This will provide more accurate data to assess the potential impact of external noise sources on the development and help identify necessary mitigation measures to meet applicable noise guidelines and criteria.

7 Noise Impact of Project to Off-site

Noise generated by the Project to the surrounding area is required to comply with the City of Ottawa Noise By-Law, ENCG, and MECP NPC-300 stationary noise limits at off-site noise sensitive receptors. The Project itself may introduce new noise sources to the environment including but not limited to mechanical equipment associated with the Plant Recreation expansion, District Energy Plant and mechanical penthouses for the on-site buildings.

As the Project's architectural, mechanical, and electrical designs are not yet advanced enough to complete a detailed noise assessment for off-site noise compliance at this stage, Stantec recommends a detailed noise assessment be completed by the Project design team's Acoustic Consultant prior to final building design. This will allow any necessary noise mitigation measures to be implemented effectively into the Project.

8 Noise Impact of Project to Itself

Noise generated by the Project onto itself should be designed to comply with the MECP NPC-300 stationary noise limits at on-site noise sensitive receptors. The Project itself may introduce new noise sources to the environment including but not limited to mechanical equipment associated with the Plant Recreation expansion, District Energy Plant and mechanical penthouses for the on-site buildings.

As the Project's architectural, mechanical, and electrical designs are not yet advanced enough to complete a detailed noise assessment for compliance to itself at this stage, Stantec recommends a detailed noise assessment be completed by the Project design team's Acoustic Consultant prior to final building design. This will allow necessary noise mitigation measures to be integrated effectively into the Project.

9 Conclusions

Stantec Consulting Ltd. (Stantec) was retained by the City of Ottawa Housing Solutions and Investment Services (HSIS) to prepare a Noise and Vibration Feasibility Study for the proposed development at 930 and 1010 Somerset Street West in the City of Ottawa.

This preliminary study demonstrates that it is feasible for the Project to comply with applicable noise and vibration guidelines and achieve land use compatibility with surrounding transportation and stationary noise, provided appropriate noise controls are incorporated in the detailed design.

The transportation noise control requirements for the proposed Project from this analysis include mandatory air conditioning and:

- Exterior wall construction up to STC 50
- Exterior window construction up to STC 36
- Minimum of brick veneer or masonry equivalent construction from the foundation to the rafters for Residential Building A and C
- Noise barriers for the assumed OLAs to meet the 55 dBA objective

Once actual OLAs have been defined for the Project, they should be reevaluated to confirm noise mitigation requirements.

A preliminary stationary noise assessment was conducted to assess the impact of off-site facilities on the development, as part of this feasibility study. This assessment does not include potential noise sources associated with the proposed Plant Recreation Centre expansion or other Project components, which are addressed separately. The assessment was based on a desktop review, supplemented with site observations. Based on the assumptions and inputs used in this study, noise control measures for the existing on-site Plant recreation centre and off-site Musca Wine Shop may be required to comply with Class 1 limits for stationary noise sources. A detailed stationary noise assessment is recommended to accurately model stationary noise and refine necessary noise control measures.

Subject to the results of a detailed assessment, on-site and off-site stationary noise controls can be considered for the Project. On-site receptor-based controls could include the installation of inoperable/fixed windows for the development in accordance with the MECP NPC-300 guideline. Both on-site and off-site source-based noise controls could include typical at-source mitigation, such as silencers and acoustic enclosures. Implementing at-source mitigation is expected to be technically feasible and may require coordination between the City and Musca Wine Shop. However, these measures should only be considered following a detailed stationary noise assessment. Alternatively, a Class 4 designation for the Project Development may be considered based on the completion and findings of a detailed stationary noise assessment.

The predicted vibration level at the southwest corner of Residential Building A, the closest building to the adjacent OLRT Trillium Line is below the impact threshold of 0.14 mm/s RMS.

The Project's design is not advanced enough at this stage to complete a detailed noise assessment for on and off-site noise compliance. Therefore, a detailed noise assessment recommended as part of future planning approvals and prior to final building design to refine noise control measures once the Project is further developed.

10 References

City of Ottawa. 2008. "City of Ottawa Zoning By-law 2008-250."

City of Ottawa. 2017. "Noise By-law No. 2017-255."

FCM/RAC. 2013. "Guidelines for New Development in Proximity to Railway Operations."

ISO. 1996. "ISO 9613-2. Acoustics – Attenuation of Sound during propagation outdoors. Part 2 – General method."

MECP. 2013. "Environmental Noise Guideline – Stationary and Transportation Sources – Approval and Planning (NPC-300)."

MOE. 1995. "Guideline D-6 - Compatibility Between Industrial Facilities and Sensitive Land Use."

MOE. 1978. "Publication NPC-104 - Sound Level Adjustments."

MTO. 2022. "Environmental Guide for Noise."

Quirt, J D. 1985. "Controlling Sound Transmission into Buildings, BPN56."

The City of Ottawa. 2016. "Environmental Noise Control Guidelines."

US FTA. 2018. "Transit Noise and Vibration Impact Manual Assessment Manual."

Appendices

Appendix A Project Concept Plan

SOMERSET STREET W

PRESTON STREET

TRILLIUM LINE

MUP

FUTURE RESIDENTIAL DEVELOPMENT SITE
(CONCEPTUAL HIGH-RISE BUILDING FOOTPRINT)

(CONCEPTUAL MID-RISE BUILDING FOOTPRINT)

DISTRICT ENERGY PLANT OPTION 2

DISTRICT ENERGY PLANT OPTION 1

RECREATION AND CULTURAL FACILITY
(3 FLOORS)

EMERGENCY AND SERVICE VEHICLES ONLY

CITY OF OTTAWA PLANT RECREATION CENTRE

1 HECTARE PUBLIC SPORTS FIELD AND / OR PASSIVE PARK

FUTURE SCHOOL SITE

PLOUFFE PARK

OTTAWA COMMUNITY HOUSING CORPORATION (0.02 HA)

STREET

GLADSTONE VILLAGE

OAK STREET

LEGEND

- VISITOR TRAFFIC FLOW
- VEHICLE ACCESS TO UNDERGROUND PARKING
- SERVICE TRAFFIC FLOW
- SCHOOL BUS TRAFFIC FLOW (ONE-WAY)
- BUS LAY-BY
- SHORT-TERM PARKING / DROP-OFF
- POTENTIAL SIGNALIZED INTERSECTION
- UNDERPASS
- PEDESTRIAN TRAVEL ROUTE

HOBIN

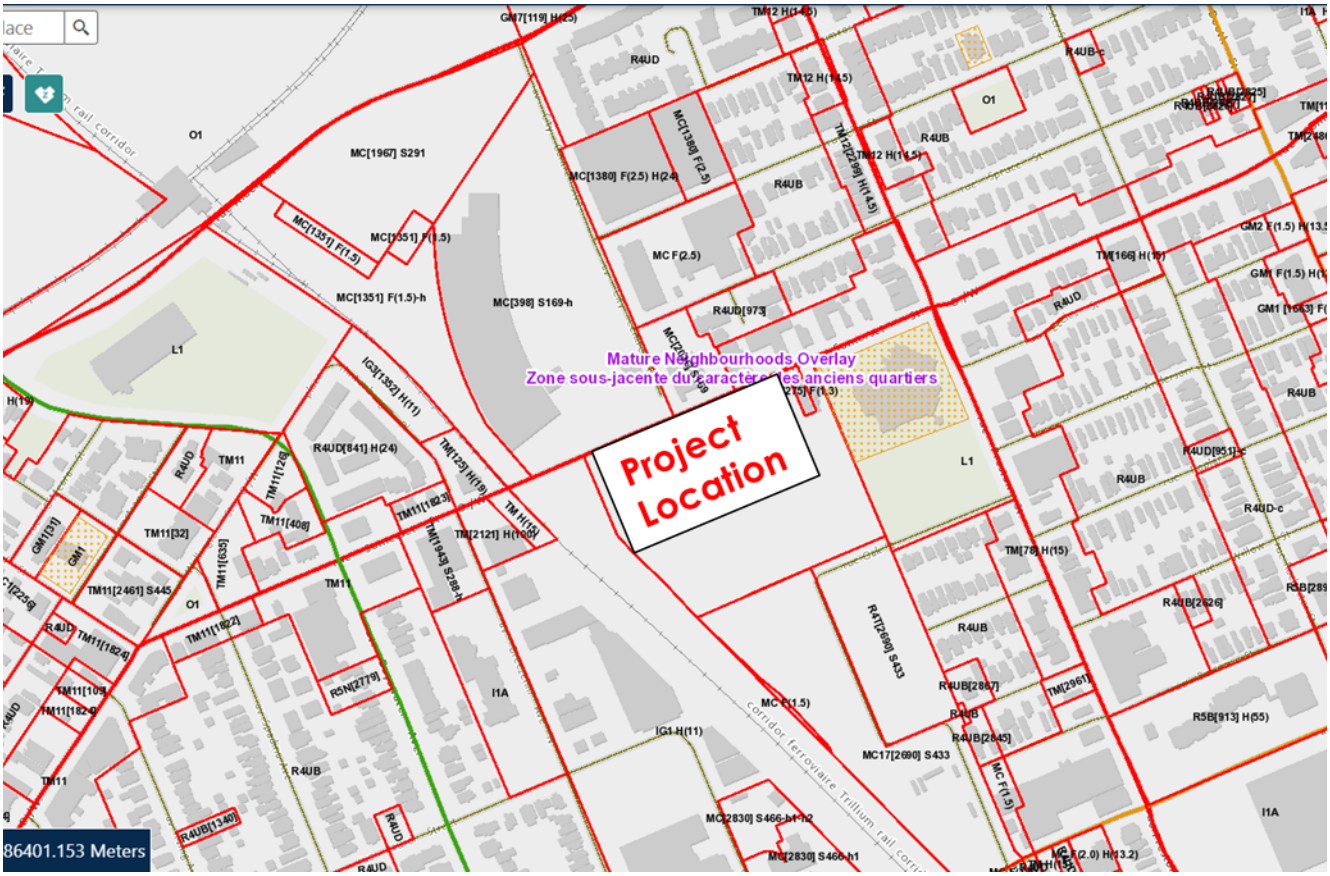
1010 SOMERSET

FINAL CONCEPT PLAN

SCALE 1:800

MAY 3, 2024

Appendix B Local Zoning Map



Source. https://maps.ottawa.ca/geoottawa/

Table 1 Zones and Zone Symbols – Township of Puslinch Comprehensive Zoning By-law No. 023-18

Zones	Zone Symbols
IG	General Industrial Zone
TM	Traditional Mainstreet Zone
GM	General Mixed Use Zone
MC	Mixed Use Centre Zone
L1	Community Leisure Facility Zone
R4	Residential Fourth Density Zone
I1	Minor Institutional Zone
O1	Parks and Open Space Zone

Appendix C Spectral Sound Power Level Data – Stationary Noise Sources

Appendix C Estimated Sound Power Level Summary (For Feasibility Study Only)

Noise Source ID	Source Description	Sound Power Level Octave Band Spectrum (dB)								Overall Sound Power Level (dBA)	Measurement Reference/Data Source
		63	125	250	500	1000	2000	4000	8000		
S1-01	Auto Shop Open Bay Door North	67	86	92	94	90	92	91	86	99	Stantec Field Measurement Database - Melt Shop South Scrap Bay Door
S1-02	Auto Shop Open Bay Door South	67	86	92	94	90	92	91	86	99	Stantec Field Measurement Database - Melt Shop South Scrap Bay Door
S1-03	Auto Shop Exhaust Stack	68	78	82	86	85	79	69	56	90	Stantec Field Measurement Database - Fan Exhaust
S2-01	Commercial Plaza HVAC Unit 01	39	57	65	75	77	74	70	62	81	Manufacturer Data - Lennox ZCB 060 - 5 Tons 2L x 1W
S2-02	Commercial Plaza HVAC Unit 02	-	49	59	70	76	73	69	62	79	Manufacturer Data - Lennox ELS 072 - 6 Tons 1L x 1W
S2-03	Commercial Plaza HVAC Unit 03	-	49	59	70	76	73	69	62	79	Manufacturer Data - Lennox ELS 072 - 6 Tons 1L x 1W
S2-04	Commercial Plaza HVAC Unit 04	-	49	59	70	76	73	69	62	79	Manufacturer Data - Lennox ELS 072 - 6 Tons 1L x 1W
S2-05	Commercial Plaza HVAC Unit 05	-	56	65	76	80	77	71	62	83	Manufacturer Data - Lennox ZCC120 - 10 Tons 2L x 2W
S2-06	Commercial Plaza HVAC Unit 06	39	57	65	75	77	74	70	62	81	Manufacturer Data - Lennox ZCB 060 - 5 Tons 2L x 1W
S2-07	Commercial Plaza HVAC Unit 07	39	57	65	75	77	74	70	62	81	Manufacturer Data - Lennox ZCB 060 - 5 Tons 2L x 1W
S2-08	Commercial Plaza HVAC Unit 08	-	56	65	76	80	77	71	62	83	Manufacturer Data - Lennox ZCC120 - 10 Tons 2L x 2W
S2-09	Commercial Plaza HVAC Unit 09	39	57	65	75	77	74	70	62	81	Manufacturer Data - Lennox ZCB 060 - 5 Tons 2L x 1W
S2-10	Commercial Plaza HVAC Unit 10	-	56	65	76	80	77	71	62	83	Manufacturer Data - Lennox ZCC120 - 10 Tons 2L x 2W
S2-11	Commercial Plaza HVAC Unit 11	-	49	59	70	76	73	69	62	79	Manufacturer Data - Lennox ELS 072 - 6 Tons 1L x 1W
S2-12	Commercial Plaza HVAC Unit 12	-	49	59	70	76	73	69	62	79	Manufacturer Data - Lennox ELS 072 - 6 Tons 1L x 1W
S2-13	Commercial Plaza Cooling Tower - Single Cell	77	85	91	95	93	90	85	75	99	Manufacturer Data - Cooling Tower - Marley NC8307JI1 - Single Cell
S3-01	Wine Shop Chiller - 1 fans	60	70	76	77	77	73	66	62	82	Stantec Field Measurement Database - Small Rooftop Chiller - 1 fan
S3-02	Wine Shop Chiller - 2 fans	63	73	79	80	80	76	69	65	85	Stantec Field Measurement Database - Small Rooftop Chiller - 2 fans
S3-03	Wine Shop Chiller - 2 fans	63	73	79	80	80	76	69	65	85	Stantec Field Measurement Database - Small Rooftop Chiller - 2 fans
S4-01	Plant Rec Centre HVAC Unit 01	-	49	59	70	76	73	69	62	79	Manufacturer Data - Lennox ELS 072 - 6 Tons 1L x 1W
S4-02	Plant Rec Centre AHU 01	67	74	80	82	82	78	74	66	87	Stantec Field Measurement Database - Air Handling Unit
S4-03	Plant Rec Centre HVAC Unit 02	-	56	65	76	80	77	71	62	83	Manufacturer Data - Lennox ZCC120 - 10 Tons 2L x 2W
S4-04	Plant Rec Centre AHU 02	67	74	80	82	82	78	74	66	87	Stantec Field Measurement Database - Air Handling Unit
S4-05	Plant Rec Centre 8-fan Chiller 01	71	76	87	94	93	90	84	76	98	Stantec Field Measurement Database - Chiller - 8 fans
S4-06	Plant Rec Centre HVAC Unit 03	-	56	65	76	80	77	71	62	83	Manufacturer Data - Lennox ZCC120 - 10 Tons 2L x 2W
S4-07	Plant Rec Centre HVAC Unit 04	-	49	59	70	76	73	69	62	79	Manufacturer Data - Lennox ELS 072 - 6 Tons 1L x 1W
S4-08	Plant Rec Centre HVAC Unit 05	-	57	71	80	83	80	75	65	87	Manufacturer Data - Lennox ELS 180 - 15 Tons 2L x 2W
S4-09	Plant Rec Centre AHU 03	67	74	80	82	82	78	74	66	87	Stantec Field Measurement Database - Air Handling Unit
S4-10	Plant Rec Centre AHU 04	67	74	80	82	82	78	74	66	87	Stantec Field Measurement Database - Air Handling Unit
S4-11	Plant Rec Centre HVAC Unit 06	-	57	71	80	83	80	75	65	87	Manufacturer Data - Lennox ELS 180 - 15 Tons 2L x 2W

Appendix D Noise Model Tables and Sample Calculations

REPORT:	**INPUT TRAFFIC FOR TNM VEHICLES (LAeq)**		
TNM VERSION:	3.2.8741.34338	REPORT DATE:	17 January 2025
CALCULATED WITH:	TNM v3.2.8741.34338	CALCULATION DATE:	1/17/2025 4:23:51 PM
CASE:	Somerset - Daytime	ORGANIZATION:	Stantec
ANALYSIS BY:	fa	PROJECT/CONTRACT:	Somerset

Roadway Name	Road Segment Start Point		Auto		Medium Truck		Heavy Truck		Bus		Motorcycle	
	Name	No.	Volume [Veh/hr]	Speed [km/h]	Volume [Veh/hr]	Speed [km/h]	Volume [Veh/hr]	Speed [km/h]	Volume [Veh/hr]	Speed [km/h]	Volume [Veh/hr]	Speed [km/h]
Hwy417 - WB	WB1	1	6632	100	106	100	317	100	0	0	0	0
	WB2	2	6632	100	106	100	317	100	0	0	0	0
	WB3	3	6632	100	106	100	317	100	0	0	0	0
	WB4	4	6632	100	106	100	317	100	0	0	0	0
	WB5	5	6632	100	106	100	317	100	0	0	0	0
	WB6	6	6632	100	106	100	317	100	0	0	0	0
	WB7	7	6632	100	106	100	317	100	0	0	0	0
	WB8	8	6632	100	106	100	317	100	0	0	0	0
	WB9	9	6632	100	106	100	317	100	0	0	0	0
	WB10	10	6632	100	106	100	317	100	0	0	0	0
	WB11	11	6632	100	106	100	317	100	0	0	0	0
	WB12	12	6632	100	106	100	317	100	0	0	0	0
	WB13	13	6632	100	106	100	317	100	0	0	0	0
	WB14	14	6632	100	106	100	317	100	0	0	0	0
	WB15	15	6632	100	106	100	317	100	0	0	0	0
	WB16	16	6632	100	106	100	317	100	0	0	0	0
	WB17	17	6632	100	106	100	317	100	0	0	0	0

Roadway Name	Road Segment Start Point		Auto		Medium Truck		Heavy Truck		Bus		Motorcycle	
	Name	No.	Volume	Speed	Volume	Speed	Volume	Speed	Volume	Speed	Volume	Speed
			[Veh/hr]	[km/h]	[Veh/hr]	[km/h]	[Veh/hr]	[km/h]	[Veh/hr]	[km/h]	[Veh/hr]	[km/h]
Hwy417 - WB	WB18	18	6632	100	106	100	317	100	0	0	0	0
	WB19	19	6632	100	106	100	317	100	0	0	0	0
	WB20	20	6632	100	106	100	317	100	0	0	0	0
	WB21	21	6632	100	106	100	317	100	0	0	0	0
	WB22	22	6632	100	106	100	317	100	0	0	0	0
	WB23	23	6632	100	106	100	317	100	0	0	0	0
	WB24	24	6632	100	106	100	317	100	0	0	0	0
	WB25	26	6632	100	106	100	317	100	0	0	0	0
	WB26	27	6632	100	106	100	317	100	0	0	0	0
	WB27	28	6632	100	106	100	317	100	0	0	0	0
	WB28	29	6632	100	106	100	317	100	0	0	0	0
	WB29	30	6632	100	106	100	317	100	0	0	0	0
	WB30	31	6632	100	106	100	317	100	0	0	0	0
Hwy417 - EB	EB1	61	6632	100	106	100	317	100	0	0	0	0
	EB2	60	6632	100	106	100	317	100	0	0	0	0
	EB3	59	6632	100	106	100	317	100	0	0	0	0
	EB4	58	6632	100	106	100	317	100	0	0	0	0
	EB5	57	6632	100	106	100	317	100	0	0	0	0
	EB6	56	6632	100	106	100	317	100	0	0	0	0
	EB7	55	6632	100	106	100	317	100	0	0	0	0
	EB8	54	6632	100	106	100	317	100	0	0	0	0
	EB9	53	6632	100	106	100	317	100	0	0	0	0
	EB10	52	6632	100	106	100	317	100	0	0	0	0
	EB11	51	6632	100	106	100	317	100	0	0	0	0
	EB12	50	6632	100	106	100	317	100	0	0	0	0

Roadway Name	Road Segment Start Point		Auto		Medium Truck		Heavy Truck		Bus		Motorcycle	
	Name	No.	Volume	Speed	Volume	Speed	Volume	Speed	Volume	Speed	Volume	Speed
			[Veh/hr]	[km/h]	[Veh/hr]	[km/h]	[Veh/hr]	[km/h]	[Veh/hr]	[km/h]	[Veh/hr]	[km/h]
Hwy417 - EB	EB13	49	6632	100	106	100	317	100	0	0	0	0
	EB14	48	6632	100	106	100	317	100	0	0	0	0
	EB15	47	6632	100	106	100	317	100	0	0	0	0
	EB16	46	6632	100	106	100	317	100	0	0	0	0
	EB17	45	6632	100	106	100	317	100	0	0	0	0
	EB18	44	6632	100	106	100	317	100	0	0	0	0
	EB19	43	6632	100	106	100	317	100	0	0	0	0
	EB20	42	6632	100	106	100	317	100	0	0	0	0
	EB21	41	6632	100	106	100	317	100	0	0	0	0
	EB22	40	6632	100	106	100	317	100	0	0	0	0
	EB23	39	6632	100	106	100	317	100	0	0	0	0
	EB24	38	6632	100	106	100	317	100	0	0	0	0
	EB25	37	6632	100	106	100	317	100	0	0	0	0
	EB26	36	6632	100	106	100	317	100	0	0	0	0
	EB27	35	6632	100	106	100	317	100	0	0	0	0
	EB28	34	6632	100	106	100	317	100	0	0	0	0
	EB29	33	6632	100	106	100	317	100	0	0	0	0
	EB30	32	6632	100	106	100	317	100	0	0	0	0
Gladstone - West of Preston	GW1	62	607	40	48	40	35	40	0	0	0	0
	GW2	63	607	40	48	40	35	40	0	0	0	0
	GW3	64	607	40	48	40	35	40	0	0	0	0
	GW4	65	607	40	48	40	35	40	0	0	0	0
	GW5	66	607	40	48	40	35	40	0	0	0	0
	GW6	67	607	40	48	40	35	40	0	0	0	0

Roadway Name	Road Segment Start Point		Auto		Medium Truck		Heavy Truck		Bus		Motorcycle	
	Name	No.	Volume	Speed	Volume	Speed	Volume	Speed	Volume	Speed	Volume	Speed
			[Veh/hr]	[km/h]	[Veh/hr]	[km/h]	[Veh/hr]	[km/h]	[Veh/hr]	[km/h]	[Veh/hr]	[km/h]
Gladstone - West of Preston	GW7	68	607	40	48	40	35	40	0	0	0	0
	GW8	69	607	40	48	40	35	40	0	0	0	0
	GW9	70	607	40	48	40	35	40	0	0	0	0
	GW10	71	607	40	48	40	35	40	0	0	0	0
	GW11	72	607	40	48	40	35	40	0	0	0	0
	GW12	73	607	40	48	40	35	40	0	0	0	0
Gladstone - East of Preston	GE1	74	607	40	48	40	35	40	0	0	0	0
	GE2	75	607	40	48	40	35	40	0	0	0	0
	GE3	76	607	40	48	40	35	40	0	0	0	0
	GE4	77	607	40	48	40	35	40	0	0	0	0
	GE5	78	607	40	48	40	35	40	0	0	0	0
	GE6	79	607	40	48	40	35	40	0	0	0	0
	GE7	80	607	40	48	40	35	40	0	0	0	0
	GE8	81	607	40	48	40	35	40	0	0	0	0
Somerset - West of Preston	SW1	82	759	50	60	50	43	50	0	0	0	0
	SW2	83	759	50	60	50	43	50	0	0	0	0
	SW3	84	759	50	60	50	43	50	0	0	0	0
	SW4	85	759	50	60	50	43	50	0	0	0	0
	SW5	86	759	50	60	50	43	50	0	0	0	0
	SW6	87	759	50	60	50	43	50	0	0	0	0
	SW7	88	759	50	60	50	43	50	0	0	0	0
	SW8	89	759	50	60	50	43	50	0	0	0	0

Roadway Name	Road Segment Start Point		Auto		Medium Truck		Heavy Truck		Bus		Motorcycle	
	Name	No.	Volume	Speed	Volume	Speed	Volume	Speed	Volume	Speed	Volume	Speed
			[Veh/hr]	[km/h]	[Veh/hr]	[km/h]	[Veh/hr]	[km/h]	[Veh/hr]	[km/h]	[Veh/hr]	[km/h]
Somerset - West of Preston	SW9	90	759	50	60	50	43	50	0	0	0	0
	SW10	91	759	50	60	50	43	50	0	0	0	0
	SW11	92	759	50	60	50	43	50	0	0	0	0
	SW12	93	759	50	60	50	43	50	0	0	0	0
	SW13	128	759	50	60	50	43	50	0	0	0	0
	SW14	129	759	50	60	50	43	50	0	0	0	0
	SW15	96	759	50	60	50	43	50	0	0	0	0
Somerset - East of Preston	SE1	95	759	50	60	50	43	50	0	0	0	0
	SE2	0	759	50	60	50	43	50	0	0	0	0
	SE3	25	759	50	60	50	43	50	0	0	0	0
	SE4	127	759	50	60	50	43	50	0	0	0	0
	SE5	130	759	50	60	50	43	50	0	0	0	0
	SE6	100	759	50	60	50	43	50	0	0	0	0
Preston	P1	97	759	50	60	50	43	50	0	0	0	0
	P2	98	759	50	60	50	43	50	0	0	0	0
	P3	94	759	50	60	50	43	50	0	0	0	0
	P4	99	759	50	60	50	43	50	0	0	0	0
	P5	101	759	50	60	50	43	50	0	0	0	0
	P6	102	759	50	60	50	43	50	0	0	0	0
	P7	103	759	50	60	50	43	50	0	0	0	0

REPORT:	**Results: Sound Levels - Input Heights**		
TNM VERSION:	3.2.8741.34338	REPORT DATE:	17 January 2025
CALCULATED WITH:	TNM v3.2.8741.34338	CALCULATION DATE:	1/17/2025 4:23:51 PM
CASE:	Somerset - Daytime	ORGANIZATION:	Stantec
ANALYSIS BY:	fa	PROJECT/CONTRACT:	Somerset
DEFAULT GROUND TYPE:	Pavement		
ATMOSPHERICS:	10°C, 70%	Average pavement type shall be used unless a state highway agency	
PAVEMENT TYPE(S) USED:	Average	substantiates the use of a different type with approval of FHWA.	

			Noise Reduction			Barrier Cost			
			Min	Avg	Max	Area / Volume	Lineal	Total	Total/DUs
Results for:		DUs	dB	dB	dB	$	$	$	$
Receivers in the Barrier Design:	All	22	-0.0	0.3	6.3	0	0	0	0
	All Impacted	13	-0.0	0.4	6.3	0	0	0	0
Meeting Noise Reduction Goal:	All	0	---	---	---	0	0	0	---
	All Impacted	0	---	---	---	0	0	0	---

Receiver				Modeled Traffic Noise Levels							
				All Abatement Barriers at Zero Height					With Abatement Barriers		
				LAeq		Increase over Existing				Noise Reduction	Calc.
Name	No.	DUs	Existing LAeq	Calc.	Absolute Criterion	Calc.	Relative Criterion	Type of Impact	Calc. LAeq	Calc.	Goal	Minus Goal
			dBA	dBA	dBA	dBA	dBA		dBA	dBA	dBA	dBA
Tower A - West Facade - 10th floor	0	0	---	60.8	0.0	---	---	None	60.8	0.0	8.0	-8.0
Tower A - North Facade - 2nd Floor	128	1	---	69.1	66.0	---	---	Sound Level	69.1	0.0	8.0	-8.0
Tower A - East Facade - 25th floor	129	1	---	59.6	66.0	---	---	None	59.7	-0.0	8.0	-8.0
Tower A - South Facade - 4th floor	139	1	---	52.9	66.0	---	---	None	52.9	0.0	8.0	-8.0
Tower B - West Facade - 10th floor	142	1	---	60.0	66.0	---	---	None	60.0	-0.0	8.0	-8.0
Tower B - West Facade - 6th floor	0	0	---	58.0	0.0	---	---	None	54.7	3.4	8.0	-4.6
Tower B - North Facade - 2nd floor	150	1	---	67.4	66.0	---	---	Sound Level	67.4	0.0	8.0	-8.0
Tower B - South facade - 15th floor	157	1	---	57.2	66.0	---	---	None	57.2	0.0	8.0	-8.0
Tower C - West Facade - 4th floor	165	1	---	55.4	66.0	---	---	None	55.4	0.0	8.0	-8.0
Tower C - North Facade - 6th floor	168	1	---	52.0	66.0	---	---	None	52.0	0.0	8.0	-8.0
Tower C - East Facade - 15th floor	170	1	---	58.7	66.0	---	---	None	58.7	0.0	8.0	-8.0

Tower C - South Facade - 4th floor	63	1	---	57.0	0.0	---	---	Sound Level	57.0	0.0	8.0	-8.0
Mid-rise - West Facade - 2nd floor	66	1	---	63.5	0.0	---	---	Sound Level	63.5	0.0	8.0	-8.0
Mid-rise - North Facade - 2nd floor	69	1	---	67.2	0.0	---	---	Sound Level	67.2	0.0	8.0	-8.0
Mid-rise - East Facade - 2nd floor	72	1	---	62.1	0.0	---	---	Sound Level	62.1	0.0	8.0	-8.0
Mid-rise - South Facade - 6th floor	73	1	---	56.8	0.0	---	---	Sound Level	56.8	0.0	8.0	-8.0
Future School - West Facade - 2nd Floor	76	1	---	54.8	0.0	---	---	Sound Level	54.8	0.0	8.0	-8.0
Future School - North Facade - 2nd Floor	77	1	---	56.0	0.0	---	---	Sound Level	55.9	0.0	8.0	-8.0
Future School - East Facade - 2nd Floor	78	1	---	59.9	0.0	---	---	Sound Level	59.9	0.0	8.0	-8.0
Future School - South Facade - 2nd Floor	79	1	---	58.7	0.0	---	---	Sound Level	58.7	0.0	8.0	-8.0
Outdoor Amenity Area - At Grade	80	1	---	49.1	0.0	---	---	Sound Level	45.7	3.4	8.0	-4.6
Outdoor Amenity Area - Elevated	81	1	---	53.2	0.0	---	---	Sound Level	46.9	6.3	8.0	-1.7

Receiver
Name: Tower A - West Facade - South End - 4th floor
ID: !00!A_WFS_4
X: 443816.79 m
Y: 5028398.33 m
Z: 70.50 m

Railway, FTA/FRA, Name: "OLRT SEGMENT", ID: "!02!OLRT SEGMENT00001"												
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)
14	443888.98	5028287.35	60.70	0	N	66.7	3.7	16.0	0.8	15.2	0.0	31.0
16	443860.79	5028312.54	60.97	0	N	66.7	3.7	13.3	0.8	15.1	0.0	33.9
27	443840.45	5028330.72	61.16	0	N	66.7	3.7	14.3	0.6	0.0	0.0	48.1
49	443827.95	5028341.89	61.28	0	N	66.7	3.7	12.5	0.4	0.0	0.0	50.2
51	443815.45	5028353.07	61.40	0	N	66.7	3.7	10.5	0.4	0.0	0.0	52.2
53	443802.95	5028364.24	61.51	0	N	66.7	3.7	8.8	0.4	0.0	0.0	53.8
55	443877.89	5028297.26	60.81	1	N	66.7	7.0	18.3	0.8	0.0	1.0	39.5
56	443858.80	5028314.32	60.99	1	N	66.7	7.0	15.4	0.8	0.0	1.0	42.5
57	443835.87	5028334.81	61.20	1	N	66.7	7.0	13.8	0.8	0.0	1.0	44.1
58	443809.02	5028358.81	61.46	1	N	66.7	4.1	14.0	0.3	15.0	1.0	32.3
59	443801.74	5028365.32	61.52	1	N	66.7	4.1	9.8	0.3	15.1	1.0	36.5
60	443865.59	5028308.25	60.92	2	N	66.7	7.2	14.8	0.7	15.1	2.0	26.9
61	443844.29	5028327.29	61.12	2	N	66.7	7.2	16.5	0.7	15.1	2.0	25.2
62	443830.09	5028339.98	61.26	2	N	66.7	7.2	15.6	0.7	15.1	2.0	26.2
63	443901.95	5028275.75	60.58	1	N	66.7	5.4	26.7	1.0	15.2	1.0	17.5
64	443852.04	5028320.36	61.05	1	N	66.7	7.4	18.3	0.7	14.8	1.0	24.5
65	443840.75	5028330.45	61.16	1	N	66.7	7.4	11.2	0.0	14.3	1.0	32.8
66	443792.27	5028374.55	61.57	0	N	66.7	3.6	9.4	0.4	0.0	0.0	53.3
67	443783.42	5028384.00	61.57	0	N	66.7	3.6	9.9	0.4	0.0	0.0	52.9
68	443774.56	5028393.45	61.57	0	N	66.7	3.6	11.1	0.4	0.0	0.0	51.6
69	443765.71	5028402.91	61.57	0	N	66.7	3.6	12.7	0.4	0.0	0.0	50.1
70	443791.95	5028374.90	61.57	1	N	66.7	4.0	9.5	0.3	15.1	1.0	36.9
71	443782.11	5028385.40	61.57	1	N	66.7	4.0	9.8	0.3	15.1	1.0	36.5
72	443773.04	5028395.07	61.57	1	N	66.7	4.0	12.1	0.3	15.1	1.0	34.2
73	443765.25	5028403.40	61.57	1	N	66.7	4.0	13.5	0.3	15.1	1.0	32.8
74	443761.35	5028407.55	61.57	1	N	66.7	4.0	31.3	0.3	15.1	1.0	15.0
75	443752.42	5028418.74	61.57	0	N	66.7	4.0	11.1	0.4	0.0	0.0	51.2
76	443734.71	5028440.94	61.57	0	N	66.7	4.0	13.9	0.4	0.0	0.0	48.4
77	443752.42	5028418.74	61.57	1	N	66.7	4.4	11.1	0.3	15.1	1.0	34.8
78	443734.71	5028440.94	61.57	1	N	66.7	4.4	13.7	0.3	15.1	1.0	32.2
79	443704.32	5028473.25	61.32	0	N	66.7	2.5	15.3	0.3	0.0	0.0	48.6
80	443661.24	5028515.67	60.82	0	N	66.7	2.5	18.6	0.3	0.0	0.0	45.3
81	443704.32	5028473.25	61.32	1	N	66.7	3.0	15.0	0.3	15.1	1.0	32.5
82	443661.24	5028515.67	60.82	1	N	66.7	3.0	18.2	0.2	15.1	1.0	29.2
83	443982.15	5028196.90	59.82	0	N	66.7	2.9	19.9	0.5	15.1	0.0	28.4
84	443929.43	5028248.80	60.32	0	N	66.7	2.8	17.0	0.6	15.1	0.0	31.2
85	443921.96	5028256.15	60.39	1	N	66.7	4.8	16.1	0.9	15.2	1.0	28.8
86	443600.42	5028574.68	61.07	0	N	66.7	2.1	19.2	0.2	0.0	0.0	45.2
87	443600.42	5028574.68	61.07	1	N	66.7	2.6	18.8	0.2	15.1	1.0	29.0
88	443888.98	5028287.35	56.44	0	N	48.5	3.9	15.9	0.8	14.9	0.0	13.0
89	443860.79	5028312.54	56.70	0	N	48.5	3.9	13.1	0.8	14.9	0.0	15.8
90	443840.45	5028330.72	56.89	0	N	48.5	3.9	14.3	0.6	0.0	0.0	29.7
91	443827.95	5028341.89	57.01	0	N	48.5	3.9	12.4	0.4	0.0	0.0	31.8
92	443815.45	5028353.07	57.13	0	N	48.5	3.9	10.5	0.4	0.0	0.0	33.7
104	443802.95	5028364.24	57.25	0	N	48.5	3.9	8.9	0.4	0.0	0.0	35.3
107	443870.23	5028304.10	56.61	1	N	48.5	7.0	14.8	0.8	12.7	1.0	12.2
109	443847.32	5028324.58	56.83	1	N	48.5	7.0	16.4	0.7	13.7	1.0	9.6
144	443832.04	5028338.24	56.97	1	N	48.5	7.0	15.3	0.7	11.9	1.0	12.5
150	443809.02	5028358.81	57.19	1	N	48.5	4.2	14.1	0.3	14.9	1.0	13.9
152	443801.74	5028365.32	57.26	1	N	48.5	4.2	9.9	0.3	14.9	1.0	18.1
154	443865.59	5028308.25	56.66	2	N	48.5	7.2	14.8	0.7	14.9	2.0	8.8
156	443844.29	5028327.29	56.86	2	N	48.5	7.2	16.5	0.7	14.9	2.0	7.1

Railway, FTA/FRA, Name: "OLRT SEGMENT", ID: "!02!OLRT SEGMENT00001"												
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)
195	443830.09	5028339.98	56.99	2	N	48.5	7.2	15.6	0.6	14.9	2.0	8.1
261	443852.04	5028320.36	56.78	1	N	48.5	7.5	18.3	0.7	14.2	1.0	6.8
262	443847.59	5028324.33	56.83	1	N	48.5	7.5	17.4	0.0	13.5	1.0	9.1
274	443838.37	5028332.57	56.91	1	N	48.5	7.5	12.3	0.0	13.5	1.0	14.2
290	444039.29	5028139.11	59.07	0	N	66.7	1.8	22.8	0.4	15.1	0.0	26.7
292	443792.27	5028374.55	57.30	0	N	48.5	3.8	9.5	0.4	0.0	0.0	34.8
303	443783.42	5028384.00	57.30	0	N	48.5	3.8	10.0	0.4	0.0	0.0	34.3
314	443774.56	5028393.45	57.30	0	N	48.5	3.8	11.2	0.4	0.0	0.0	33.1
328	443765.71	5028402.91	57.30	0	N	48.5	3.8	12.7	0.4	0.0	0.0	31.6
341	443791.95	5028374.90	57.30	1	N	48.5	4.2	9.6	0.3	14.9	1.0	18.5
343	443782.11	5028385.40	57.30	1	N	48.5	4.2	9.9	0.3	14.9	1.0	18.2
344	443773.04	5028395.07	57.30	1	N	48.5	4.2	12.1	0.3	14.9	1.0	15.9
356	443765.25	5028403.40	57.30	1	N	48.5	4.2	13.5	0.3	14.9	1.0	14.5
368	444098.95	5028076.00	58.82	0	N	66.7	0.3	25.7	0.2	15.0	0.0	25.6
370	443507.72	5028668.01	62.57	0	N	66.7	3.9	23.4	0.3	0.0	0.0	39.1
381	443507.72	5028668.01	62.57	1	N	66.7	4.3	23.1	0.2	15.2	1.0	23.0
401	443545.39	5028628.79	62.07	0	N	66.7	3.8	23.5	0.3	0.0	0.0	39.2
404	443545.39	5028628.79	62.07	1	N	66.7	4.1	23.2	0.2	15.1	1.0	23.0
417	444154.04	5028011.15	59.37	0	N	66.7	2.9	24.9	0.3	15.1	0.0	23.5
419	443752.42	5028418.74	57.30	0	N	48.5	4.2	11.1	0.4	0.0	0.0	32.8
431	443734.71	5028440.94	57.30	0	N	48.5	4.2	13.8	0.4	0.0	0.0	30.1
443	443752.42	5028418.74	57.30	1	N	48.5	4.5	11.1	0.4	14.9	1.0	16.6
455	443734.71	5028440.94	57.30	1	N	48.5	4.5	13.6	0.4	14.9	1.0	14.0
467	444196.80	5027951.66	60.62	0	N	66.7	7.2	23.2	0.5	15.3	0.0	20.5
491	443704.32	5028473.25	57.05	0	N	48.5	2.8	15.1	0.3	0.0	0.0	30.3
522	443661.24	5028515.67	56.55	0	N	48.5	2.8	18.3	0.3	0.0	0.0	27.1
534	443704.32	5028473.25	57.05	1	N	48.5	3.2	14.8	0.3	15.0	1.0	14.3
546	443661.24	5028515.67	56.55	1	N	48.5	3.2	18.0	0.3	15.0	1.0	11.0
558	444256.30	5027844.72	59.57	0	N	66.7	10.3	21.5	0.9	15.4	0.0	18.7
612	444303.42	5027736.58	59.57	0	N	66.7	11.0	21.7	1.0	15.4	0.0	17.6
628	443982.15	5028196.90	55.55	0	N	48.5	3.1	19.7	0.5	14.9	0.0	10.2
639	443929.43	5028248.80	56.05	0	N	48.5	3.1	16.7	0.6	14.9	0.0	13.1
643	443921.96	5028256.15	56.13	1	N	48.5	4.9	16.0	0.9	14.9	1.0	10.7
655	444221.48	5027910.82	60.57	0	N	66.7	9.1	24.7	0.8	15.3	0.0	16.8
678	444279.97	5027792.21	59.57	0	N	66.7	10.9	23.1	0.9	15.4	0.0	16.4
695	444327.14	5027679.04	59.57	0	N	66.7	11.3	23.7	0.9	15.4	0.0	15.4
707	444235.73	5027885.74	59.57	0	N	66.7	7.9	27.9	0.7	15.3	0.0	14.9
720	443600.42	5028574.68	56.80	0	N	48.5	2.4	18.9	0.2	0.0	0.0	26.9
732	443600.42	5028574.68	56.80	1	N	48.5	2.9	18.5	0.2	15.0	1.0	10.9
775	444039.29	5028139.11	54.81	0	N	48.5	2.3	22.4	0.4	15.0	0.0	8.5
793	444098.95	5028076.00	54.56	0	N	48.5	1.1	24.9	0.2	15.0	0.0	7.3
805	443507.72	5028668.01	58.30	0	N	48.5	4.1	23.3	0.3	0.0	0.0	20.8
869	443507.72	5028668.01	58.30	1	N	48.5	4.4	23.0	0.3	15.0	1.0	4.9
899	443545.39	5028628.79	57.80	0	N	48.5	3.9	23.3	0.3	0.0	0.0	20.9
902	443545.39	5028628.79	57.80	1	N	48.5	4.3	23.1	0.3	15.0	1.0	4.9
912	444154.04	5028011.15	55.10	0	N	48.5	3.2	24.6	0.4	15.0	0.0	5.4
916	444196.80	5027951.66	56.35	0	N	48.5	7.3	23.1	0.5	14.9	0.0	2.8
929	444256.30	5027844.72	55.30	0	N	48.5	10.3	21.5	0.8	14.9	0.0	1.0

Receiver
Name: Tower A - West Facade - 4th floor
ID: !01!POR1
X: 443813.12 m
Y: 5028407.63 m
Z: 70.50 m

Point Source, ISO 9613, Name: "Auto Shop Open Bay Door North", ID: "!03!S1-01"																				
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	443749.25	5028333.25	65.00	0	DEN	A	99.3	0.0	0.0	3.0	0.0	50.8	0.9	-2.2	0.0	0.0	15.3	0.0	0.0	37.6
6	443749.25	5028333.25	65.00	1	DEN	A	99.3	0.0	0.0	3.0	0.0	51.1	0.9	-2.3	0.0	0.0	23.5	0.0	1.0	28.1

Point Source, ISO 9613, Name: "Auto Shop Open Bay Door South", ID: "!03!S1-02"																				
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)
18	443752.74	5028324.53	65.00	0	DEN	A	99.3	0.0	0.0	3.0	0.0	51.2	0.9	-2.5	0.0	0.0	16.0	0.0	0.0	36.7
25	443752.74	5028324.53	65.00	1	DEN	A	99.3	0.0	0.0	3.0	0.0	51.5	0.9	-2.5	0.0	0.0	23.5	0.0	1.0	27.9

Point Source, ISO 9613, Name: "Auto Shop Exhaust Stack", ID: "!03!S1-03"																				
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	443756.60	5028342.50	68.00	0	DEN	A	90.1	0.0	0.0	0.0	0.0	49.7	0.3	-2.4	0.0	0.0	0.0	0.0	0.0	42.5
32	443756.60	5028342.50	68.00	1	DEN	A	90.1	0.0	0.0	0.0	0.0	50.0	0.3	-2.4	0.0	0.0	17.7	0.0	1.0	23.5

Receiver
Name: Tower A - North Facade - 14th floor
ID: !01!POR2
X: 443817.11 m
Y: 5028432.12 m
Z: 100.50 m

Point Source, ISO 9613, Name: "Commercial Plaza Cooling Tower - Single Cell", ID: "!04!S2-13"																				
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	443736.38	5028664.61	85.05	0	DEN	A	99.1	0.0	0.0	0.0	0.0	58.8	0.9	-2.5	0.0	0.0	0.0	0.0	0.0	41.9

Point Source, ISO 9613, Name: "Commercial Plaza HVAC Unit 01", ID: "!04!S2-01"																				
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	443772.17	5028467.26	63.00	0	DEN	A	80.9	0.0	0.0	0.0	0.0	47.7	0.5	-2.5	0.0	0.0	0.0	0.0	0.0	35.2

Point Source, ISO 9613, Name: "Commercial Plaza HVAC Unit 02", ID: "!04!S2-02"																				
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	443774.68	5028483.72	63.00	0	DEN	A	79.1	0.0	0.0	0.0	0.0	48.7	0.6	-2.6	0.0	0.0	0.0	0.0	0.0	32.3

Point Source, ISO 9613, Name: "Commercial Plaza HVAC Unit 05", ID: "!04!S2-05"																				
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	443736.78	5028520.88	63.00	0	DEN	A	83.2	0.0	0.0	0.0	0.0	53.0	0.8	-2.8	0.0	0.0	0.0	0.0	0.0	32.2

Point Source, ISO 9613, Name: "Commercial Plaza HVAC Unit 04", ID: "!04!S2-04"																				
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	443772.16	5028488.05	63.00	0	DEN	A	79.1	0.0	0.0	0.0	0.0	49.2	0.7	-2.6	0.0	0.0	0.0	0.0	0.0	31.8

Point Source, ISO 9613, Name: "Commercial Plaza HVAC Unit 03", ID: "!04!S2-03"																				
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)
36	443768.63	5028488.18	63.00	0	DEN	A	79.1	0.0	0.0	0.0	0.0	49.4	0.7	-2.6	0.0	0.0	0.0	0.0	0.0	31.6

Point Source, ISO 9613, Name: "Commercial Plaza HVAC Unit 08", ID: "!04!S2-08"																				
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)
39	443732.52	5028585.22	63.00	0	DEN	A	83.2	0.0	0.0	0.0	0.0	56.1	1.1	-2.8	0.0	0.0	0.0	0.0	0.0	28.9

Point Source, ISO 9613, Name: "Commercial Plaza HVAC Unit 10", ID: "!04!S2-10"																				
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	443739.17	5028601.80	63.00	0	DEN	A	83.2	0.0	0.0	0.0	0.0	56.6	1.1	-2.6	0.0	0.0	0.0	0.0	0.0	28.1

Point Source, ISO 9613, Name: "Commercial Plaza HVAC Unit 06", ID: "!04!S2-06"																				
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	443735.72	5028570.92	63.00	0	DEN	A	80.9	0.0	0.0	0.0	0.0	55.4	1.0	-2.8	0.0	0.0	0.0	0.0	0.0	27.3

Point Source, ISO 9613, Name: "Commercial Plaza HVAC Unit 09", ID: "!04!S2-09"																				
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)
60	443744.14	5028579.84	63.00	0	DEN	A	80.9	0.0	0.0	0.0	0.0	55.6	1.0	-2.8	0.0	0.0	0.0	0.0	0.0	27.1

Point Source, ISO 9613, Name: "Commercial Plaza HVAC Unit 07", ID: "!04!S2-07"																				
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)
62	443730.59	5028577.57	63.00	0	DEN	A	80.9	0.0	0.0	0.0	0.0	55.8	1.1	-2.8	0.0	0.0	0.0	0.0	0.0	26.9

Point Source, ISO 9613, Name: "Commercial Plaza HVAC Unit 11", ID: "!04!S2-11"																				
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)
64	443719.40	5028594.64	63.00	0	DEN	A	79.1	0.0	0.0	0.0	0.0	56.7	1.4	-2.8	0.0	0.0	0.0	0.0	0.0	23.8
85	443719.40	5028594.64	63.00	1	DEN	A	79.1	0.0	0.0	0.0	0.0	59.7	1.8	-2.6	0.0	0.0	17.2	0.0	2.8	0.3
87	443719.40	5028594.64	63.00	1	DEN	A	79.1	0.0	0.0	0.0	0.0	59.5	1.8	-2.6	0.0	0.0	0.0	0.0	1.0	19.5

Point Source, ISO 9613, Name: "Commercial Plaza HVAC Unit 12", ID: "!04!S2-12"																				
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)
98	443718.98	5028613.90	63.00	0	DEN	A	79.1	0.0	0.0	0.0	0.0	57.4	1.5	-2.9	0.0	0.0	0.0	0.0	0.0	23.0
102	443718.98	5028613.90	63.00	1	DEN	A	79.1	0.0	0.0	0.0	0.0	58.9	1.7	-2.7	0.0	0.0	0.0	0.0	1.0	20.2

Receiver
Name: Mid-rise - North Facade - 3rd floor
ID: !01!POR5
X: 443924.94 m
Y: 5028479.01 m
Z: 67.50 m

Point Source, ISO 9613, Name: "Wine Shop Chiller - 2 fans", ID: "!05!S3-02"																				
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	443937.64	5028519.27	60.82	0	DEN	A	85.4	0.0	0.0	0.0	0.0	43.6	0.2	-2.4	0.0	0.0	0.0	0.0	0.0	44.0

Point Source, ISO 9613, Name: "Wine Shop Chiller - 1 fans", ID: "!05!S3-01"																				
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	443940.01	5028512.67	60.82	0	DEN	A	82.4	0.0	0.0	0.0	0.0	42.5	0.2	-2.4	0.0	0.0	0.0	0.0	0.0	42.2

Point Source, ISO 9613, Name: "Wine Shop Chiller - 2 fans", ID: "!05!S3-03"																				
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	443938.06	5028535.12	60.82	0	DEN	A	85.4	0.0	0.0	0.0	0.0	46.3	0.2	-2.5	0.0	0.0	0.0	0.0	0.0	41.4

Receiver
Name: Mid-rise - West Facade - 6th floor
ID: !01!POR6
X: 443940.41 m
Y: 5028445.77 m
Z: 76.50 m

Point Source, ISO 9613, Name: "Plant Rec Centre 8-fan Chiller 01 ", ID: "!06!S4-05"																				
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)
195	444061.68	5028502.25	66.50	0	DEN	A	98.0	0.0	0.0	0.0	0.0	53.6	0.6	-2.8	0.0	0.0	0.0	0.0	0.0	46.6
196	444061.68	5028502.25	66.50	1	DEN	A	98.0	0.0	0.0	0.0	0.0	54.4	0.7	-2.8	0.0	0.0	0.0	0.0	1.0	44.8

Point Source, ISO 9613, Name: "Plant Rec Centre AHU 01", ID: "!06!S4-02"																				
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)
199	444052.95	5028497.81	66.00	0	DEN	A	87.4	0.0	0.0	0.0	0.0	52.9	0.5	-2.8	0.0	0.0	8.9	0.0	0.0	27.9
206	444052.95	5028497.81	66.00	1	DEN	A	87.4	0.0	0.0	0.0	0.0	55.0	0.6	-2.8	0.0	0.0	0.0	0.0	1.3	33.3

Point Source, ISO 9613, Name: "Plant Rec Centre AHU 02", ID: "!06!S4-04"																				
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)
208	444057.47	5028487.96	66.00	0	DEN	A	87.4	0.0	0.0	0.0	0.0	52.9	0.5	-2.8	0.0	0.0	9.3	0.0	0.0	27.4
217	444057.47	5028487.96	66.00	2	DEN	A	87.4	0.0	0.0	0.0	0.0	55.3	0.7	-2.8	0.0	0.0	0.0	0.0	3.5	30.8

Point Source, ISO 9613, Name: "Plant Rec Centre AHU 04", ID: "!06!S4-10"																				
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)
219	444069.88	5028478.93	66.00	0	DEN	A	87.4	0.0	0.0	0.0	0.0	53.5	0.6	-2.8	0.0	0.0	0.0	0.0	0.0	36.0
221	444069.88	5028478.93	66.00	1	DEN	A	87.4	0.0	0.0	0.0	0.0	54.1	0.6	-2.8	0.0	0.0	0.0	0.0	1.0	34.4

Point Source, ISO 9613, Name: "Plant Rec Centre AHU 03", ID: "!06!S4-09"																				
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)
229	444070.70	5028481.76	66.00	0	DEN	A	87.4	0.0	0.0	0.0	0.0	53.6	0.6	-2.8	0.0	0.0	8.9	0.0	0.0	27.0

Point Source, ISO 9613, Name: "Plant Rec Centre HVAC Unit 05", ID: "!06!S4-08"																				
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)
238	444066.06	5028483.57	65.50	0	DEN	A	86.5	0.0	0.0	0.0	0.0	53.4	0.8	-2.8	0.0	0.0	0.0	0.0	0.0	35.1
239	444066.06	5028483.57	65.50	2	DEN	A	86.5	0.0	0.0	0.0	0.0	54.9	0.9	-2.8	0.0	0.0	0.0	0.0	2.2	31.4

Point Source, ISO 9613, Name: "Plant Rec Centre HVAC Unit 06", ID: "!06!S4-11"																				
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)
240	444093.51	5028513.36	67.00	0	DEN	A	86.5	0.0	0.0	0.0	0.0	55.5	1.0	-2.9	0.0	0.0	5.8	0.0	0.0	27.1
241	444093.51	5028513.36	67.00	1	DEN	A	86.5	0.0	0.0	0.0	0.0	55.7	1.0	-2.8	0.0	0.0	0.0	0.0	1.0	31.6
242	444093.51	5028513.36	67.00	2	DEN	A	86.5	0.0	0.0	0.0	0.0	55.8	1.0	-2.8	0.0	0.0	0.0	0.0	2.0	30.5

Point Source, ISO 9613, Name: "Plant Rec Centre HVAC Unit 02", ID: "!06!S4-03"																				
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)
243	444051.80	5028490.14	65.50	0	DEN	A	83.2	0.0	0.0	0.0	0.0	52.6	0.7	-2.8	0.0	0.0	0.0	0.0	0.0	32.6
244	444051.80	5028490.14	65.50	1	DEN	A	83.2	0.0	0.0	0.0	0.0	55.2	1.0	-2.9	0.0	0.0	0.0	0.0	1.0	28.9

Point Source, ISO 9613, Name: "Plant Rec Centre HVAC Unit 03", ID: "!06!S4-06"																				
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)
245	444063.51	5028499.58	65.50	0	DEN	A	83.2	0.0	0.0	0.0	0.0	53.6	0.8	-2.8	0.0	0.0	0.0	0.0	0.0	31.6
246	444063.51	5028499.58	65.50	1	DEN	A	83.2	0.0	0.0	0.0	0.0	54.4	0.9	-2.8	0.0	0.0	0.0	0.0	1.0	29.8

Point Source, ISO 9613, Name: "Plant Rec Centre HVAC Unit 01", ID: "!06!S4-01"																				
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)
247	444048.46	5028500.53	65.50	0	DEN	A	79.1	0.0	0.0	0.0	0.0	52.7	0.9	-2.7	0.0	0.0	0.0	0.0	0.0	28.1

Point Source, ISO 9613, Name: "Plant Rec Centre HVAC Unit 04", ID: "!06!S4-07"																				
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)
248	444059.64	5028497.30	65.50	0	DEN	A	79.1	0.0	0.0	0.0	0.0	53.3	1.0	-2.8	0.0	0.0	0.0	0.0	0.0	27.6
249	444059.64	5028497.30	65.50	1	DEN	A	79.1	0.0	0.0	0.0	0.0	54.6	1.1	-2.8	0.0	0.0	0.0	0.0	1.0	25.2