REPORT

# 1393 GRAHAMS LANE

BURLINGTON, ONTARIO

## NOISE AND VIBRATION IMPACT STUDY

RWDI #2303584

March 8, 2024

### SUBMITTED TO

**Alireza Takook, OAA, PMP, LEED AP BD+C**
Project Manager, Cost & Project Management
Alireza.Takook@atlusgroup.com

**Atlus Group**
33 Yonge Street, Suite 500
Toronto, Ontario, Canada, M5E 1G4
D: 647.255.9879

### SUBMITTED BY

**Lucas Savedra, B.A.Sc.**
Project Manager
Lucas.Savedra@rwdi.com

**Peter VanDelden, P.Phys, INCE, COHC**
Technical Director, Noise & Vibration
Peter.VanDelden@rwdi.com

**Slavi Grozev, P.Eng.**
Senior Engineer, Noise and Vibration
Slavi.Grozev@rwdi.com

**RWDI – Head office**
600 Southgate Drive
Guelph, Ontario N1G 4P6
T: 519.823.1311




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# VERSION HISTORY

| Index | Date | Description | Prepared by | Reviewed by |
|---|---|---|---|---|
| 1 | Mar. 8, 2024 | Noise and Vibration Impact Assessment | Caelan Weber-Martin | Peter VanDelden, Slavi Grozev |

# EXECUTIVE SUMMARY

RWDI was retained to prepare a Noise and Vibration Impact Study for the proposed residential development located at 1393 Grahams Lane in Burlington, Ontario. The development is proposed to consist of a 16-storey building, a 9-storey building, and a 20-storey building. This assessment was completed to support the Zoning By-law Amendment (ZBA) submission as required by the City of Burlington.

The following noise control measures are recommended for the proposed development:

1. Installation of central air-conditioning so that all suites' windows can remain closed.
2. The inclusion of noise warning clauses related to:
    a. Transportation sound levels at the building façade and in the outdoor amenity areas
    b. Proximity to railway line
    c. Proximity to commercial/industrial land-use
3. Minimum sound isolation performance:
    a. Suite bedroom window glazing with sound isolation performance up to STC-31 for the east façade.
    b. Minimum brick veneer or masonry equivalent for the west façades of Building B and C facing the CN spur line.
4. Construction of perimeter noise barriers along the outdoor amenity areas.
5. Application of at-receptor mitigation by closing windows of the development together with an enabling Class 4 area designation from the City of Burlington.

The potential for vibration influences on the site due to the adjacent CN spur line was evaluated. Over a one-week period, a single train shunting event was measured. Vibration levels were below the applicable limits, so that no mitigation measures for vibration are required.

The influences of stationary sources of sound were evaluated. The sound from Smit Autobody will be compliant with the sound level limits. Sound from Ashland Chemicals is predicted to be 1 dB in excess of the limits at a small portion of one façade of the development. The remaining facilities do not have MECP permits. Cumulative sound from all facilities is predicted to be in excess of the limits by up to 7 dB for 2 facades, with other facades being much less in excess. Application for a Class 4 designation is recommended to allow mitigation of sound on the development. Cumulative sound from all of the facilities is predicted to be in compliance with the Class 4 limits.

At this stage in design the noise levels produced by the development on itself and its surroundings could not be quantitatively assessed. However, with appropriate selections it will be feasible to meet the applicable criteria for the effect on the building itself and its surroundings. We recommend that the building design be evaluated prior to building permit to ensure that the acoustical design is adequately implemented in order to meet the applicable criteria.

This assessment of the proposed development, based on both vibration measurements and sound level modelling shows that with appropriate noise mitigation measures it is feasible to meet the applicable sound and vibration criteria.

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# 1 INTRODUCTION

RWDI was retained to prepare a Noise and Vibration Impact Study for the proposed residential development located at 1393 Grahams Lane in Burlington, Ontario. The proposed development will consist of a 16-storey building, a 9-storey building, and a 20-storey building. The context site plan is shown in **Figure 1**.

The site is exposed to noise from road traffic from: Fairview Street to the north; Brant Street to the East; and Grahams Lane to the South.

The site is exposed to noise from rail traffic from: CN freight and Metrolinx GO movements along the Oakville and Halton subdivisions approximately 425m to the north; and CN freight movements along the spur line adjacent to the proposed development to the west. The spur line was also evaluated for vibration levels.

An assessment of nearby stationary sources, which includes commercial/industrial buildings, was conducted based on the Ministry of the Environment, Conservation, and Parks (MECP) D-6 screening criteria. A full land use compatibility study was prepared by RWDI under a separate report cover titled "1393 Graham's Lane Land Use Compatibility Study (Air Quality & Noise)", dated March 4, 2024.

This assessment was completed to support the Zoning By-law Amendment (ZBA) submission as required by the City of Burlington. This assessment was based on design drawings dated February 26, 2024. A copy of the drawings is included in **Appendix A.**

# 2 SITE VISIT

Site visits were conducted by RWDI on February 2, 2024, and on February 9, 2024 to consider the acoustic environment and the influences of stationary sources of noise. Notable stationary noise sources in the area include Ashland Chemicals to the north, the Royal Canadian Legion building to the east, and a transformer associated with Burlington Hydro to the southwest. Offsite sound level measurements of Ashland Chemicals were conducted on both February 2 and February 9, to obtain a general understanding of the overall typical sound levels emitted from the facility. Sound from the Burlington Hydro transformer, west of the proposed development, was also measured. No other noise sources were audible at the proposed development during the site visit.

A long-term noise and vibration monitor was deployed on February 2, 2024, along the western portion of the proposed development, to obtain noise and vibration measurements for the CN spur line activities located directly to the west of the proposed development. The monitor was retrieved one week later on February 9, 2024. Over the course of the week, one train was identified to be passing the monitor a few times on February 4, 2024, between 14:10 and 14:27. Measurements from these train pass-bys are included in this assessment.

# 3 THE EFFECTS OF THE ENVIRONMENT ON THE PROPOSED DEVELOPMENT

## 3.1 Transportation Source Assessment

### 3.1.1 Applicable Criteria

Applicable criteria for road and rail transportation noise sources are provided in the MECP NPC-300 Environmental Noise Guideline (MOE, 2013). A summary of the applicable criteria is provided in **Appendix B**.

### 3.1.2 Road Traffic Volume Data

Turning Movement Counts (TMCs) at the intersection of Brant Street and Fairview Street, and the intersection of Brant Street at Prospect Street provided detailed traffic volumes for the two peak time periods: 07:00 to 09:00 and 15:00 to 18:00. The TMCs were used to determine the traffic volume and types of vehicles on each link during the AM and PM peaks and 8-hour interval which were assumed to be 9%, 10% and 60% of the Annual Average Daily Traffic (AADT), respectively. The maximum AADTs obtained from the approximation of each of these three time periods was used for the AADT for each of the respective roadways. A typical arterial road daytime/nighttime split of 85%/15% was applied for Brant Street and Fairview Street traffic volumes and a typical local road daytime/nighttime split of 90%/10% was applied for Grahams Lane. A typical medium to heavy truck ratio of 5:8 was assumed for all roads. The traffic volumes for each of the respective roadways were increased at a rate of 2% per year to a horizon year of 2034.

A summary of the traffic data used is included in **Table 1** below, with more detailed information included in **Appendix C**.

**Table 1: Road Traffic Volumes**

| Roadway | Segment | 2034 Future Traffic (AADT) | % Day/Night | Speed Limit (km/hr) | % Medium Trucks | % Heavy Trucks |
|---|---|---|---|---|---|---|
| **Brant Street** | South of Fairview Street | 35,566 | 85% /15% | 50 | 0.8% | 1.4% |
| **Fairview Street** | West of Brant Street | 43,707 | 85% / 15% | 50 | 1.2% | 1.8% |
| **Grahams Lane** | West of Brant Street | 3,833[1] | 90% / 10% | 50 | 2.0% | 3.3% |

Notes:
1. The TMC for Brant Street at Fairview Street was the best available traffic data for Grahams Lane. Volumes from the Brant Street at Prospect Street TMC were conservatively applied to the entire segment west of Brant Street to the end of Grahams Lane.

### 3.1.3 Rail Traffic Volume Data

Metrolinx GO transit commuter trains and CN Rail freight trains travel along the CN Oakville Subdivision, approximately 430m north of the proposed development site. Future Transit Lakeshore West (GO Lakeshore) commuter line rail volume data was obtained from Metrolinx.

Freight rail volumes were requested from CN but were not provided by the date of this report. As such, rail volumes reported by CN in 2017 from a publicly available report in the area were applied in this assessment. The 2017 freight volumes were increased at a rate of 2.5% per year to a horizon year of 2034. Although both the Halton Subdivision and the Oakville Subdivision carry CN freight activity, all freight rail traffic was assessed along the CN Oakville Subdivision as a conservative approach. The Halton subdivision turns away from the proposed development as it crosses Brant Street and traffic along it would have a reduced effect when compared to the Oakville Subdivision.

The data used for the analysis is summarized in **Table 2**, with details of the data used included in **Appendix C**.

**Table 2: Rail Volumes and Configuration**

| Train Type | Daytime | Nighttime | Type of Locomotive | No of Locomotives | No of Cars | Speed (km/h) |
|---|---|---|---|---|---|---|
| **GO Lakeshore – Oakville Subdivision** | 132 | 20 | Diesel | 1 | 12 | 153 |
| **GO Lakeshore – Oakville Subdivision** | 192 | 54 | Electric[1] | 1 | 12 | 153 |
| **CN Freight – Oakville Subdivision** | 6 | 3 | Diesel | 4 | 25 | 80 |

Notes:
1. All GO locomotives were assessed as Diesel locomotives as per Metrolinx direction.

### 3.1.4 Representative Receptors

The selection of receptors affected by transportation noise sources was based on the drawings reviewed for this assessment. Using the "building evaluation" feature of Cadna/A, each façade of the residential buildings was assessed.

Outdoor Living Areas (OLAs) would include outdoor areas intended and designed for the quiet enjoyment of the outdoor environment and which are readily accessible from the building. OLAs may include any common outdoor amenity spaces associated with a multi-unit residential development (e.g. courtyards, roof-top terraces), and/or private backyards and terraces with a minimum depth of 4m provided they are the only outdoor living area for the occupant.

Daytime sound levels were assessed at the following identified OLAs, shown in **Table 3**.

**Table 3: Outdoor Living Areas (OLAs)**

| Receptor | Description |
|---|---|
| **OLA_01** | At-Grade Outdoor Amenity Area - Middle |
| **OLA_02** | At-Grade Outdoor Amenity Area - Building A |
| **OLA_03a** | At-Grade Outdoor Amenity Area - Building B |
| **OLA_03b** | At-Grade Outdoor Amenity Area - Building B |
| **OLA_04a** | At-Grade Outdoor Amenity Area - Building C |
| **OLA_04b** | At-Grade Outdoor Amenity Area - Building C |
| **OLA_05a** | Level 5 Rooftop Outdoor Amenity Area - Building A |
| **OLA_05b** | Level 5 Rooftop Outdoor Amenity Area - Building A |
| **OLA_05c** | Level 5 Rooftop Outdoor Amenity Area - Building A |
| **OLA_06a** | Level 10 Rooftop Outdoor Amenity Area - Building A |
| **OLA_06b** | Level 10 Rooftop Outdoor Amenity Area - Building A |

The OLA locations are indicated in **Figure 2**.

### 3.1.5 Analysis and Results

Sound levels due to the adjacent roads were predicted by inputting sound emission data using the Ontario Road Noise Analysis Method for Environment and Transportation (ORNAMENT) (MOE, 1989) algorithms as line sources in the Cadna/A software package. Sound levels due to adjacent rail sources were predicted using the FTA method (FTA, 2018) as implemented in the Cadna/A software package.

The elevation of Fairview Street associated with the overpass above the railway to the north of the proposed development was considered and included in this assessment, using a maximum elevation of 10m above local grade for the overpass.

The spur line directly to the west was included as a line source as part of the rail noise analysis based on measurements obtained during the long-term noise and vibration monitoring. A week of continuous sound level monitoring showed one event of train activity with a duration of 18 minutes. Although only one daytime event occurred, one train during daytime hours and one train during nighttime hours was assumed for the purpose of this assessment. No impulsive noise due to slack adjustment was identified in recordings obtained during the monitoring over the course of the week of February 2, 2024, to February 9, 2024.

A 2.2m rail crash barrier between the spur line and the proposed development, indicated in the site plan drawings, was included in the analysis.

To assess the effect of transportation noise on suites, the maximum sound level on each façade was determined with the results summarized in **Table 4**. Façades Sound levels are presented below for road traffic noise (Fairview Street, Brant Street, and Grahams Lane), for rail traffic (Metrolinx GO and CN Freight along the Oakville subdivision, and the CN spur line to the west), and for all transportation sources combined. The west façades of Building B and C are directly adjacent to the CN spur line and require a minimum brick veneer of masonry equivalent construction.

**Table 4: Predicted Ground Transportation Source Sound Levels – Plane of Window**

| Building | Façade | Road | | Rail | | Road + Rail | | Notes |
|---|---|---|---|---|---|---|---|---|
| | | Day $L_{EQ}$, 16hr (dBA) | Night $L_{EQ}$, 8hr (dBA) | Day $L_{EQ}$, 16hr (dBA) | Night $L_{EQ}$, 8hr (dBA) | Day $L_{EQ}$, 16hr (dBA) | Night $L_{EQ}$, 8hr (dBA) | |
| **Building A – 16 Storey Section** | North | 59 | 55 | 60 | 57 | 63 | 59 | 2 |
| | East | 60 | 54 | 58 | 55 | 62 | 58 | 1 |
| | South | 61 | 54 | 51 | 48 | 61 | 55 | 1 |
| | West | 57 | 53 | 58 | 55 | 61 | 57 | 1 |
| **Building A – 4-9 Storey Section[4]** | North | 58 | 53 | 58 | 55 | 60 | 57 | 1 |
| | South | 61 | 55 | 50 | 47 | 61 | 55 | 1 |
| | West | 58 | 52 | 56 | 53 | 59 | 55 | 1 |
| **Building B** | North | 59 | 54 | 59 | 56 | 62 | 58 | 2 |
| | East | 58 | 53 | 58 | 55 | 61 | 57 | 1 |
| | South | 60 | 53 | 49 | 47 | 60 | 54 | 1 |
| | West | 58 | 53 | 57 | 54 | 60 | 57 | 1, 3 |
| **Building C** | North | 62 | 58 | 61 | 59 | 65 | 61 | 2 |
| | East | 59 | 55 | 59 | 56 | 62 | 59 | 2 |
| | South | 54 | 49 | 54 | 52 | 57 | 54 | 1 |
| | West | 60 | 56 | 59 | 57 | 63 | 59 | 2, 3 |

Note(s):

1. Applicable for low and medium density developments: Provision for future installation of air-conditioning, warning clause "Type C". Applicable for developments where air-conditioning will be included in the project design: Warning clause "Type D". Refer to **Appendix D** for guidance regarding air-conditioning as a noise mitigation measure.
2. The acoustical performance of building components must be specified to meet the indoor sound level criteria. Installation of air conditioning to allow for windows and doors to remain closed, warning clause "Type D". Refer to **Appendix D** for guidance regarding air-conditioning as a noise mitigation measure.
3. Minimum brick veneer of masonry equivalent for the first row of housing or adjacent façades with exposure to railway line.
4. Due to the geometry, east façade of Building A – 4 – 9 storey section does not have a notable exposure to transportation sources of noise.

To assess the effect of transportation noise on the qualifying OLAs for the development, predicted sound level results are summarized in Table 5.

**Table 5: Transportation Sound Levels in Outdoor Living Areas (OLAs)**

| Receptor | Description | Daytime $L_{EQ}$, 16hr (dBA) | Notes |
|---|---|---|---|
| **OLA_01** | At-Grade Outdoor Amenity Area - Middle | 58 | 2 |
| **OLA_02** | At-Grade Outdoor Amenity Area - Building A | 56 | 2 |
| **OLA_03a** | At-Grade Outdoor Amenity Area - Building B | 60 | 2 |
| **OLA_03b** | At-Grade Outdoor Amenity Area - Building B | 60 | 2 |
| **OLA_04a** | At-Grade Outdoor Amenity Area - Building C | 59 | 2 |
| **OLA_04b** | At-Grade Outdoor Amenity Area - Building C | 54 | 1 |
| **OLA_05a** | Level 5 Rooftop Outdoor Amenity Area - Building A | 57 | 2 |

| Receptor | Description | Daytime $L_{EQ}$, 16hr (dBA) | Notes |
|---|---|---|---|
| **OLA_05b** | Level 5 Rooftop Outdoor Amenity Area - Building A | 59 | 2 |
| **OLA_05c** | Level 5 Rooftop Outdoor Amenity Area - Building A | 59 | 2 |
| **OLA_06a** | Level 10 Rooftop Outdoor Amenity Area - Building A | 59 | 2 |
| **OLA_06b** | Level 10 Rooftop Outdoor Amenity Area - Building A | 57 | 2 |

Note(s):
1. The predicted sound level meets the NPC-300 criterion for OLAs. Noise control measures are not required.
2. For OLA sound levels >55 dBA and ≤60 dBA, noise controls may be applied to meet the 55 dBA criterion. If noise control measures are not provided, a warning clause "Type A" is recommended.

The low frequency nature of the sound from the train at the closest façade may result in a noise-induced vibration. It is predicted to be moderately perceptible for 6 minutes, and clearly perceptible for 7 minutes out of the 18 minutes measured.

## 3.2 Rail Vibration Assessment

Applicable criteria for rail vibration are taken from the Rail Association of Canada (RAC, 2013) guideline. A summary of the applicable criteria is provided in **Appendix B**.

Due to the proximity of the CN spur line to the proposed development, the potential for train passes to result in perceptible vibration within the new development, was also evaluated. Long-term noise and vibration monitoring was conducted at the site of the proposed development by RWDI over a period of one week. The equipment was installed during a site visit on February 2, 2024. Measurements were taken using a long-term vibration monitor, coupled with three PCB Piezotronics Type 393A03 accelerometers, connected to a National Instruments 9234 data acquisition card, measuring 3 axes of vibration (x, y,and z).

One train pass event was identified on February 4, 2024, between 14:10 and 14:27. The maximum measured x, y, and z axis vibration RMS velocities were 0.090 mm/s, 0.082 mm/s, and 0.072 mm/s for the train passes. The measured vibration levels are therefore below the applicable 0.14mm/s rms vibration criterion.

Summary vibration monitoring data, and the monitoring location can be found in **Appendix E**.

## 3.3 Stationary Source Assessment

Stationary sources could be grouped into two categories:

Category 1: Those that have a permit with the MECP through an Environmental Compliance Approval (ECA) or Environmental Activity and Sector Registry (EASR); and
Category 2: Those that are exempt from ECA or EASR permit requirements.

For Category 1 situations, it would be necessary to ensure that the permitted sources remain compliant. This would involve the implementation of mitigation measures at the source and/or at the proposed development. In the case of on-building mitigation at the proposed development, a special designation is needed from the municipality.

Coordination and agreements between the permitted stationary source owner, proposed new development owner, the land-use planning authority and potentially the MECP would be needed.

For Category 2 situations, the noise provisions of the applicable Municipal Code / Noise By-Law and guidance from NPC-300 would be applicable. In this case, sound level mitigation would be for due diligence; to meet the sound level criteria in the local noise by-law; and to avoid nuisance complaints from future occupants of the proposed new development.

### 3.3.1 Land-Use Compatibility Review (D-6 Guideline Assessment)

To clarify the evaluation of surrounding industries and businesses, MECP Guideline D-6 (MOE, 1995) was used. The classifications and potential zones of influence are summarized in **Appendix B**. Facilities with a zone of influence that overlapped the proposed development were considered. The businesses in the area are described in grater detail in the compatibility study RWDI prepared for the proposed development. This study was completed under a separate cover titled "1393 Graham's Lane Land Use Compatibility Study (Air Quality & Noise)", dated March 4, 2024.

#### *3.3.1.1 Class III Industries*

Ashland Chemicals, owned by Solenis, located approximately 150m to the north, was identified as a potential Class III Industry. The elevated grade associated with Fairview Street overpass between Ashland Chemicals and the proposed development provides limited screening from noise at the industry, with a line of sight from the industry to the proposed development underneath the bridge and above the overpass to the upper floors of the proposed development.

Nalco Canada Co, located approximately 926 m to the north, was also identified as a Class III Industry. However, given the proximity of existing residences the zone of influence is expected to be similar to that of a class II facility. The facility's Acoustic Assessment Report summary table shows that the facility is in compliance with NPC-300 limits at the nearest sensitive receptors immediately west of it. The proposed development is almost 1,000 m from this facility, thus even at its elevation, the development will not place any additional constraints on this facility nor would the facility have any audible sounds at the development. Therefore, this facility has insignificant noise emission impacts at the proposed development.

#### *3.3.1.2 Class II Industries*

Sun Chemicals was identified as a Class II industry approximately 228 m to the northwest of the proposed development. There are existing residences located 75m west of the Sun Chemicals facility, which suggests its zone of influence is less than that of a typical class II facility. Given the separation distance with the proposed development and the contained nature of the operation, this facility is not expected to be a compatibility issue for noise.

No other Class II facilities were identified within a 300m radius of the proposed development.

#### *3.3.1.3 Class I Industries*

Noise sources from Class I facilities within a 70m area surrounding the proposed development were considered for this assessment. Businesses along Graham's Lane and Legion Road were described as Class I. Sources at these businesses were identified from aerial/street level imagery in conjunction with site visit observations.

### 3.3.2 Stationary Source Limits

Applicable criteria for stationary noise sources noise are provided in the MECP NPC-300 Environmental Noise Guideline (MOE, 2013). A summary of the applicable criteria is provided in **Appendix B**.

Site visits identified that the acoustic environment of the proposed development is dominated by the sounds of human activity. This includes traffic on adjacent roads, busy commuter and industrial rail lines as well as a number of businesses. Sites like this, with "urban hum" that is typical of a major population centre, are described as "Class 1" acoustic environments in NPC-300.

Sound level limits above the exclusion limits are expected at some parts of the development. Background sound levels due road noise were therefore calculated. Road traffic was conservatively excluded from Grahams Lane for the purpose of calculating background sound levels, as detailed road traffic data is not available for the Grahams Lane road segment adjacent to the proposed development.

A summary of the existing road traffic volumes used for the background sound level calculations is shown below in **Table 6**

**Table 6: Existing Road Traffic Volumes for Background Sound Level Calculations**

| Roadway | Segment | Existing Road Traffic Volumes[1] (AADT) | Speed Limit (km/hr) | % Medium Trucks | % Heavy Trucks |
|---|---|---|---|---|---|
| **Brant Street** | South of Fairview Street | 25,908 | 50 | 0.8% | 1.4% |
| **Fairview Street** | West of Brant Street | 31,838 | 50 | 1.2% | 1.8% |

Notes:
1. Road traffic data from the year of 2018.

Volumes for the quietest daytime and nighttime hour were assumed to be 2.5% and 0.2% of the AADT for daytime and night-time respectively, according to the typical hourly traffic distribution, published by the Institute of Traffic Engineers (ITE, 2010). Sound levels were predicted by inputting sound emission data from the ORNAMENT (MOE, 1989) algorithms as line sources in the Cadna/A software package.

Background sound levels were predicted at across each façade and each outdoor point of reception. The worst-case receptors are considered the locations on the proposed development buildings that experience the highest sound level from stationary sources relative to the background sound level (i.e. high stationary source impact, low background sound level). Background sound levels are presented in **Table 7**Error! Reference source not found. for each worst-case receptor.

**Table 7: Background Sound Levels from Road Traffic at Worst-Case Receptors**

| Building/Receptor | Façade | Background Sound Level | | Default Class 1 Exclusion Limits | | Applicable Class 1 Sound Level Limit | |
|---|---|---|---|---|---|---|---|
| | | Daytime-Evening 0700-2300h (dBA) | Nighttime 2300-0700h[1] (dBA) | Daytime-Evening 0700-2300h (dBA) | Nighttime 2300-0700h[1] (dBA) | Daytime-Evening 0700-2300h (dBA) | Nighttime 2300-0700h[1] (dBA) |
| **Building A – 16 Storey Section** | N | 53 | 44 | 50 | 45 | 53 | 45 |
| | E | 51 | 41 | 50 | 45 | 51 | 45 |
| | S | 46 | 35 | 50 | 45 | 50 | 45 |
| | W | 49 | 42 | 50 | 45 | 50 | 45 |
| **Building A - 4-9 Storey Section[3]** | N | 52 | 41 | 50 | 45 | 52 | 45 |
| | S | 44 | 33 | 50 | 45 | 50 | 45 |
| | W | 49 | 39 | 50 | 45 | 50 | 45 |
| **Building B** | N | 51 | 43 | 50 | 45 | 51 | 45 |
| | E | 48 | 41 | 50 | 45 | 50 | 45 |
| | S | 42 | 33 | 50 | 45 | 50 | 45 |
| | W | 52 | 41 | 50 | 45 | 52 | 45 |
| **Building C** | N | 54 | 46 | 50 | 45 | 54 | 46 |
| | E | 50 | 42 | 50 | 45 | 50 | 45 |
| | S | 44 | 34 | 50 | 45 | 50 | 45 |
| | W | 53 | 43 | 50 | 45 | 53 | 45 |
| **OPOR_01** | - | 54 | - | 50 | - | 54 | - |
| **OPOR_02** | - | 54 | - | 50 | - | 54 | - |
| **OPOR_03** | - | 46 | - | 50 | - | 50 | - |
| **OPOR_04** | - | 53 | - | 50 | - | 53 | - |
| **OPOR_05** | - | 47 | - | 50 | - | 50 | - |
| **OPOR_06** | - | 52 | - | 50 | - | 52 | - |

Notes:
1. Outdoor areas are not assessed during the nighttime period.

Elevated limits were applied to the stationary source analysis where applicable, discussed further below.

### 3.3.3 Stationary Source Modeling

Estimated sound levels from the facilities surrounding the proposed development were modelled. Smit Auto Body to the south and Ashland Chemicals to the north were identified as facilities with environmental permits within their respective potential zones of influence.

#### *3.3.3.1 Representative Receptors*

The worst-case receptor locations were assessed to evaluate the potential stationary source noise effects on the proposed development. Outdoor points of reception for stationary sources were assessed at the worst-case location within each OLA.

#### *3.3.3.2 Assumed Sources and Sound Power Levels*

RWDI proxy data were used for the sound power levels of all HVAC units, general exhaust fans, paint booth exhaust fans, as well as a compressor and air impact wrench associated with 905 Tire (connected to Smit Auto Body) to the south. Sound levels for the Ashland Chemicals Plant and the transformer associated with Burlington Hydro to the southwest were based on measurements taken during the site visits. The assumed sound power levels included in the screening level stationary source assessment are presented in **Table 8**. The locations of the sources summarized in **Table 8** included in the stationary source assessment are illustrated in **Appendix F**, **Figure F.1**.

**Table 8: Stationary Source Sound Power Level Assumptions**

| Source Description | Source ID (As shown in Figure F.1) | Proxy Data / Measurement | Sound Power Level (dBA) | Duty Cycle | |
|---|---|---|---|---|---|
| | | | | Daytime and Evening (07:00h – 23:00h) | Nighttime (23:00h – 07:00h) |
| **1-Fan HVAC Unit** | HVAC_1F | Proxy Data | 82 | Continuous | 30 minutes/hour[2] |
| **2-Fan HVAC Unit** | HVAC_2F | Proxy Data | 85 | Continuous | 30 minutes/hour[2] |
| **6-Fan HVAC Unit** | HVAC_6F | Proxy Data | 94 | Continuous | Continuous[2] |
| **Make-Up Air Unit** | MUA | Proxy Data | 75 | Continuous | Continuous[2] |
| **General Exhaust Fan** | Exhaust | Proxy Data | 78 | Continuous | -[3] |
| **Paint Booth Exhaust Fan** | PB_Exh | Proxy Data | 90 | Continuous | -[3] |
| **Compressor and Air Impact Wrench** | Comp_and_Wrench | Proxy Data | 100[1] | 10 minutes/hour | -[3] |
| **Burlington Hydro Transformer** | Transformer | Measurement | 86 | Continuous | Continuous |
| **Ashland Chemicals Plant** | Ashland | Measurement | 101 | Continuous | Continuous |

Note(s):

1. Compressor and Air Impact Wrench sound power level includes a 10dB penalty for quasi steady impulsive character.
2. Rooftop HVAC units associated with facilities that do not operate at nighttime were assumed to operate 30 minutes per hour during nighttime hours. All sources associated with the Royal Canadian Legion to the northeast were assumed to operate continuously during daytime and nighttime.
3. Sources associated with the operation of a facility such as exhaust fans, compressor and air impact wrenches were assumed to not operate during nighttime hours if the business is closed during nighttime hours.

#### *3.3.3.3 Analysis and Results*

Stationary source noise modelling was carried out using the Cadna/A software package, a commercially available implementation of the ISO 9613 (ISO, 1994 and ISO, 1996) algorithms. The predicted sound levels are assessed against the sound level limits shown in **Table 9**. A sample calculation is included with **Appendix G**.

Ashland Chemicals was evaluated based on sound levels measured off-site. During the site visits conducted on February 2, 2024 and February 9, 2024, it was noted that activities at Ashland Chemicals were mildly audible at a distance of approximately 25m from the industry's property line. Measurements were at this same location on both site visits. Measured sound levels were used to develop a sound power level for the facility, which was then modelled as an area source covering the entire facility area. More detailed information may be of value a Site Plan Approval.

Cumulative sound levels during the worst-case 1-hour periods are presented in **Table 9**.

**Table 9: Predicted Sound Levels at Worst-case Receptor Locations – Continuous Stationary Sources**

| Building/Receptor | Façade | Predicted Sound Level | | Criteria | Meets Class 1 Criteria? (Daytime / Nighttime) |
|---|---|---|---|---|---|
| | | Daytime-Evening 0700-2300h (dBA) | Nighttime 2300-0700h[1] (dBA) | Class 1 Daytime / Nighttime $L_{EQ-1hr}$ (dBA) | |
| **Building A – 16 Storey Section** | N | 52 | 52 | 53[2] / 45 | Yes / No |
| | E | 54 | 52 | 51[2] / 45 | No / No |
| | S | 51 | 45 | 50 / 45 | No / Yes |
| | W | 49 | 46 | 50 / 45 | Yes / No |
| **Building A - 4-9 Storey Section[3]** | N | 46 | 46 | 52[2] / 45 | Yes / No |
| | S | 51 | 44 | 50 / 45 | No / Yes |
| | W | 48 | 45 | 50 / 45 | Yes / Yes |
| **Building B** | N | 45 | 46 | 51[2] / 45 | Yes / No |
| | E | 51 | 46 | 50 / 45 | No / No |
| | S | 50 | 45 | 50 / 45 | Yes / Yes |
| | W | 45 | 44 | 52[2] / 45 | Yes / Yes |
| **Building C** | N | 47 | 48 | 54[2] / 46[2] | Yes / No |
| | E | 49 | 48 | 50 / 45 | Yes / No |
| | S | 46 | 44 | 50 / 45 | Yes / Yes |
| | W | 46 | 46 | 53[2] / 45 | Yes / No |

| Building/Receptor | Façade | Predicted Sound Level | | Criteria | Meets Class 1 Criteria? (Daytime / Nighttime) |
|---|---|---|---|---|---|
| | | Daytime-Evening 0700-2300h (dBA) | Nighttime 2300-0700h[1] (dBA) | Class 1 Daytime / Nighttime $L_{EQ-1hr}$ (dBA) | |
| **OPOR_01** | - | 49 | -[1] | 54[2] / -- dBA | Yes |
| **OPOR_02** | - | 47 | -[1] | 54[2] / -- dBA | Yes |
| **OPOR_03** | - | 50 | -[1] | 50 / -- dBA | Yes |
| **OPOR_04** | - | 47 | -[1] | 53[2] / -- dBA | Yes |
| **OPOR_05** | - | 52 | -[1] | 50 / -- dBA | No |
| **OPOR_06** | - | 51 | -[1] | 52[2] / -- dBA | Yes |

Note(s):
1. Outdoor areas are not assessed during the nighttime period.
2. Elevated Class 1 Limits applied from background transportation sound level calculations.
3. Due to the geometry, east façade of Building A – 4 – 9 storey section does not have a notable exposure to noise.

The modelling of cumulative sound shows that daytime-evening and nighttime levels are in excess of the criteria for some facades. During daytime the excess is 3 dB at one façade and otherwise 1 dB or less. During nighttime the excess is 7 dB at two facades and is otherwise 3 dB or less.

When considering the facilities that have MECP permits, the modelling shows that Ashland Chemicals has a 1 dB excess at only one façade during nighttime. Ashland Chemicals would be compliant at all other times. Smit Autobody does not individually cause excess of the limits. These results show that the sound levels in excess of the limits are due primarily to facilities that are not subject to MECP permitting, and to their cumulative effect.

## 3.4 Recommendations

Based on the noise and vibration assessment results, the following recommendations were determined for the project. Recommendations are provided for both transportation sources and stationary sources.

### 3.4.1 Transportation Sources

The following recommendations are provided to address transportation sources.

#### *3.4.1.1 Building Façade Components*

Due to the elevated transportation sound levels in the area, acoustical design of the façade components including spandrel, window glazing, and exterior doors, are recommended to be specified for the proposed development.

To assess the development's feasibility, preliminary window glazing, and exterior balcony door sound isolation requirements were determined. These were based on following assumptions:

- Typical residential living room:
  - Glazing 60% of façade, Door: 20% of façade
  - 55% Façade to floor area Ratio

- Typical residential bedroom:
  - Glazing 80% of façade, Door: N/A
  - 81% Façade to floor area Ratio
- Acoustical character of rooms: High absorption finishes/furniture for bedrooms and intermediate absorption finishes/furniture for living rooms.

Based on the predicted plane of window sound levels and the assumptions listed above, recommendations for the minimum sound insulation ratings for the building components were determined using the National Research Council of Canada "BPN-56 method" (NRCC, 1985). The reported results are in terms of Sound Transmission Class (STC) ratings as summarized in **Table 10**.

**Table 10: Recommended Facade Component Minimum Sound Insulation Rating**

| Portion of Development | Window Glazing | Exterior Door | Façade Wall |
|---|---|---|---|
| **Tower A – 16 Storey Section** | STC-29 | STC-25[1] | STC-45 |
| **Tower A – 4-9 Storey Section** | STC-30 | STC-25[1] | STC-45 |
| **Building B** | STC-28 | STC-25[1] | STC-45[2] |
| **Building C** | STC-31 | STC-25[1] | STC-45[2] |

Note(s):
1. Typical exterior doors meeting the Ontario Building Code meet STC-25.
2. Exterior walls for west façades of Building B and C to include a minimum brick veneer or masonry equivalent (typically STC-50) for buildings adjacent to and/or with direct exposure to the railway spur.

The maximum requirement for the window glazing was determined to be STC-31, which is considered feasible as this can be achieved by various double-glazed configurations of insulated glazing units.

Taking into account the assumptions used as a basis to determine the glazing requirements, the applicable indoor transportation source sound level criteria are predicted to be achieved.

We recommend that the façade construction be reviewed during detailed design and prior to building permits to ensure that the indoor sound level limits will be met, and that the window/door supplier is requested to provide STC laboratory test reports as part of shop drawing submittal to confirm that the glazing/door components will meet the minimum STC requirements.

#### *3.4.1.2 Ventilation Recommendations*

Due to the transportation sound levels at the plane of the façade, central air conditioning is recommended for the proposed development to allow for windows and doors to remain closed as a noise mitigation measure. Further, prospective purchasers or tenants should be informed by a warning clause "Type D".

#### *3.4.1.3 Outdoor Living Areas*

Due to exposure to transportation sources, sound levels in OLAs are predicted to be above 55 dBA. The NPC-300 guideline allows that if the $L_{EQ}$ (16) in the OLA is greater than 55 dBA and less than or equal to 60 dBA either:

- noise control measures may be applied to reduce the sound level to 55 dBA; or

- if measures are not provided, prospective purchasers or tenants should be informed of potential noise problems by a warning clause Type A.

To reduce the transportation sound levels in OLAs to meet the applicable criteria, noise barriers are recommended, if feasible, to meet 55 dBA. If the noise barriers are determined to not be feasible for technical, economic, or administrative reasons, a warning clause Type A is recommended, which would meet the NPC-300 requirements.

The recommended geometries of the noise barriers are included with **Figure 3** (to meet 55 dBA). The barrier heights are summarized in **Table 11**. General guidance with respect to noise barrier design is included with **Appendix D**.

**Table 11: Barrier Height Recommendations for OLAs**

| Receptor | Description | Predicted OLA Sound Level | Barrier Height (m) to Meet Sound Criterion |
|---|---|---|---|
| | | Daytime $L_{EQ}$, 16hr | ≤ 55 dBA[1] |
| **OLA_01** | At-Grade Outdoor Amenity Area - Middle | 58 dBA | 3.5 m |
| **OLA_02** | At-Grade Outdoor Amenity Area - Building A | 56 dBA | 3.5 m |
| **OLA_03a** | At-Grade Outdoor Amenity Area - Building B | 60 dBA | 2.5 m |
| **OLA_03b** | At-Grade Outdoor Amenity Area - Building B | 60 dBA | 2.5 m |
| **OLA_04a** | At-Grade Outdoor Amenity Area - Building C | 59 dBA | 2.5 m |
| **OLA_04b** | At-Grade Outdoor Amenity Area - Building C | 54 dBA | - |
| **OLA_05a** | Level 5 Rooftop Outdoor Amenity Area - Building A | 57 dBA | 1.8 m |
| **OLA_05b** | Level 5 Rooftop Outdoor Amenity Area - Building A | 59 dBA | 1.8 m |
| **OLA_05c** | Level 5 Rooftop Outdoor Amenity Area - Building A | 59 dBA | 1.8 m |
| **OLA_06a** | Level 10 Rooftop Outdoor Amenity Area - Building A | 59 dBA | 1.7 m |
| **OLA_06b** | Level 10 Rooftop Outdoor Amenity Area - Building A | 57 dBA | 1.7 m |

Note(s):
1. Refer to Figure 3 for barrier geometry to meet 55 dBA.
2. If noise control measures are not provided, a warning clause "Type A" is recommended.

### 3.4.2 Rail Vibration

The measurements demonstrated that the ground-borne vibration produced by trains passing along the spur line are well within acceptable limits provided by RAC. Therefore, vibration mitigation is not required for the proposed development.

### 3.4.3 Stationary Sources

The noise modeling results show a limited excess of the NPC-300 limits. Since these excess sound levels are due primarily to a number of facilities that are not subject to MECP permitting, and to their cumulative effect, it is recommended that on-building mitigation be considered. In this case, on-building mitigation would involve allowing residents to close their windows by providing central air conditioning. To permit on-building mitigation for stationary sources, a “Class 4” designation from the City of Burlington is required.

Designation of this site as Class 4 is subject to criteria by NPC-300, as follows:

- **It is intended for development with new noise sensitive land use.** The City of Burlington has designated this area for development with new noise sensitive land uses, as shown in the *Pre-Feasibility Noise and Vibration Study, Burlington Mobility Hubs*, August 2021.
- **It is not yet built as a sensitive land use.** This proposal intends to change from non-residential to a include a residential use.
- **It is in proximity to existing, lawfully established stationary sources.** The site is in proximity to Ashland Chemicals and Smit Autobody, which have each previously obtained a permit from the MECP.
- **It has formal confirmation as Class 4**. This application will include a request for a Class 4 designation of the site.

With the Class 4 designation, the sound level limits increase. Daytime façade limits increase by 6 to 10 dB while nighttime limits increase by 9 to 10 dB. The outdoor point of reception limits increase by 1 to 5 dB. The resulting limits are shown in **Table 12** together with a comparison to the modelled results. Sound levels modelled for this feasibility assessment would demonstrate compliance with a Class 4 designation for the proposed development.

**Table 12: Predicted Stationary Source Sound Levels at Worst-case Receptor Locations vs Class 4 Limits**

| Building/Receptor | Façade | Time Period | | Sound Level Criteria | Meets Class 4 Criteria? (Daytime / Nighttime) |
|---|---|---|---|---|---|
| | | Daytime-Evening 0700-2300h (dBA) | Nighttime 2300-0700h[1] (dBA) | Class 4 Daytime / Nighttime $L_{EQ-1hr}$ (dBA) | |
| Building A – 16 Storey Section | N | 52 | 52 | 60 / 55 | Yes / Yes |
| | E | 54 | 52 | 60 / 55 | Yes / Yes |
| | S | 51 | 45 | 60 / 55 | Yes / Yes |
| | W | 49 | 46 | 60 / 55 | Yes / Yes |
| Building A - 4-9 Storey Section[2] | N | 46 | 46 | 60 / 55 | Yes / Yes |
| | S | 51 | 44 | 60 / 55 | Yes / Yes |
| | W | 48 | 45 | 60 / 55 | Yes / Yes |
| Building B | N | 45 | 46 | 60 / 55 | Yes / Yes |
| | E | 51 | 46 | 60 / 55 | Yes / Yes |
| | S | 50 | 45 | 60 / 55 | Yes / Yes |
| | W | 45 | 44 | 60 / 55 | Yes / Yes |
| Building C | N | 47 | 48 | 60 / 55 | Yes / Yes |
| | E | 49 | 48 | 60 / 55 | Yes / Yes |
| | S | 46 | 44 | 60 / 55 | Yes / Yes |
| | W | 46 | 46 | 60 / 55 | Yes / Yes |

| Building/Receptor | Façade | Time Period | | Sound Level Criteria | Meets Class 4 Criteria? (Daytime / Nighttime) |
|---|---|---|---|---|---|
| | | Daytime-Evening 0700-2300h (dBA) | Nighttime 2300-0700h[1] (dBA) | Class 4 Daytime / Nighttime $L_{EQ-1hr}$ (dBA) | |
| **OPOR_01** | - | 49 | -[1] | 55 / -- dBA | Yes |
| **OPOR_02** | - | 47 | -[1] | 55 / -- dBA | Yes |
| **OPOR_03** | - | 50 | -[1] | 55 / -- dBA | Yes |
| **OPOR_04** | - | 47 | -[1] | 55 / -- dBA | Yes |
| **OPOR_05** | - | 52 | -[1] | 55 / -- dBA | Yes |
| **OPOR_06** | - | 51 | -[1] | 55 / -- dBA | Yes |

Note(s):
1. Outdoor areas are not assessed during the nighttime period.
2. Due to the geometry, east façade of Building A – 4 – 9 storey section does not have a notable exposure to noise.

Due to the proximity of the proposed development to the commercial and industrial facilities, a warning clause "Type E" is recommended to inform prospective occupants of the potential for audible noise from these facilities. If a Class 4 area designation is introduced, a warning clause "Type F" is recommended.

### 3.4.4 Warning Clauses

The following warning clauses are recommended for the proposed development:

1. NPC-300 Type A to address transportation sound levels in Outdoor Living Areas (OLAs)
2. NPC-300 Type C or D to address transportation sound levels at the plane of window
3. Proximity to Railway Line Warning Clause
4. NPC-300 Type E to address proximity to commercial/industrial facilities
5. NPC-300 Type F for Class 4 Area Notification.

Warning clauses are recommended to be included on all development agreements, offers of purchase and agreements of purchase and sale or lease. The wording of the recommended warning clauses is included with **Appendix H**.

# 4 THE EFFECTS OF THE PROPOSED DEVELOPMENT ON ITS SURROUNDINGS AND ON ITSELF

On-site stationary sources for the development are expected to consist of HVAC and cooling-related equipment in the roof-top mechanical penthouse as well as various exhaust fans. Sound level details are not available at this time as the mechanical design has not yet been prepared. The influence of noise from the proposed development on the surroundings or on the development itself can therefore not yet be assessed.

Provided that best practices for the acoustical design of the building are followed, noise from building services equipment associated with the development are expected to meet the applicable sound level criteria due to the nature (residential/mixed-use) of the proposed development.

# 5 CONCLUSIONS

RWDI was retained to prepare a Noise and Vibration Impact Study for the proposed mixed-use development located in Burlington, Ontario.

The following noise control measures are recommended for the proposed development:

1. Installation of central air-conditioning so that all suites' windows can remain closed.
2. The inclusion of noise warning clauses related to:
   a. Transportation sound levels at the building façade and in the outdoor amenity areas
   b. Proximity to railway line
   c. Proximity to commercial/industrial land-use
3. Minimum sound isolation performance:
   a. Suite bedroom window glazing with sound isolation performance up to STC-31 for the east façade.
   b. Minimum brick veneer or masonry equivalent for west façades of Building B and C facing the CN Spur Line.
4. Construction of perimeter noise barriers along the outdoor amenity areas if feasible, or warning clause Type A.
5. Application for a Class 4 area designation.

The potential for vibration influences on the site due to the adjacent CN spur line was evaluated. Over a one-week period, a single train shunting event was measured. Vibration levels were below the applicable limits, so that no mitigation measures for vibration are required.

The influences of stationary sources of sound were evaluated. The sound from Smit Autobody will be compliant with the sound level limits. Sound from Ashland Chemicals is predicted to be 1 dB in excess of the limits at a small portion of one façade of the development. The remaining facilities do not have MECP permits. Cumulative sound from all facilities is predicted to be in excess of the limits by up to 7 dB for 2 facades, with other facades being much less in excess. Application for a Class 4 designation is recommended to allow mitigation of sound on the development. Cumulative sound from all of the facilities is predicted to be in compliance with the Class 4 limits.

At this stage in design the noise levels produced by the development on itself and its surroundings could not be quantitatively assessed. However, with appropriate selections it will be feasible to meet the applicable criteria for the effect on the building itself and its surroundings. We recommend that the building design be evaluated prior to building permit to ensure that the acoustical design is adequately implemented in order to meet the applicable criteria.

Based on the results of the analysis including implementation of the recommendations included with this assessment, the proposed development is feasible to meet the applicable sound and vibration criteria.

# 6 REFERENCES

1. Ontario Ministry of the Environment (MOE), August 2013, Publication NPC-300, Environmental Noise Guideline Stationary and Transportation Sources – Approval and Planning (MOE, 2013).
2. Ontario Ministry of the Environment (MOE), 1989, ORNAMENT Ontario Road Noise Analysis Method for Environment and Transportation, Technical Publication (MOE, 1989)
3. Ontario Ministry of the Environment (MOE) Publication Guideline D-6, "Compatibility Between Industrial Facilities and Sensitive Land Uses", July 1995 (MOE, 1995).
4. Controlling Sound Transmission into Buildings (BPN-56), National Research Council Canada (NRCC, 1985).
5. Federal Transit Administration, U.S. Department of Transportation, Transit Noise and Vibration Impact Assessment, 2018 (FTA, 2018).
6. International Organization for Standardization (ISO), 1994b, International Standard ISO 9613-1:1994, Acoustics – Attenuation of Sound during propagation outdoors. Part 1: Calculation of the absorption of sound by the atmosphere. (ISO, 1994)
7. International Organization for Standardization (ISO), 1996, International Standard ISO 9613-2:1996, Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation (ISO, 1996)
8. Institute of Transportation Engineers (ITE), 2010, *Traffic Engineering Handbook, 6th Edition* (ITE, 2010)

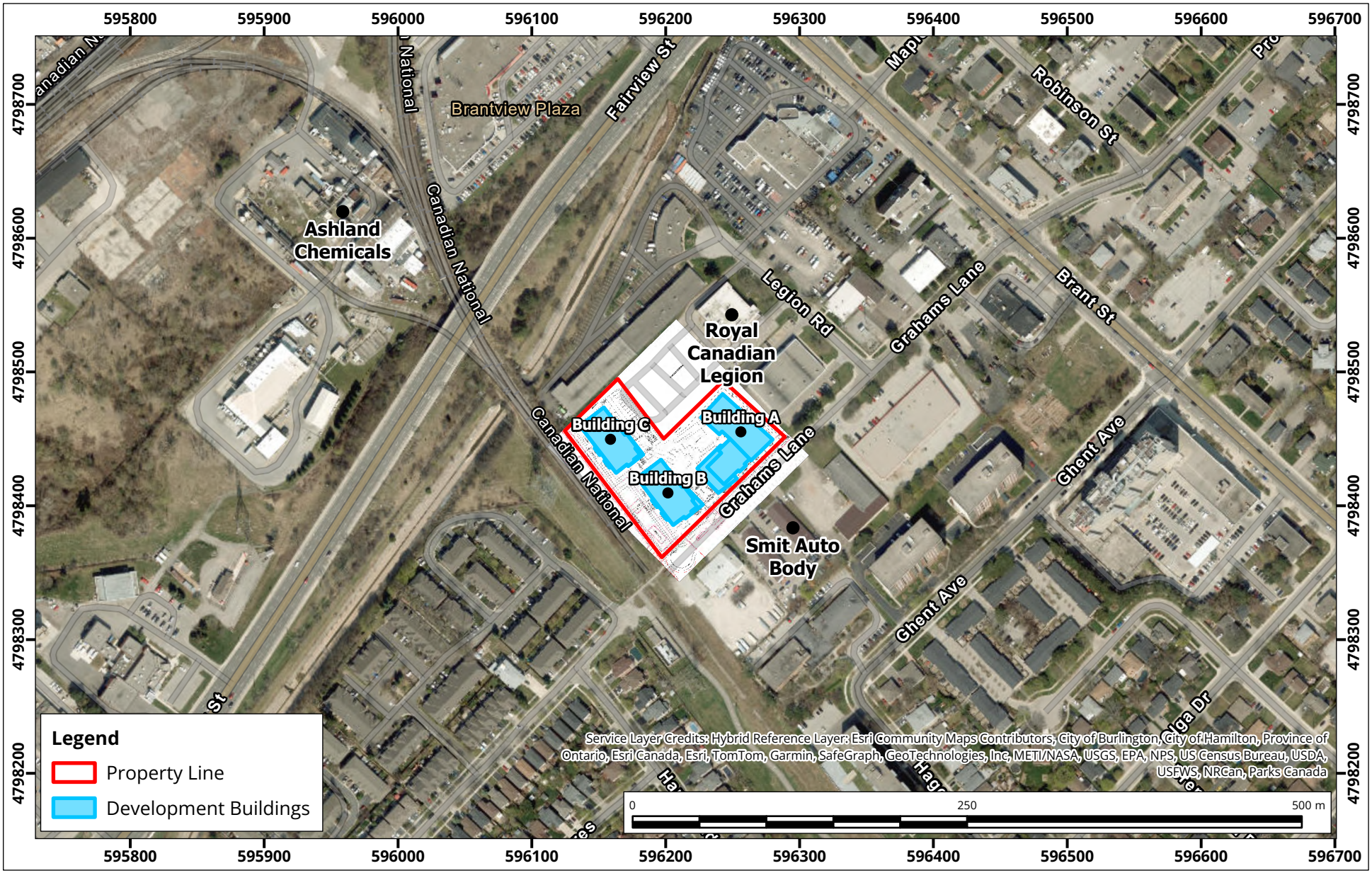
# STATEMENT OF LIMITATIONS

This report entitled 1393 Grahams Lane was prepared by Rowan Williams Davies & Irwin Inc. ("RWDI") for Atlus Group ("Client"). The findings and conclusions presented in this report have been prepared for the Client and are specific to the project described herein ("Project"). The conclusions and recommendations contained in this report are based on the information available to RWDI when this report was prepared. Because the contents of this report may not reflect the final design of the Project or subsequent changes made after the date of this report, RWDI recommends that it be retained by Client during the final stages of the project to verify that the results and recommendations provided in this report have been correctly interpreted in the final design of the Project.

The conclusions and recommendations contained in this report have also been made for the specific purpose(s) set out herein. Should the Client or any other third party utilize the report and/or implement the conclusions and recommendations contained therein for any other purpose or project without the involvement of RWDI, the Client or such third party assumes any and all risk of any and all consequences arising from such use and RWDI accepts no responsibility for any liability, loss, or damage of any kind suffered by Client or any other third party arising therefrom.

Finally, it is imperative that the Client and/or any party relying on the conclusions and recommendations in this report carefully review the stated assumptions contained herein and to understand the different factors which may impact the conclusions and recommendations provided.

# FIGURES




# Site Context Plan

True North

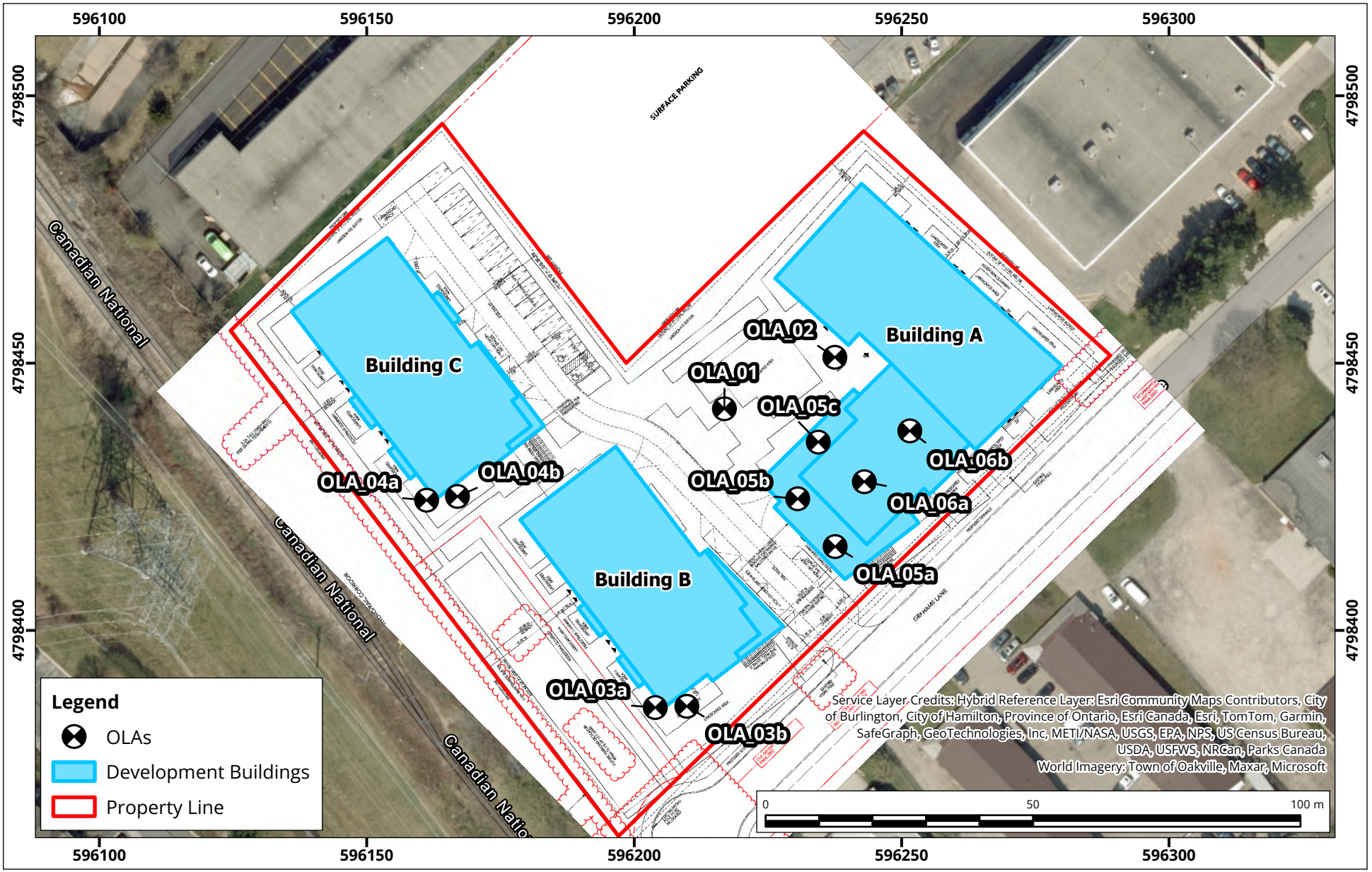
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| Approx. Scale: | 1:4,000 | |
| Date Revised: | Mar 4, 2024 | |

Map Projection: NAD 1983 UTM Zone 17N

1393 Grahams Lane - Burlington, Ontario

Project #: 2303584

Map Document: \\rwdgroup\guelph\AM_Jobs\2023\2303584\03WorkItems\06EnvironmentalNoiseAnalysis\ArcGIS\1393 Grahams Lane - Burlington, Ontario.aprx




# Outdoor Living Areas (OLAs) Locations

## Location of Common Outdoor Amenity Areas

Map Projection: NAD 1983 UTM Zone 17N

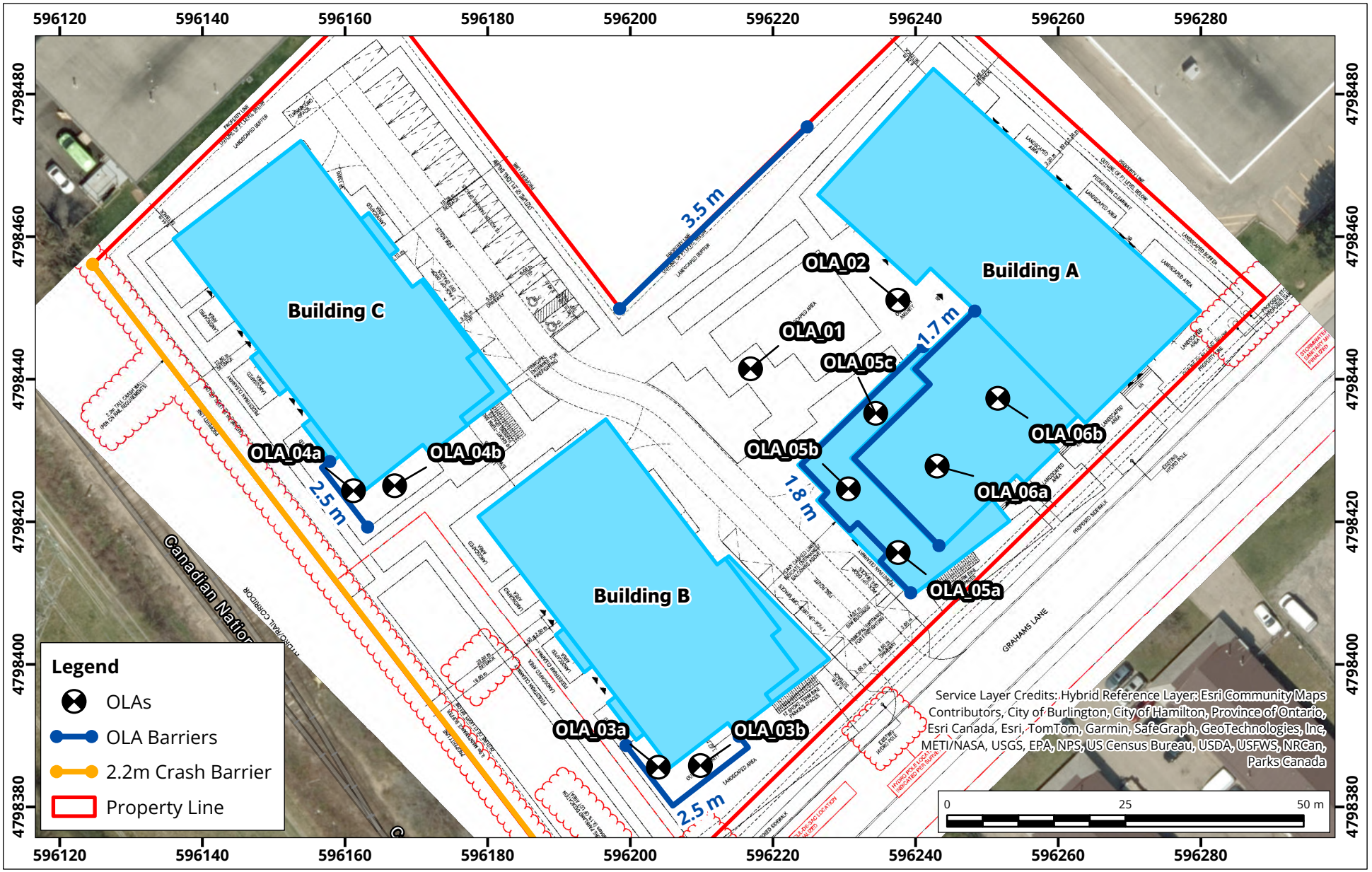
1393 Grahams Lane - Burlington, Ontario

True North

Project #: 2303584

| | | | |
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| Approx. Scale: | 1:1,000 | |
| Date Revised: | Mar 1, 2024 | |

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# Outdoor Living Areas (OLAs) Mitigation to 55 dBA

## Recommended Barrier Geometry and Height to meet 55 dBA

True North

| | | | |
|---|---|---|---|
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| Approx. Scale: | 1:750 | |
| Date Revised: | Mar 1, 2024 | |

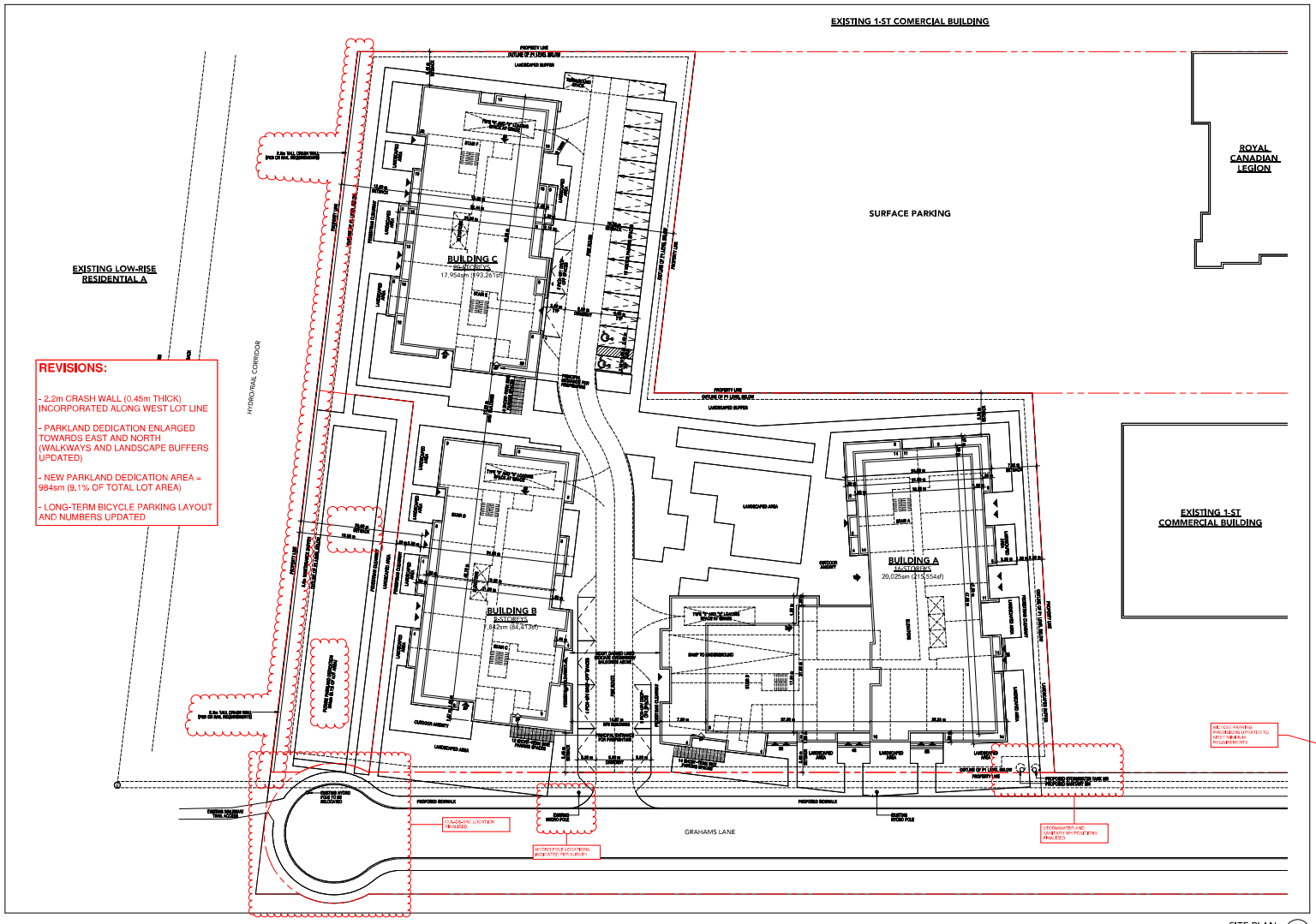
Map Projection: NAD 1983 UTM Zone 17N

1393 Grahams Lane - Burlington, Ontario

Project #: 2303584

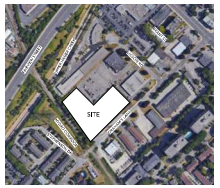
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# APPENDIX A




SITE PLAN
SCALE: 1 : 250
1
A1 00

KEY MAP




SITE STATISTICS

BUILDING & SITE SUMMARIES

| | | |
|---|---|---|
| LOT AREA | 16,779sm (2.66 AC) | LOT AREA AND DENSITY ADJUSTED TO ONCE LOT NEW CL-45.40 AT SOUTHWEST CORNER |
| GROSS FLOOR AREA | 49,837sm (497,629sf) | |
| DENSITY (FAR) | 3.23 | |

COVERAGE

| | |
|---|---|
| BUILDING COVERAGE: | XXXXsm (XX%) |
| PAVING (HARDSCAPING): | XXXXsm (XX%) |
| LANDSCAPING (SOFTSCAPING): | XXXXsm (XX%) |

| | |
|---|---|
| LOT FRONTAGE / DEPTH: | 128.77m / 155.44m |
| No. OF STOREYS / HEIGHT: | BLDG A = 16st / 49.5m<br>BLDG B = 9st / 28.5m<br>BLDG C = 20st / 61.5m |

GCA/GFA/NSA CALCULATIONS

| | UNITS | GCA | NSA |
|---|---|---|---|
| BUILDING A | | | |
| LEVEL 1 | 1B | 1,695sm | 865sm |
| LEVEL 2 | 1B | 1,682sm | 1,392sm |
| LEVEL 3 | 2B | 1,729sm | 1,439sm |
| LEVEL 4 | 2B | 1,729sm | 1,439sm |
| LEVEL 5 | 2B | 1,592sm | 1,442sm |
| LEVEL 6 | 2B | 1,592sm | 1,442sm |
| LEVEL 7 | 2B | 1,550sm | 1,356sm |
| LEVEL 8 | 2B | 1,550sm | 1,356sm |
| LEVEL 9 | 2B | 1,463sm | 1,370sm |
| LEVEL 10 | 1B | 985sm | 860sm |
| LEVEL 11 | 1B | 985sm | 860sm |
| LEVEL 12 | 1B | 930sm | 807sm |
| LEVEL 13 | 1B | 930sm | 807sm |
| LEVEL 14 | 1B | 930sm | 807sm |
| LEVEL 15 | 1B | 857sm | 734sm |
| LEVEL 16 | 1B | 857sm | 734sm |
| MECH. PENTHOUSE | - | XXX | - |
| BLDG A SUBTOTAL: | XXX | 24,439sm (263,056sf) | 19,961sm (214,855sf) |
| EFFICIENCY = | 82% | | |

BLDG A GFA W/ DEDUCTIONS: 24,439sm (263,056sf)

| | | | |
|---|---|---|---|
| BUILDING B | | | |
| LEVEL 2 | 7 | 857sm | 417sm |
| LEVEL 2 | 11 | 857sm | 717sm |
| LEVEL 3 | 12 | 898sm | 770sm |
| LEVEL 4 | 15 | 1,028sm | 930sm |
| LEVEL 5 | 15 | 930sm | 832sm |
| LEVEL 6 | 15 | 975sm | 877sm |
| LEVEL 7 | 15 | 975sm | 877sm |
| LEVEL 8 | 15 | 975sm | 877sm |
| LEVEL 9 | 15 | 898sm | 793sm |
| MECH. PENTHOUSE | - | XXX | - |
| BLDG B SUBTOTAL: | XXX | 8,393sm (90,337sf) | 7,297sm (78,551sf) |
| EFFICIENCY = | 87% | | |

BLDG B GFA W/ DEDUCTIONS: 8,393sm (90,337sf)

| | | | |
|---|---|---|---|
| BUILDING C | | | |
| LEVEL 2 | 7 | 857sm | 417sm |
| LEVEL 2 | 12 | 857sm | 717sm |
| LEVEL 3 | 12 | 857sm | 717sm |
| LEVEL 4 | 15 | 1,017sm | 919sm |
| LEVEL 5 | 15 | 969sm | 871sm |
| LEVEL 6 | 15 | 1,045sm | 945sm |
| LEVEL 7 | 15 | 1,045sm | 945sm |
| LEVEL 8 | 15 | 1,045sm | 945sm |
| LEVEL 9 | 15 | 908sm | 807sm |
| LEVEL 10 | 15 | 908sm | 807sm |
| LEVEL 11 | 15 | 930sm | 832sm |
| LEVEL 12 | 15 | 930sm | 832sm |
| LEVEL 13 | 15 | 975sm | 877sm |
| LEVEL 14 | 15 | 975sm | 877sm |
| LEVEL 15 | 15 | 975sm | 877sm |
| LEVEL 16 | 15 | 975sm | 877sm |
| LEVEL 17 | 15 | 975sm | 877sm |
| LEVEL 18 | 15 | 975sm | 877sm |
| LEVEL 19 | 15 | 894sm | 793sm |
| LEVEL 20 | 15 | 894sm | 793sm |
| MECH. PENTHOUSE | - | XXX | - |
| BLDG C SUBTOTAL: | 304 | 24,899sm (267,954sf) | 20,564sm (221,331sf) |
| EFFICIENCY = | 83% | | |

BLDG C GFA W/ DEDUCTIONS: 24,899sm (267,954sf)

| | | | |
|---|---|---|---|
| TOTALS: | 554 | 49,731sm (535,348sf) | 41,822sm (450,737sf) |
| EFFICIENCY = | 84% | | |

TOTAL GFA W/ DEDUCTIONS: 49,731sm (535,348sf)

| UNIT MIX / COUNT | S | 1B | 1B+D | 2B | 2B+D | 3B |
|---|---|---|---|---|---|---|
| | 450sf+/- | 550sf+/- | 600sf+/- | 750sf+/- | 850sf+/- | 950sf+/- |
| BUILDING A | | | | | | |
| LEVEL 1 | 2 | 10 | X | 5 | X | 1 |
| LEVEL 2 | 3 | 10 | X | 5 | X | 1 |
| LEVEL 3 | 4 | 11 | X | 6 | X | 1 |
| LEVEL 4 | 4 | 11 | X | 6 | X | 1 |
| LEVEL 5 | 4 | 11 | X | 6 | X | 1 |
| LEVEL 6 | 4 | 11 | X | 6 | X | 1 |
| LEVEL 7 | 4 | 11 | X | 6 | X | 1 |
| LEVEL 8 | 4 | 11 | X | 6 | X | 1 |
| LEVEL 9 | 4 | 11 | X | 6 | X | 1 |
| LEVEL 10 | 2 | 8 | X | 4 | X | 1 |
| LEVEL 11 | 2 | 8 | X | 4 | X | 1 |
| LEVEL 12 | 2 | 8 | X | 4 | X | 1 |
| LEVEL 13 | 2 | 8 | X | 4 | X | 1 |
| LEVEL 14 | 2 | 8 | X | 4 | X | 1 |
| LEVEL 15 | 2 | 8 | X | 4 | X | 1 |
| LEVEL 16 | 2 | 8 | X | 4 | X | 1 |
| SUBTOTAL: | XXXX | XXXX | XXXX | XXXX | XXXX | XXX |
| BUILDING B | | | | | | |
| LEVEL 2 | 1 | 4 | X | 2 | X | X |
| LEVEL 2 | 2 | 4 | X | 2 | X | 1 |
| LEVEL 3 | 2 | 4 | X | 2 | X | 1 |
| LEVEL 4 | 2 | 6 | X | 3 | X | 1 |
| LEVEL 5 | 2 | 6 | X | 3 | X | 1 |
| LEVEL 6 | 2 | 6 | X | 3 | X | 1 |
| LEVEL 7 | 2 | 6 | X | 3 | X | 1 |
| LEVEL 8 | 2 | 6 | X | 3 | X | 1 |
| SUBTOTAL: | XXXX | XXXX | XXXX | XXXX | XXXX | XXX |
| BUILDING C | | | | | | |
| LEVEL 2 | 2 | 7 | X | 4 | X | X |
| LEVEL 2 | 2 | 4 | X | 2 | X | 1 |
| LEVEL 3 | 2 | 4 | X | 2 | X | 1 |
| LEVEL 4 | 2 | 5 | X | 3 | X | 1 |
| LEVEL 5 | 2 | 5 | X | 3 | X | 1 |
| LEVEL 6 | 2 | 6 | X | 4 | X | 1 |
| LEVEL 7 | 2 | 6 | X | 4 | X | 1 |
| LEVEL 8 | 2 | 6 | X | 4 | X | 1 |
| LEVEL 9 | 2 | 6 | X | 4 | X | 1 |
| LEVEL 10 | 2 | 6 | X | 4 | X | 1 |
| LEVEL 11 | 2 | 6 | X | 4 | X | 1 |
| LEVEL 12 | 2 | 6 | X | 4 | X | 1 |
| LEVEL 13 | 2 | 6 | X | 4 | X | 1 |
| LEVEL 14 | 2 | 6 | X | 4 | X | 1 |
| LEVEL 15 | 2 | 6 | X | 4 | X | 1 |
| LEVEL 16 | 2 | 6 | X | 4 | X | 1 |
| LEVEL 17 | 2 | 6 | X | 4 | X | 1 |
| LEVEL 18 | 2 | 6 | X | 4 | X | 1 |
| LEVEL 19 | 2 | 6 | X | 4 | X | 1 |
| LEVEL 20 | 2 | 6 | X | 4 | X | 1 |
| SUBTOTAL: | XXXX | XXXX | XXXX | XXXX | XXXX | XXX |
| TOTALS: | XXXX | XXXX | XXXX | XXXX | XXXX | XXX |
| UNIT MIX: | 5 (XX%) | 10 (XX%) | 0 | 39 (XX%) | 0 | 39 (XX%) |

AMENITY SPACES (INDOOR/OUTDOOR)

| | |
|---|---|
| INDOOR AMENITY AREA = XXX / UNIT | OUTDOOR AMENITY AREA = XXX / UNIT |
| INDOOR REQUIRED: XXXsm | OUTDOOR REQUIRED: XXXsm |
| INDOOR PROPOSED: XXXsm | OUTDOOR PROPOSED: XXXsm |

GREEN ROOF

| | |
|---|---|
| AVAILABLE ROOF AREA: XXXsm | |
| AREA (60%): XXXsm (60%) | AREA PROPOSED: XXXsm (60%) |

PARKING SPACE RATES (BASED ON PLANNING RATE OF 0.5/RESIDENTIAL)

| | |
|---|---|
| RESIDENT: | 0.5/UNIT |
| VISITOR: | 0.1/UNIT |

| PARKING SPACES: | REQUIRED | PROPOSED |
|---|---|---|
| PERPENDICULAR STALL DIMENSION: | 6.0m x 2.75m | 6.0m x 2.75m |
| PARALLEL STALL DIMENSION: | 7.3m x 2.75m | 7.3m x 2.75m |
| BARRIER-FREE STALL (TYPE A): | 6.0m x 3.4m | 6.0m x 3.4m |
| BARRIER-FREE STALL (TYPE B): | 6.0m x 2.4m | 6.0m x 2.4m |
| DRIVE AISLE WIDTH: | 6.0m | 6.0m |
| RESIDENTIAL: | 505 | 505 (505 UG) |
| VISITOR: | 91 | 93 (16 AG + 77 UG) |
| TOTAL SPACES: | 596 SPACES | 596 SPACES (3 LEVELS) |

BICYCLE PARKING SPACE RATES

| | |
|---|---|
| RESIDENTIAL: 0.5 SPACES/UNIT | VISITOR: 0.1 SPACES/UNIT |
| 0.5 PER UNIT | 0.1 PER UNIT |

| BICYCLE PARKING SPACES: | | |
|---|---|---|
| SHORT-TERM (AT-GRADE): | 36 | 36 |
| LONG-TERM (UNDERGROUND): | 361 | 360 |
| TOTAL SPACES: | 397 | 396 |
| STORAGE LOCKERS: | | |
| RESIDENTIAL: | 0 | 0 |

LOADING SPACE RATES

RESIDENTIAL (LOADING TYPE "A" AND TYPE "B")

| LOADING SPACES: | REQUIRED | PROPOSED |
|---|---|---|
| RESIDENTIAL: | 3 | 3 |

SURVEY INFORMATION

BOUNDARY SURVEY OF PART OF LOT 49, BENNETT BLOCK, REGISTERED PLAN 99, CITY OF BURLINGTON

MACKAY MACKAY & PETERS LIMITED, 2080 SOUTH SERVICE ROAD, BURLINGTON, ONTARIO, L7L 5Y7, T: (905) 639-3375

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SITE PLAN SYMBOL AND SIGN LEGEND

- PRINCIPLE ENTRANCE (FOR FIRE FIGHTING)
- ENTRANCE TO RETAIL OR GRADE RELATED RES. UNIT
- CATCH BASIN (REFER TO CIVIL DWGS.)
- AREA DRAIN (REFER TO CIVIL DWGS.)
- TRENCH DRAIN (REFER TO CIVIL DWGS.)
- MANHOLE (REFER TO CIVIL DWGS.)
- FIRE HYDRANT
- SIAMESE (STANDPIPE) CONNECTION
- ACCESIBLE PARKING SIGNAGE
- FIRE ROUTE SIGNAGE
- (LIGHT STANDARD (EXTERIOR POLE FIXTURE)
- WALL MOUNTED EXTERIOR LIGHT FIXTURE
- ACCESIBLE CURB CUT
- BARRIER FREE PARKING SPACE

PROJECT NORTH | TRUE NORTH | SEAL

Project:
1393 GRAHAMS LANE

NORTHSTONE CAPITAL PARTNERS

1393 GRAHAMS LANE

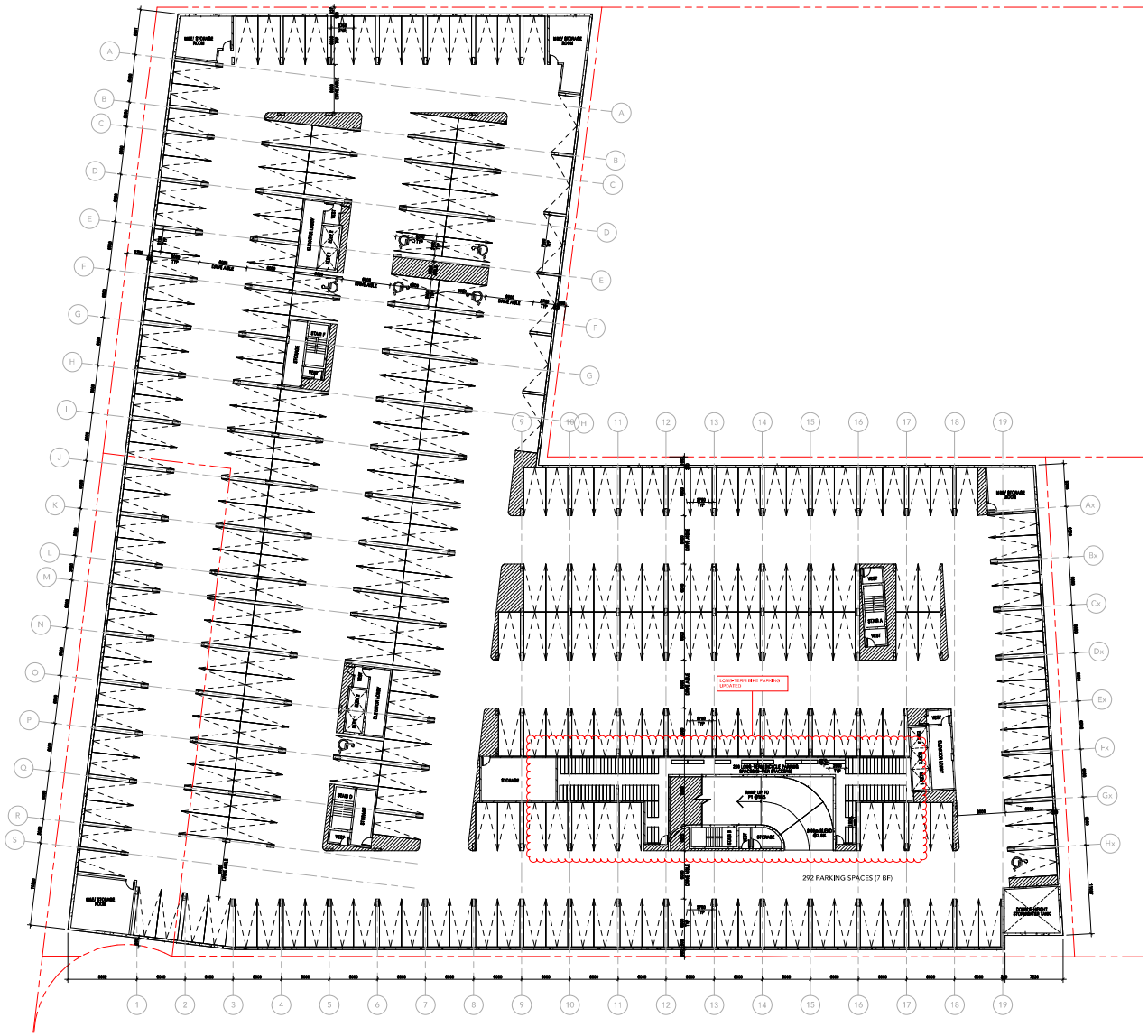
BURLINGTON ONTARIO

Drawing Title:
SITE PLAN AND STATISTICS

| Project Manager | Project No. |
|---|---|
| JA | XX-XXX |
| Date Plotted: | Scale: |
| 2/26/2024 12:25:46 PM | As Indicated |

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**REVISIONS:**

- 2.2m CRASH WALL (0.45m THICK) INCORPORATED ALONG WEST LOT LINE

- PARKLAND DEDICATION ENLARGED TOWARDS EAST AND NORTH (WALKWAYS AND LANDSCAPE BUFFERS UPDATED)

- NEW PARKLAND DEDICATION AREA = 984sm (9.1% OF TOTAL LOT AREA)

- LONG-TERM BICYCLE PARKING LAYOUT AND NUMBERS UPDATED

FLOOR PLAN - LEVEL P2
SCALE: 1 : 200

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FLOOR PLAN (ABOVE GRADE) LEGEND

- AREA DRAIN (REFER TO MECH. DWGS.)
- FLOOR DRAIN (REFER TO MECH. DWGS.)
- ROOF DRAIN (REFER TO MECH. DWGS.)
- TRENCH DRAIN (REFER TO CIVIL DWGS.)
- WALL MOUNTED EXTERIOR LIGHT FIXTURE
- WARNING SYSTEM FOR MOTORISTS
- AO AUTO OPERATORS
- ELECTRICAL PANEL
- CONVEX MIRROR
- PAINTED YELLOW LINES (PEDESTRIAN PATHWAYS)
- SIAMESE (STANDPIPE) CONNECTION
- FHC FIRE HOSE CABINET
- FHV STANDPIPE HOSE VALVE CABINET
- FE FIRE EXTINGUISHER CABINET
- EXTENT OF BUILDING ABOVE
- BARRIER FREE TURNING RADIUS

TYPICAL VEHICULAR PARKING SPACE:

AS PER BY-LAW XXXXXXX

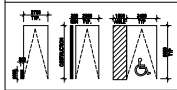
DRIVE AISLE: MIN. 6.6m

TYPICAL PARKING SPACE DIMENSIONS:

WIDTH: MIN. 2.6m — LENGTH: 5.6m
VERTICAL CLEARANCE: 2.0m

TYPICAL ACCESSIBLE PARKING SPACE DIMENSIONS:

WIDTH: MIN. 3.9m — LENGTH: 5.6m
VERTICAL CLEARANCE: 2.1m



TYPICAL BICYCLE PARKING SPACE:

| | | |
|---|---|---|
| WIDTH | 0.6m (MIN) | |
| LENGTH | 1.8m | |
| VERTICAL CLEARANCE | 1.9m | |



PROJECT NORTH | TRUE NORTH | SEAL

Project
1393 GRAHAMS LANE

NORTHSTONE CAPITAL PARTNERS

1393 GRAHAMS LANE

BURLINGTON ONTARIO

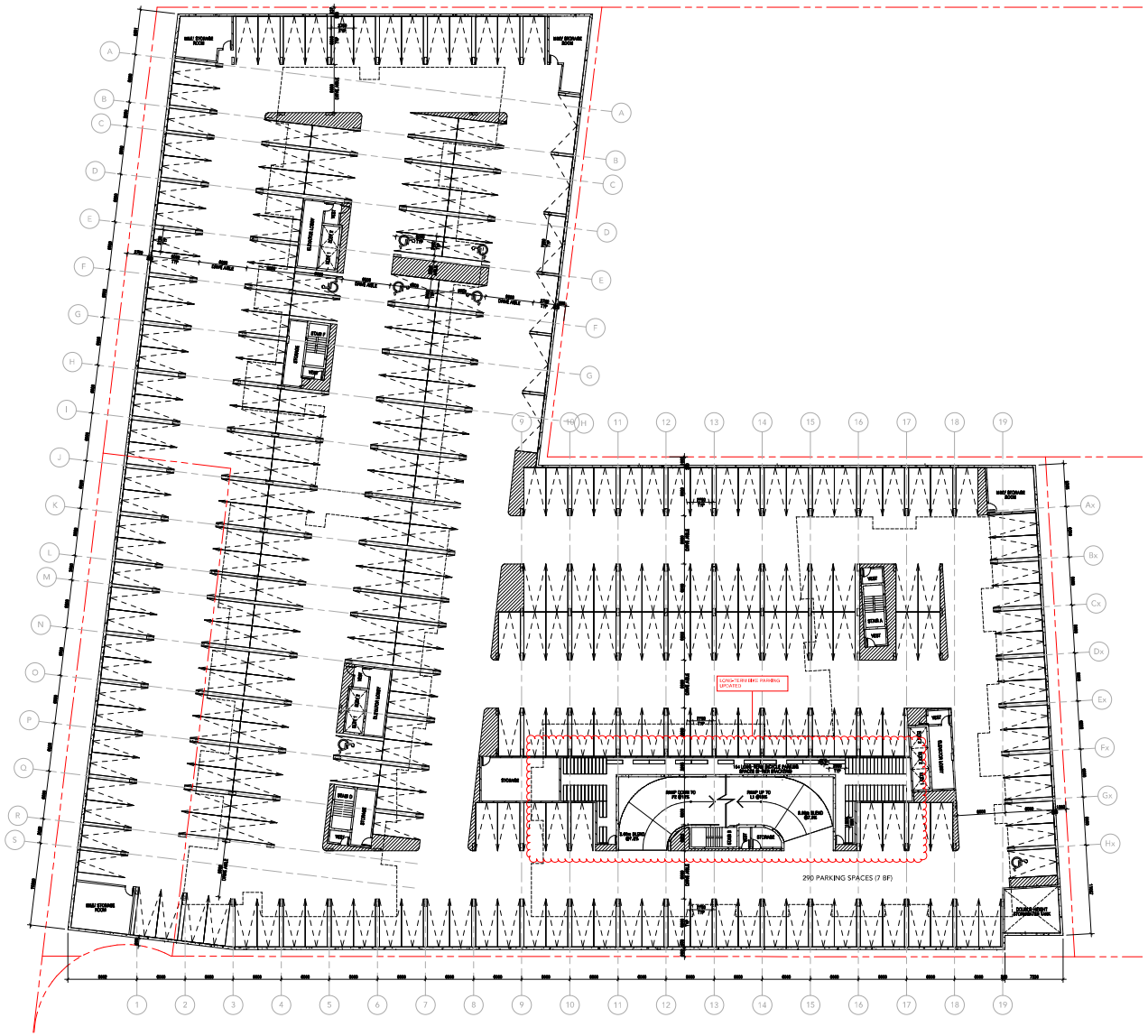
Drawing Title
LEVEL P2 FLOOR PLAN

| Project Manager Team | Project No. |
|---|---|
| JA | XX-XXX |
| Date Plotted | Scale |
| 2/26/2024 12:25:47 PM | As Indicated |

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FLOOR PLAN - LEVEL P1
SCALE: 1 : 200

**REVISIONS:**

- 2.2m CRASH WALL (0.45m THICK) INCORPORATED ALONG WEST LOT LINE
- PARKLAND DEDICATION ENLARGED TOWARDS EAST AND NORTH (WALKWAYS AND LANDSCAPE BUFFERS UPDATED)
- NEW PARKLAND DEDICATION AREA = 984sm (9.1% OF TOTAL LOT AREA)
- LONG-TERM BICYCLE PARKING LAYOUT AND NUMBERS UPDATED

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FLOOR PLAN (ABOVE GRADE) LEGEND:

- AREA DRAIN (REFER TO MECH. DWGS.)
- FLOOR DRAIN (REFER TO MECH. DWGS.)
- ROOF DRAIN (REFER TO MECH. DWGS.)
- TRENCH DRAIN (REFER TO CIVIL DWGS.)
- WALL MOUNTED EXTERIOR LIGHT FIXTURE
- WARNING SYSTEM FOR MOTORISTS
- AO AUTO OPERATORS
- ELECTRICAL PANEL
- CONVEX MIRROR
- PAINTED YELLOW LINES (PEDESTRIAN PATHWAYS)
- SIAMESE (STANDPIPE) CONNECTION
- FHC FIRE HOSE CABINET
- FHV STANDPIPE HOSE VALVE CABINET
- FE FIRE EXTINGUISHER CABINET
- EXTENT OF BUILDING ABOVE
- BARRIER FREE TURNING RADIUS

TYPICAL VEHICULAR PARKING SPACE:
AS PER BY-LAW XXXXXXX
DRIVE AISLE: MIN. 6.0m
TYPICAL PARKING SPACE (REGULAR):
WIDTH: MIN. 2.6m LENGTH: 5.6m
VERTICAL CLEARANCE: 2.0m
TYPICAL ACCESSIBLE PARKING SPACE (WHEELCHAIR):
WIDTH: MIN. 3.9m LENGTH: 5.6m
VERTICAL CLEARANCE: 2.1m

TYPICAL BICYCLE PARKING SPACE:
WIDTH: 0.6m (MIN)
LENGTH: 1.8m
VERTICAL CLEARANCE: 1.9m

PROJECT NORTH | TRUE NORTH | SEAL

Project:
1393 GRAHAMS LANE

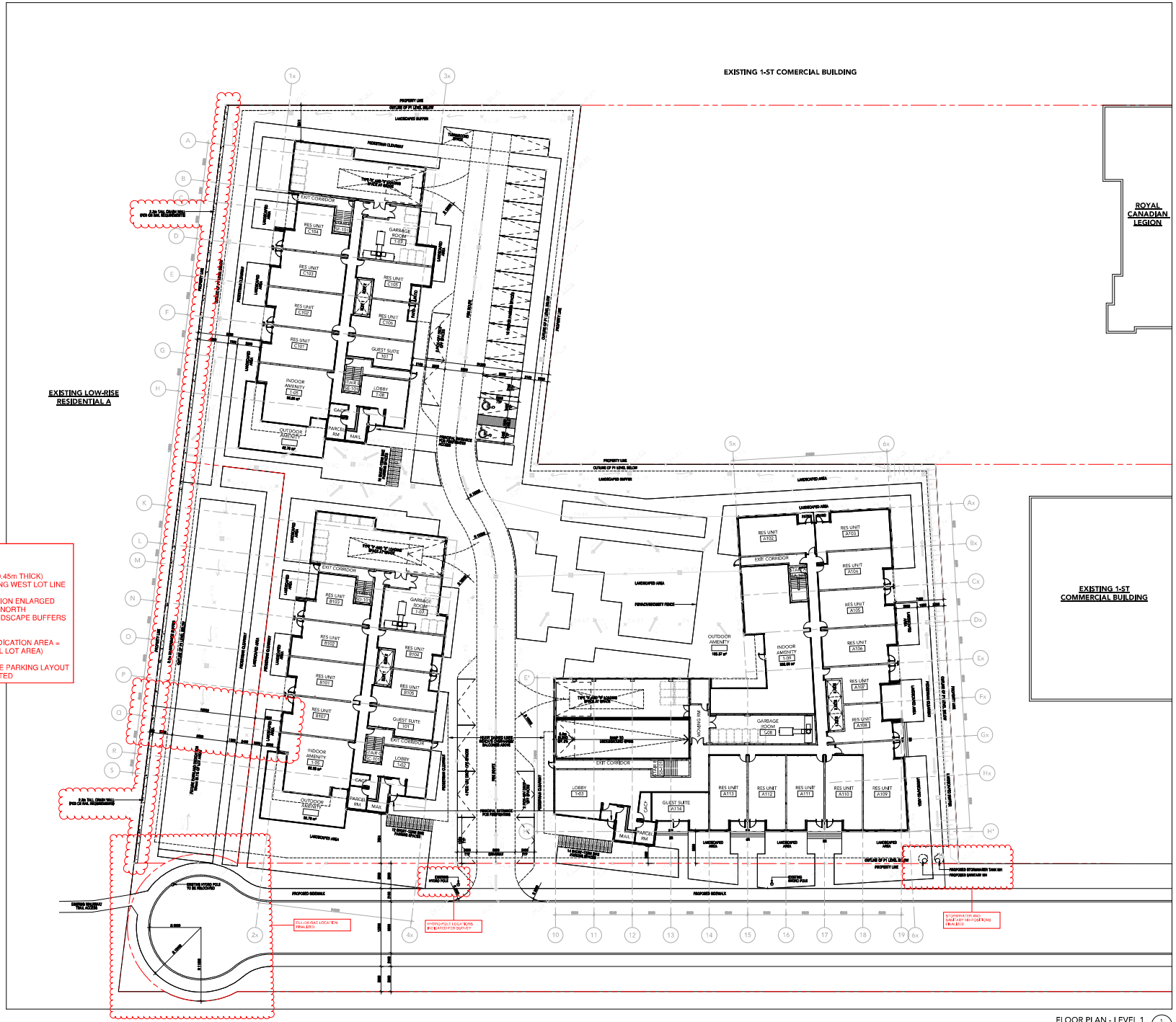
NORTHSTONE CAPITAL PARTNERS
1393 GRAHAMS LANE
BURLINGTON ONTARIO

Drawing Title:
LEVEL P1 FLOOR PLAN

| Project Manager Team: | Project No: |
|---|---|
| JA | XX-XXX |
| Date Plotted: | Scale: |
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**REVISIONS:**

- 2.2m CRASH WALL (0.45m THICK) INCORPORATED ALONG WEST LOT LINE
- PARKLAND DEDICATION ENLARGED TOWARDS EAST AND NORTH (WALKWAYS AND LANDSCAPE BUFFERS UPDATED)
- NEW PARKLAND DEDICATION AREA = 984sm (9.1% OF TOTAL LOT AREA)
- LONG-TERM BICYCLE PARKING LAYOUT AND NUMBERS UPDATED

FLOOR PLAN - LEVEL 1
SCALE: 1 : 200

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FLOOR PLAN (ABOVE GRADE) LEGEND

- AREA DRAIN (REFER TO MECH. DWGS.)
- FLOOR DRAIN (REFER TO MECH. DWGS.)
- ROOF DRAIN (REFER TO MECH. DWGS.)
- TRENCH DRAIN (REFER TO CIVIL DWGS.)
- WALL MOUNTED EXTERIOR LIGHT FIXTURE
- WARNING SYSTEM FOR MOTORISTS
- AO AUTO OPERATORS
- ELECTRICAL PANEL
- CONVEX MIRROR
- PAINTED YELLOW LINES (PEDESTRIAN PATHWAYS)
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- FHC FIRE HOSE CABINET
- FHV STANDPIPE HOSE VALVE CABINET
- FE FIRE EXTINGUISHER CABINET
- EXTENT OF BUILDING ABOVE
- BARRIER FREE TURNING RADIUS

PROJECT NORTH | TRUE NORTH | SEAL

Project
1393 GRAHAMS LANE

NORTHSTONE CAPITAL PARTNERS
1393 GRAHAMS LANE
BURLINGTON ONTARIO

Drawing Title
LEVEL 1 FLOOR PLAN

| Project Manager Team | Project No. |
|---|---|
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| Date Plotted | Scale |
| 2/26/2024 12:25:51 PM | As Indicated |

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# APPENDIX B

# CRITERIA

## Transportation Sources

Guidance from the Ontario Ministry of the Environment, Conservation and Parks (MECP) NPC-300 Environmental Noise Guideline was used to assess environmental noise generated by transportation-related sources. There are three aspects to consider, which include the following:

i. Transportation source sound levels in indoor living areas (living rooms and sleeping quarters), which determines building façade elements (windows, exterior walls, doors) sound insulation design recommendations.
ii. Transportation source sound levels at the plane of the window, which determines air-conditioning and ventilation system recommendations and associated warning clauses which inform the future occupants that windows and doors must be closed in order to meet the indoor sound level criteria.
iii. Transportation source sound levels in Outdoor Living Areas (OLAs), which determines OLA noise mitigation and related warning clause recommendations.

### Road and Rail

#### Indoor Sound Level Criteria

For assessing sound originating from transportation sources, NPC-300 defines sound level criteria as summarized in **Table 1** for indoor areas of sensitive uses. The specified values are maximum sound levels and apply to the indicated indoor spaces with the windows and doors closed.

**Table 1: Indoor Sound Level Criteria for Road and Rail Sources**

| Type of Space | Source | Sound Level Criteria (Indoors) | |
|---|---|---|---|
| | | Daytime $L_{eq,16\text{-}hr}$ 07:00h – 23:00h | Nighttime $L_{eq,8\text{-}hr}$ 23:00h – 07:00h |
| **Living Quarters** Examples: Living, dining and den areas of residences, hospitals, nursing homes, schools and daycare centres | **Road** | 45 dBA | |
| | **Rail** | 40 dBA | |
| **Sleeping Quarters** | **Road** | 45 dBA | 40 dBA |
| | **Rail** | 40 dBA | 35 dBA |

NPC-300 also provides guidelines for acceptable indoor sound levels that are extended to land uses and developments which are not normally considered noise sensitive. The guideline sound level criteria presented in **Table 2** are provided to inform good-practice design objectives.

**Table 2: Supplementary Indoor Sound Level Criteria for Road and Rail Sources**

| Type of Space | Source | Sound Level Criteria (Indoors) | |
|---|---|---|---|
| | | Daytime $L_{eq,16\text{-}hr}$ 07:00h – 23:00h | Nighttime $L_{eq,8\text{-}hr}$ 23:00h – 07:00h |
| General offices, reception areas, retail stores, etc. | **Road** | 50 dBA | - |
| | **Rail** | 45 dBA | - |
| Theatres, places of worship, libraries, individual or semi-private offices, conference rooms, reading rooms, etc. | **Road** | 45 dBA | - |
| | **Rail** | 40 dBA | - |
| Sleeping quarters of residences, hospitals, nursing/retirement homes, etc. | **Road** | - | 40 dBA |
| | **Rail** | - | 35 dBA |
| Sleeping quarters of hotels/motels | **Road** | - | 45 dBA |
| | **Rail** | - | 40 dBA |

### Outdoor Living Areas (OLAs)

Outdoor Living Areas (OLAs) would include outdoor areas intended and designed for the quiet enjoyment of the outdoor environment and which are readily accessible from the building.

OLAs may include any common outdoor amenity spaces associated with a multi-unit residential development (e.g. courtyards, roof-top terraces), and/or private backyards and terraces with a minimum depth of 4m provided they are the only outdoor living area for the occupant. The sound level criteria for outdoor living areas is summarized in **Table 3**.

**Table 3: Sound Level Criteria – Outdoor Living Area**

| Assessment Location | Sound Level Criteria (Outdoors) | |
|---|---|---|
| | Daytime $L_{eq,16\text{-}hr}$ 07:00h – 23:00h | Nighttime $L_{eq,8\text{-}hr}$ 23:00h – 07:00h |
| Outdoor Living Area (OLA) (Combined Road and Rail) | 55 dBA | - |

### Outdoor and Plane of Window Sound Levels

In addition to the sound level criteria, noise control measures and requirements for ventilation and warning clauses requirements are recommended for residential land-uses based on predicted transportation source sound levels incident in the plane of window at bedrooms and living/dining rooms, and/or at outdoor living areas. These recommendations are summarized in **Table 4** below.

**Table 4: Ventilation, Building Component, and Warning Clauses Recommendations for Road/Rail Sources**

| Assessment Location | Transportation Sound Level (Outdoors) | | Recommendations |
|---|---|---|---|
| | Daytime $L_{eq,16\text{-}hr}$ 07:00h – 23:00h | Nighttime $L_{eq,8\text{-}hr}$ 23:00h – 07:00h | |
| Plane of Window (Road) | > 65 dBA | > 60 dBA | Installation of air conditioning to allow windows to remained closed.<br>The sound insulation performance of building components must be specified and designed to meet the indoor sound level criteria.<br>Warning clause "Type D" is recommended. |
| | > 55 dBA | > 50 dBA | Applicable for low and medium density development: Forced-air ventilation system to allow for the future installation of air-conditioning. Warning clause "Type C" is recommended.<br>Applicable for high density development: Air conditioning to allow windows to remained closed. Warning clause "Type D" is recommended. |
| Plane of Window (Rail [1,2]) | > 60 dBA | > 55 dBA | The acoustical performance of building façade components should be specified such that the indoor sound level limits are predicted to be achieved.<br>Warning clause "Type D" is recommended. |
| | > 60 dBA ($L_{eq,\ 24hr}$) and < 100m from tracks | | Exterior walls consisting of a brick veneer or masonry equivalent for the first row of dwellings.<br>Warning clause "Type D" is recommended. |
| Outdoor Living Area (Combined Road and Rail [3]) | ≤ 60 dBA<br>> 55 dBA | - | If sound levels are predicted to exceed 55 dBA, but are less than 60 dBA, noise controls may be applied to reduce the sound level to 55 dBA.<br>If noise control measures are not provided, a warning clause "Type A" is recommended. |
| | > 60 dBA | - | Noise controls (barriers) should be implemented to meet the 55 dBA criterion.<br>If mitigation is not feasible to meet the 55 dBA criterion for technical, economic or administrative reasons, an exceedance of 5 dB may be acceptable (to a maximum sound level of 60 dBA). In this case a warning clause "Type B" would be recommended. |

Note(s):

1. Whistle noise is included (if applicable) in the determination of the sound level at the plane of window.
2. Some railway companies (e.g. CN, CP) may require that the exterior walls include a brick veneer or masonry equivalent for the façade facing the railway line, regardless of the sound level.
3. Whistle noise is not included in the determination of the sound level at the OLA.

### Rail Layover Sites

NPC-300 provides a sound level limit for rail layover sites to be the higher of the background sound level or 55 dBA $L_{eq,1\text{-}hr,}$ for any one-hour period.

### Rail Vibration Criteria

An assessment of rail vibration is generally recommended for developments within 75m of a rail corridor or rail yard, and adjacent to or within a setback of 15m of a transit (subway or light-rail) rail line.

#### GO, Freight, VIA Train

The generally accepted vibration criterion for sensitive land-uses is the threshold of perception for human exposure to vibration, being a vibration velocity level of 0.14 mm/s RMS in any one-third octave band centre frequency in the range of 4 Hz to 200 Hz.

This vibration criterion is based on a one-second exponential time-averaged maximum hold root-mean-square (RMS) vibration velocity level and is consistent with the Railway Associations of Canada (RAC, 2013) guideline, and the U.S. Federal Transit Authority (FTA, 2018) criterion for residential land-uses.

#### TTC Streetcar/Subway

If the predicted rms vertical vibration velocity from the Line exceeds 0.1 mm/sec, mitigation methods shall be applied during the detailed design to meet this criterion to the extent technologically, economically, and administratively feasible.

This vibration criterion is based on a one-second exponential time-averaged maximum hold root-mean-square (RMS) vibration velocity level and is consistent with the Toronto Transit Commission (TTC) guidelines for the assessment of potential vibration impact of future expansion (MOEE/TTC, 1993).

## Aircraft

Land-use compatibility in the vicinity of airports is addressed in Ministry of the Environment, Conservation, and Parks (MECP) Guideline NPC-300 (MOE, 2013). The guideline provides recommendations for ventilation, and noise control for different Noise Exposure Forecast (NEF) values, which would be based on NEF contour maps available from the airport authority. The NEF values can be expressed as $L_{A,eq,24hr}$ sound levels by using the expression NEF = $L_{Aeq,24hr}$ -32 dBA.

**Table 5: Indoor Sound Level Criteria for Aircraft Sources**

| Assessment Location | Indoor Sound Level Criteria NEF ($L_{eq,\ 24hr}$) [1] |
|---|---|
| Living/dining/den areas of residences, hospitals, schools, nursing/retirement homes, daycare centres, etc. | NEF- 5 (37 dBA) |
| Sleeping quarters | NEF-0 (32 dBA) |

NPC-300 also provides guidelines for acceptable indoor sound levels that are extended to land uses and developments which are not normally considered noise sensitive. The guideline sound level criteria presented in **Table 6** are provided to inform good-practice design objectives.

**Table 6: Supplementary Indoor Sound Level Criteria for Aircraft Sources**

| Assessment Location | Indoor Sound Level Criteria[1] |
|---|---|
| General offices, reception areas, retail stores, etc. | NEF-15 (47 dBA) |
| Individual or semi-private offices, conference rooms, etc. | NEF-10 (42 dBA) |
| Sleeping quarters of hotels/motels, theatres, libraries, places of worship, etc. | NEF-5 (37 dBA) |

**Table 7: NPC-300 Sound Level Criteria for Aircraft (Outdoors)**

| Assessment Location | Outdoor Sound Level Criteria[1] |
|---|---|
| Outdoor areas, including OLA | NEF-30 (62 dBA) |

**Table 8: Ventilation, Building Component, and Warning Clauses Recommendations for Aircraft Sources**

| Assessment Location | Aircraft Sound Level | NPC-300 Requirements |
|---|---|---|
| | NEF ($L_{EQ,24\text{-}hr}$) | |
| Outdoors | ≥NEF 30 | Air conditioning to allow windows to remained closed.<br>The sound insulation performance of building components must be specified and designed to meet the indoor sound level criteria.<br>Warning clauses “Type D” and “Type B” are recommended. |
| | < NEF 30<br>≥ NEF 25 | The sound insulation performance of building components must be specified and designed to meet the indoor sound level criteria.<br>Applicable for low and medium density development: Forced-air ventilation system to allow for the future installation of air-conditioning. Warning clause “Type C” is recommended.<br>Applicable for high density development: Air conditioning to allow windows to remained closed. Warning clause “Type D” is recommended. |
| | < NEF 25 | Further assessment not required |

# Stationary Sources

## NPC-300 Sound Level Criteria – Stationary Sources

Guidance from the MECP NPC-300 Environmental Noise Guideline is used to assess environmental noise generated by stationary sources, for example industrial and commercial facilities.

Noise from stationary sources is treated differently from transportation sources and requires sound levels be assessed for the predictable worst-case one-hour average sound level ($L_{eq}$) for each period of the day. For assessing sound originating from stationary sources, NPC-300 defines sound level criteria for two types of Points of Reception (PORs): outdoor and plane of window.

### Continuous Sources – Regular Operations

The assessment criteria for all PORs is the higher of either the exclusion limit per NPC-300 or the minimum background sound level that occurs or is likely to occur at a POR. The applicable exclusion limit is determined based on the level of urbanization or "Class" of the area. The NPC-300 exclusion limits for continuously operating stationary sources are summarized in **Table 9**.

**Table 9: NPC-300 Exclusion Limits – Continuous and Quasi-Steady Impulsive Stationary Sources (LAeq-1hr)**

| Time Period | Class 1 Area | | Class 2 Area | | Class 3 Area | | Class 4 Area | |
|---|---|---|---|---|---|---|---|---|
| | Outdoor | Plane of Window | Outdoor | Plane of Window | Outdoor | Plane of Window | Outdoor | Plane of Window |
| **Daytime 0700-1900h** | 50 dBA | 50 dBA | 50 dBA | 50 dBA | 45 dBA | 45 dBA | 55 dBA | 60 dBA |
| **Evening 1900-2300h** | 50 dBA | 50 dBA | 45 dBA | 50 dBA | 40 dBA | 40 dBA | 55 dBA | 60 dBA |
| **Nighttime 2300-0700h** | -- | 45 dBA | -- | 45 dBA | -- | 40 dBA | -- | 55 dBA |

Note(s):

1. The applicable sound level criterion is the background sound level or the exclusion limit, whichever is higher.
2. Class 1, 2 and 3 sound level criteria apply to a window that is assumed to be open.
3. Class 4 area criteria apply to a window that is assumed closed. Class 4 area requires formal designation by the land-use planning authority.

### Continuous Sources - Emergency Equipment Testing

Sound level criteria for emergency backup equipment (e.g. generators) operating in non-emergency situations such as testing or maintenance are 5 dB greater than the applicable sound level criteria for stationary sources.

In addition, the operation of emergency equipment under maintenance and testing conditions is assessed separately from all other stationary noise sources.

## Impulsive Sources

For impulsive sound, other than quasi-steady impulsive sound, from a stationary source, the sound level criteria at a POR is expressed in terms of the Logarithmic Mean Impulse Sound Level ($L_{LM}$). As with the continuous noise sources, the assessment criteria for all PORs is the higher of either the exclusion limit per NPC-300 or the minimum background sound level that occurs or is likely to occur at a POR.

A summary of the exclusionary sound level limits is summarized in **Table 10.**

**Table 10: NPC-300 Exclusion Limits – Impulsive Stationary Sources ($L_{LM}$)**

| Time Period | Number of Impulses in Period of 1-Hour | Class 1 and 2 Areas | | Class 3 Areas | | Class 4 Areas | |
|---|---|---|---|---|---|---|---|
| | | Outdoor | Plane of Window | Outdoor | Plane of Window | Outdoor | Plane of Window |
| **Daytime (0700-2300h)** | 9 or more | 50 dBAI | 50 dBAI | 45 dBAI | 45 dBAI | 55 dBAI | 60 dBAI |
| **Nighttime (2300–0700h)** | | - | 45 dBAI | - | 40 dBAI | - | 55 dBAI |
| **Daytime (0700-2300h)** | 7 to 8 | 55 dBAI | 55 dBAI | 50 dBAI | 50 dBAI | 60dBAI | 65 dBAI |
| **Nighttime (2300–0700h)** | | - | 50 dBAI | - | 45 dBAI | - | 60 dBAI |
| **Daytime (0700-2300h)** | 5 to 6 | 60 dBAI | 60 dBAI | 55 dBAI | 55 dBAI | 65 dBAI | 70 dBAI |
| **Nighttime (2300–0700h)** | | - | 55 dBAI | - | 50 dBAI | - | 65 dBAI |
| **Daytime (0700-2300h)** | 4 | 65 dBAI | 65 dBAI | 60 dBAI | 60 dBAI | 70 dBAI | 75 dBAI |
| **Nighttime (2300–0700h)** | | - | 60 dBAI | - | 55 dBAI | - | 70 dBAI |
| **Daytime (0700-2300h)** | 3 | 70 dBAI | 70 dBAI | 65 dBAI | 65 dBAI | 75 dBAI | 80 dBAI |
| **Nighttime (2300–0700h)** | | - | 65 dBAI | - | 60 dBAI | - | 75 dBAI |
| **Daytime (0700-2300h)** | 2 | 75 dBAI | 75 dBAI | 70 dBAI | 70 dBAI | 80 dBAI | 85 dBAI |
| **Nighttime (2300–0700h)** | | - | 70 dBAI | - | 65 dBAI | - | 80 dBAI |
| **Daytime (0700-2300h)** | 1 | 80 dBAI | 80 dBAI | 75 dBAI | 75 dBAI | 85 dBAI | 90 dBAI |
| **Nighttime (2300–0700h)** | | - | 75 dBAI | - | 70 dBAI | - | 85 dBAI |

Note(s):

4. The applicable sound level criterion is the background sound level or the exclusion limit, whichever is higher.

## D-Series Guidelines

The MECP D-series guidelines (MOE, 1995) provide direction for land use planning to maximize compatibility of industrial uses with adjacent land uses. The goal of Guideline D-6 is to minimize encroachment of sensitive land uses on industrial facilities and vice versa, in order to address potential incompatibility due to adverse effects such as noise, odour and dust.

For each class of industry, the guideline provides an estimate of potential influence area and states that this influence area shall be used in the absence of the recommended technical studies. Guideline D-6 also recommends a minimum separation distance between each class of industry and sensitive land uses (see **Table 11**). Section 4.10 of D-6 identifies exceptional circumstances with respect to redevelopment, infill and mixed-use areas. In these cases, the guideline suggests that separation distances at, or less than, the recommended minimum separation distance may be acceptable if a justifying impact assessment is provided.

**Table 11: Summary of Guideline D-6**

| Industry Class | Definition | Potential Influence Area [1] | Recommended Minimum Separation Distance [1] |
|---|---|---|---|
| **Class I** | Small scale, self-contained, daytime only, infrequent heavy vehicle movements, no outside storage. | 70 m | 20 m |
| **Class II** | Medium scale, outdoor storage of wastes or materials, shift operations and frequent heavy equipment movement during the daytime. | 300 m | 70 m |
| **Class III** | Large scale, outdoor storage of raw and finished products, large production volume, continuous movement of products and employees during daily shift operations. | 1000 m | 300 m |

Note(s):

1. Measured from Property Line to Property Line.

Guideline D-6 provides criteria for classifying industrial land uses, based on their outputs, scale of operations, processes, schedule and intensity of operations. **Table 12** provides the classification criteria and examples.

**Table 12: Guideline D-6 Industrial Categorization Criteria**

| Criteria | Class I | Class II | Class III |
|---|---|---|---|
| **Outputs** | • Sound not audible off property<br>• Infrequent dust and/ or odour emissions and not intense<br>• No ground-borne vibration | • Sound occasionally audible off property<br>• Frequent dust and/ or odour emissions and occasionally intense<br>• Possible ground-borne vibration | • Sound frequently audible off property<br>• Persistent and intense dust and/ or odour emissions<br>• Frequent ground-borne vibration |
| **Scale** | • No outside storage<br>• Small scale plant or scale is irrelevant in relation to all other criteria | • Outside storage permitted<br>• Medium level of production | • Outside storage of raw and finished products<br>• Large production levels |
| **Process** | • Self-contained plant or building which produces / stores a packaged product<br>• Low probability of fugitive emissions | • Open process<br>• Periodic outputs of minor annoyance<br>• Low probability of fugitive emissions | • Open process<br>• Frequent outputs of major annoyances<br>• High probability of fugitive emissions |
| **Operation / Intensity** | • Daytime operations only<br>• Infrequent movement of products and/or heavy trucks | • Shift operations permitted<br>• Frequent movements of products and/or heavy trucks with majority of movements during daytime hours | • Continuous movement of products and employees<br>• Daily shift operations permitted |
| **Examples** | • Electronics Manufacturing<br>• Furniture refinishing<br>• Beverage bottling<br>• Auto parts<br>• Packaging services<br>• Dairy distribution<br>• Laundry and linen supply | • Magazine printing<br>• Paint spray booths<br>• Metal command<br>• Electrical production<br>• Dairy product manufacturing<br>• Feed packing plant | • Paint and varnish manufacturing<br>• Organic chemicals manufacturing<br>• Breweries<br>• Solvent recovery plant<br>• Soap manufacturing<br>• Metal manufacturing |

# APPENDIX C

# *Brant St @ Fairview St*

## Morning Peak Diagram

**Specified Period**
**From:** 7:00:00
**To:** 9:00:00

**One Hour Peak**
**From:** 8:00:00
**To:** 9:00:00

**Municipality:** Halton Region
**Site #:** 1020550100
**Intersection:** Fairview St & Brant St
**TFR File #:** 4
**Count date:** 2-May-2018

**Weather conditions:**
Clear/Dry

**Person(s) who counted:**
Cam

**** Signalized Intersection ****

**Major Road:** Fairview St runs W/E

| | | | | |
|---|---|---|---|---|
| North Leg Total: | 1965 | | | |
| North Entering: | 975 | | | |
| North Peds: | 6 | | | |
| Peds Cross: | ⋈ | | | |
| Heavys | 20 | 11 | 3 | 34 |
| Trucks | 7 | 9 | 0 | 16 |
| Cars | 110 | 610 | 205 | 925 |
| Totals | 137 | 630 | 208 | |
| Heavys | 39 | | | |
| Trucks | 11 | | | |
| Cars | 940 | | | |
| Totals | 990 | | | |
| East Leg Total: | 1954 | | | |
| East Entering: | 551 | | | |
| East Peds: | 21 | | | |
| Peds Cross: | ⧖ | | | |

Brant St

| Heavys | Trucks | Cars | Totals |
|---|---|---|---|
| 32 | 12 | 558 | 602 |

| | Cars | Trucks | Heavys | Totals |
|---|---|---|---|---|
| | 129 | 4 | 5 | 138 |
| | 290 | 4 | 11 | 305 |
| | 103 | 4 | 1 | 108 |
| | 522 | 12 | 17 | |

Fairview St

N
W E
S

| Heavys | Trucks | Cars | Totals |
|---|---|---|---|
| 17 | 5 | 284 | 306 |
| 6 | 15 | 941 | 962 |
| 3 | 4 | 216 | 223 |
| 26 | 24 | 1441 | |

Fairview St

| Cars | Trucks | Heavys | Totals |
|---|---|---|---|
| 1376 | 18 | 9 | 1403 |

Brant St

| | | | | |
|---|---|---|---|---|
| Peds Cross: | ⧖ | | | |
| West Peds: | 22 | | | |
| West Entering: | 1491 | | | |
| West Leg Total: | 2093 | | | |
| Cars | 929 | | | |
| Trucks | 17 | | | |
| Heavys | 15 | | | |
| Totals | 961 | | | |
| Cars | 158 | 527 | 230 | 915 |
| Trucks | 1 | 2 | 3 | 6 |
| Heavys | 1 | 17 | 0 | 18 |
| Totals | 160 | 546 | 233 | |
| Peds Cross: | ⋈ | | | |
| South Peds: | 1 | | | |
| South Entering: | 939 | | | |
| South Leg Total: | 1900 | | | |

### Comments

# *Brant St @ Fairview St*

## Mid-day Peak Diagram

**Specified Period**
**From:** 11:00:00
**To:** 14:00:00

**One Hour Peak**
**From:** 12:15:00
**To:** 13:15:00

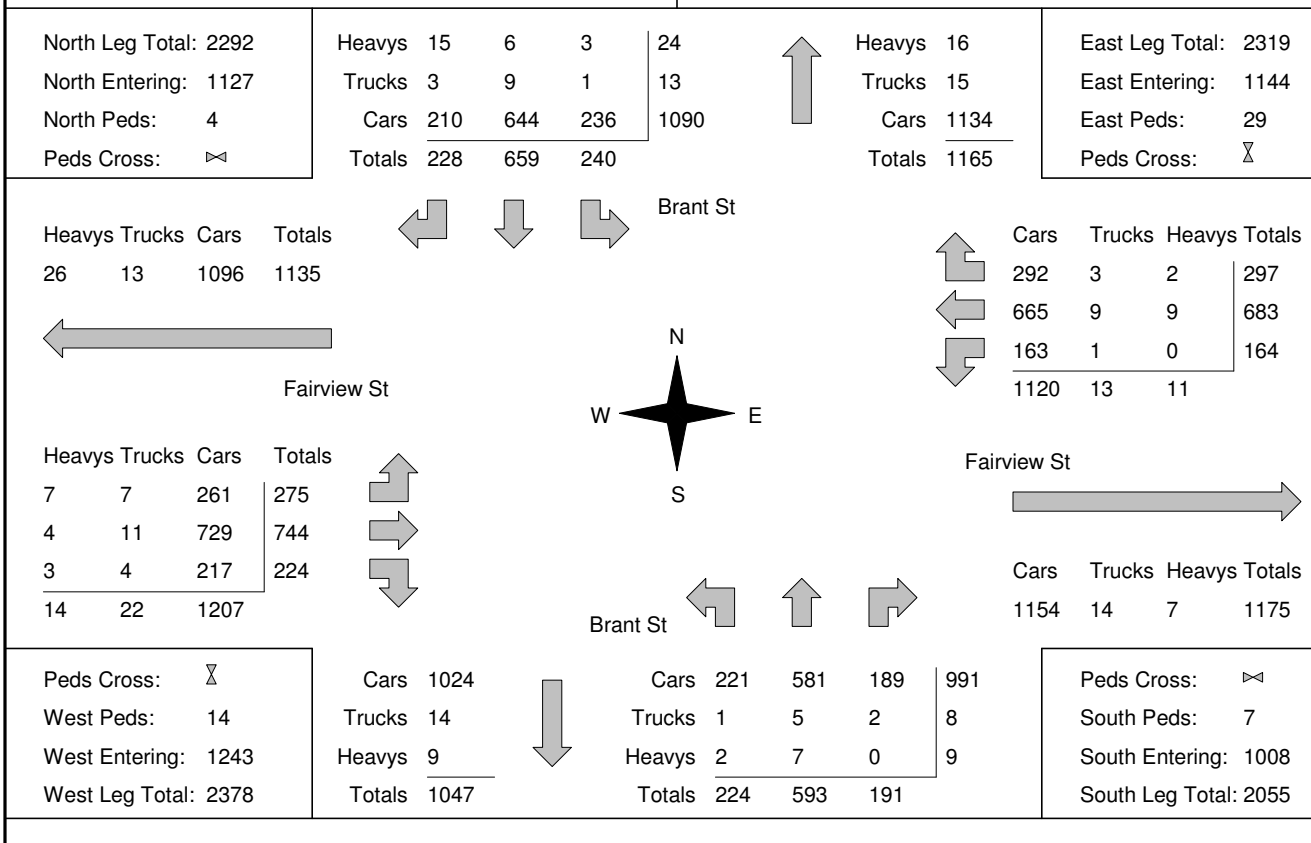
**Municipality:** Halton Region
**Site #:** 1020550100
**Intersection:** Fairview St & Brant St
**TFR File #:** 4
**Count date:** 2-May-2018

**Weather conditions:**
Clear/Dry

**Person(s) who counted:**
Cam

**** Signalized Intersection ****

**Major Road:** Fairview St runs W/E




### Comments

# *Brant St @ Fairview St*

## Afternoon Peak Diagram

**Specified Period**
**From:** 15:00:00
**To:** 18:00:00

**One Hour Peak**
**From:** 16:30:00
**To:** 17:30:00

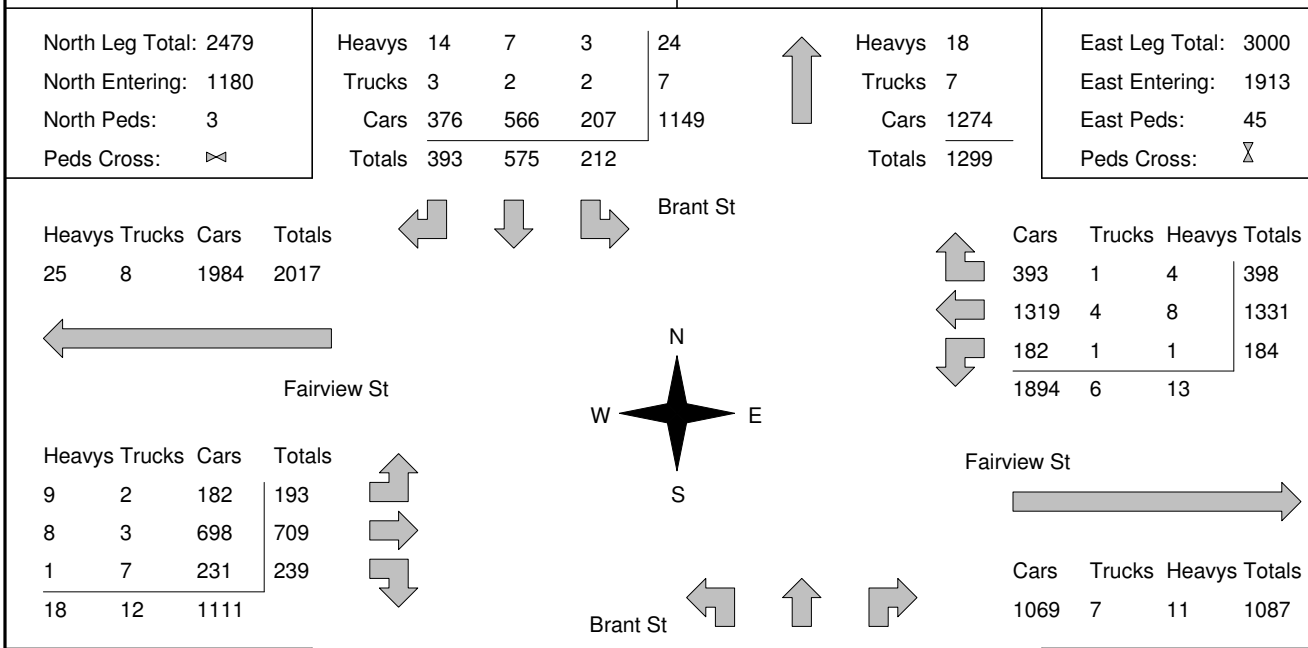
**Municipality:** Halton Region
**Site #:** 1020550100
**Intersection:** Fairview St & Brant St
**TFR File #:** 4
**Count date:** 2-May-2018

**Weather conditions:**
Clear/Dry

**Person(s) who counted:**
Cam

**** Signalized Intersection ****

**Major Road:** Fairview St runs W/E




## Comments

# *Brant St @ Fairview St*

## Total Count Diagram

**Municipality:** Halton Region
**Site #:** 1020550100
**Intersection:** Fairview St & Brant St
**TFR File #:** 4
**Count date:** 2-May-2018

**Weather conditions:**
Clear/Dry

**Person(s) who counted:**
Cam

**** Signalized Intersection ****

**Major Road:** Fairview St runs W/E

| | | | | |
|---|---|---|---|---|
| North Leg Total: | 17273 | | | |
| North Entering: | 8005 | | | |
| North Peds: | 38 | | | |
| Peds Cross: | ⋈ | | | |
| Heavys | 105 | 65 | 24 | 194 |
| Trucks | 42 | 49 | 14 | 105 |
| Cars | 1777 | 4336 | 1593 | 7706 |
| Totals | 1924 | 4450 | 1631 | |
| Heavys | 184 | | | |
| Trucks | 92 | | | |
| Cars | 8992 | | | |
| Totals | 9268 | | | |
| East Leg Total: | 18335 | | | |
| East Entering: | 9409 | | | |
| East Peds: | 245 | | | |
| Peds Cross: | ⧖ | | | |

Brant St

| Heavys | Trucks | Cars | Totals |
|---|---|---|---|
| 194 | 101 | 9311 | 9606 |

| Cars | Trucks | Heavys | Totals |
|---|---|---|---|
| 2154 | 22 | 27 | 2203 |
| 5849 | 48 | 72 | 5969 |
| 1215 | 16 | 6 | 1237 |
| 9218 | 86 | 105 | |

Fairview St

N
W E
S

| Heavys | Trucks | Cars | Totals |
|---|---|---|---|
| 88 | 31 | 1998 | 2117 |
| 60 | 52 | 5627 | 5739 |
| 17 | 31 | 1593 | 1641 |
| 165 | 114 | 9218 | |

Fairview St

| Cars | Trucks | Heavys | Totals |
|---|---|---|---|
| 8754 | 83 | 89 | 8926 |

Brant St

| | | | | |
|---|---|---|---|---|
| Peds Cross: | ⧖ | | | |
| West Peds: | 143 | | | |
| West Entering: | 9497 | | | |
| West Leg Total: | 19103 | | | |
| Cars | 7144 | | | |
| Trucks | 96 | | | |
| Heavys | 88 | | | |
| Totals | 7328 | | | |
| Cars | 1685 | 4840 | 1534 | 8059 |
| Trucks | 11 | 39 | 17 | 67 |
| Heavys | 17 | 69 | 5 | 91 |
| Totals | 1713 | 4948 | 1556 | |
| Peds Cross: | ⋈ | | | |
| South Peds: | 49 | | | |
| South Entering: | 8217 | | | |
| South Leg Total: | 15545 | | | |

### Comments

# *200275-Brant St & Prospect St*

## Morning Peak Diagram

**Specified Period**
**From:** 7:00:00
**To:** 9:00:00

**One Hour Peak**
**From:** 8:00:00
**To:** 9:00:00

**Municipality:** Burlington
**Site #:** 0000200275
**Intersection:** Brant St & Prospect St
**TFR File #:** 1
**Count date:** 14-May-2019

**Weather conditions:**
Sunny

**Person(s) who counted:**
Nick

**** Signalized Intersection ****

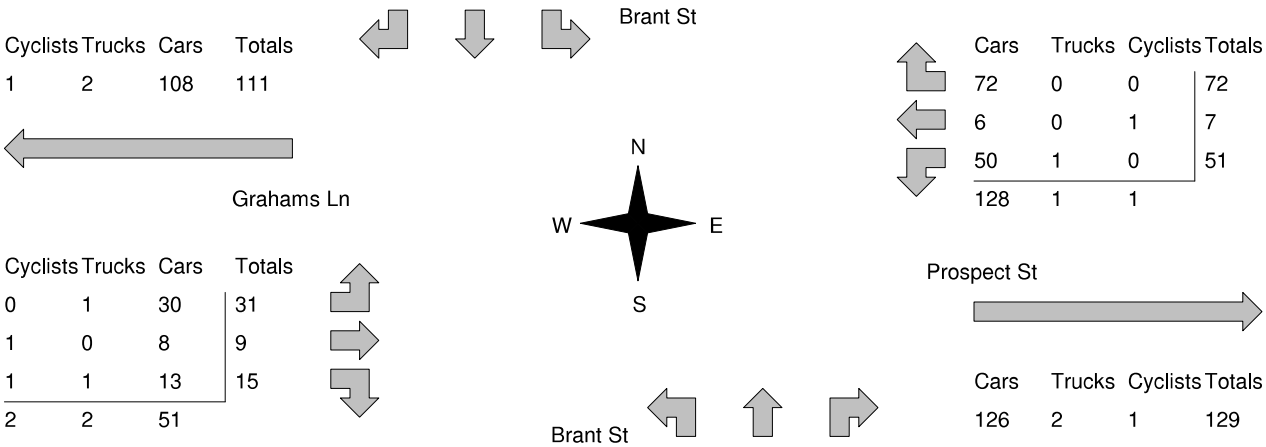
**Major Road:** Brant St runs N/S

North Leg Total: 1809
North Entering: 980
North Peds: 4
Peds Cross: ⋈

| | | | | |
|---|---|---|---|---|
| Cyclists | 0 | 4 | 0 | 4 |
| Trucks | 2 | 24 | 1 | 27 |
| Cars | 78 | 790 | 81 | 949 |
| Totals | 80 | 818 | 82 | |

| | |
|---|---|
| Cyclists | 2 |
| Trucks | 19 |
| Cars | 808 |
| Totals | 829 |

East Leg Total: 259
East Entering: 130
East Peds: 30
Peds Cross: ⧖




| Cyclists | Trucks | Cars | Totals |
|---|---|---|---|
| 1 | 2 | 108 | 111 |

| Cars | Trucks | Cyclists | Totals |
|---|---|---|---|
| 72 | 0 | 0 | 72 |
| 6 | 0 | 1 | 7 |
| 50 | 1 | 0 | 51 |
| 128 | 1 | 1 | |

| Cyclists | Trucks | Cars | Totals |
|---|---|---|---|
| 0 | 1 | 30 | 31 |
| 1 | 0 | 8 | 9 |
| 1 | 1 | 13 | 15 |
| 2 | 2 | 51 | |

| Cars | Trucks | Cyclists | Totals |
|---|---|---|---|
| 126 | 2 | 1 | 129 |

Peds Cross: ⧖
West Peds: 19
West Entering: 55
West Leg Total: 166

| | |
|---|---|
| Cars | 853 |
| Trucks | 26 |
| Cyclists | 5 |
| Totals | 884 |

| | | | | |
|---|---|---|---|---|
| Cars | 24 | 706 | 37 | 767 |
| Trucks | 0 | 18 | 1 | 19 |
| Cyclists | 0 | 2 | 0 | 2 |
| Totals | 24 | 726 | 38 | |

Peds Cross: ⋈
South Peds: 7
South Entering: 788
South Leg Total: 1672

## Comments

# *200275-Brant St & Prospect St*

## Mid-day Peak Diagram

**Specified Period**
**From:** 11:00:00
**To:** 14:00:00

**One Hour Peak**
**From:** 13:00:00
**To:** 14:00:00

**Municipality:** Burlington
**Site #:** 0000200275
**Intersection:** Brant St & Prospect St
**TFR File #:** 1
**Count date:** 14-May-2019

**Weather conditions:**
Sunny

**Person(s) who counted:**
Nick

**** Signalized Intersection ****

**Major Road:** Brant St runs N/S

North Leg Total: 2134
North Entering: 989
North Peds: 7
Peds Cross: ⋈

| | | | | |
|---|---|---|---|---|
| Cyclists | 1 | 4 | 0 | 5 |
| Trucks | 2 | 18 | 3 | 23 |
| Cars | 66 | 829 | 66 | 961 |
| Totals | 69 | 851 | 69 | |

| | |
|---|---|
| Cyclists | 3 |
| Trucks | 39 |
| Cars | 1103 |
| Totals | 1145 |

East Leg Total: 302
East Entering: 186
East Peds: 26
Peds Cross: ⧖

Brant St

| Cyclists | Trucks | Cars | Totals |
|---|---|---|---|
| 1 | 5 | 101 | 107 |

| Cars | Trucks | Cyclists | Totals |
|---|---|---|---|
| 106 | 2 | 0 | 108 |
| 16 | 0 | 0 | 16 |
| 62 | 0 | 0 | 62 |
| 184 | 2 | 0 | |

Grahams Ln

N
W E
S

| Cyclists | Trucks | Cars | Totals |
|---|---|---|---|
| 0 | 3 | 95 | 98 |
| 1 | 0 | 12 | 13 |
| 0 | 2 | 23 | 25 |
| 1 | 5 | 130 | |

Prospect St

| Cars | Trucks | Cyclists | Totals |
|---|---|---|---|
| 112 | 3 | 1 | 116 |

Brant St

Peds Cross: ⧖
West Peds: 22
West Entering: 136
West Leg Total: 243

| | | | | |
|---|---|---|---|---|
| Cars | 914 | | | |
| Trucks | 20 | | | |
| Cyclists | 4 | | | |
| Totals | 938 | | | |

| | | | | |
|---|---|---|---|---|
| Cars | 19 | 902 | 34 | 955 |
| Trucks | 3 | 34 | 0 | 37 |
| Cyclists | 0 | 3 | 0 | 3 |
| Totals | 22 | 939 | 34 | |

Peds Cross: ⋈
South Peds: 6
South Entering: 995
South Leg Total: 1933

## Comments

# *200275-Brant St & Prospect St*

## Afternoon Peak Diagram

**Specified Period**
**From:** 15:00:00
**To:** 18:00:00

**One Hour Peak**
**From:** 16:15:00
**To:** 17:15:00

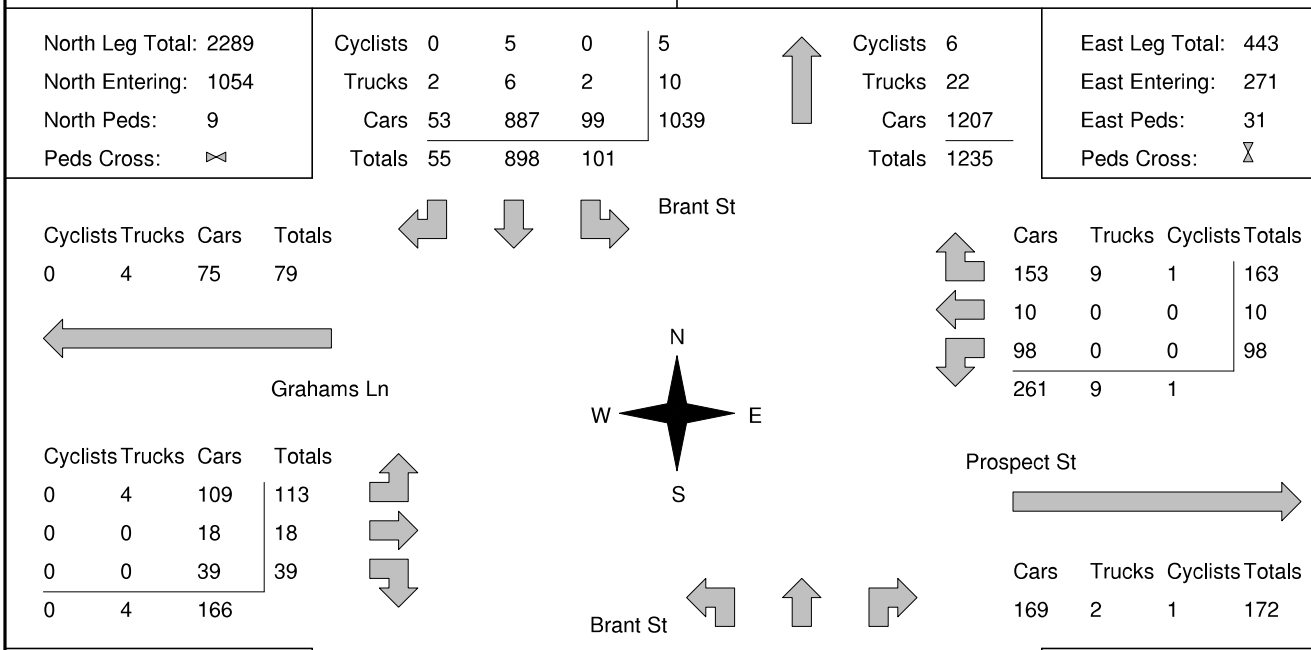
**Municipality:** Burlington
**Site #:** 0000200275
**Intersection:** Brant St & Prospect St
**TFR File #:** 1
**Count date:** 14-May-2019

**Weather conditions:**
Sunny

**Person(s) who counted:**
Nick

**** Signalized Intersection ****

**Major Road:** Brant St runs N/S




**Comments**

# *200275-Brant St & Prospect St*

## Total Count Diagram

**Municipality:** Burlington
**Site #:** 0000200275
**Intersection:** Brant St & Prospect St
**TFR File #:** 1
**Count date:** 14-May-2019

**Weather conditions:**
Sunny

**Person(s) who counted:**
Nick

**** Signalized Intersection ****

**Major Road:** Brant St runs N/S

North Leg Total: 15496
North Entering: 7293
North Peds: 69
Peds Cross: ⋈

| | | | | |
|---|---|---|---|---|
| Cyclists | 4 | 25 | 0 | 29 |
| Trucks | 30 | 136 | 11 | 177 |
| Cars | 495 | 6034 | 558 | 7087 |
| Totals | 529 | 6195 | 569 | |

| | |
|---|---|
| Cyclists | 25 |
| Trucks | 226 |
| Cars | 7952 |
| Totals | 8203 |

East Leg Total: 2394
East Entering: 1412
East Peds: 211
Peds Cross: ⧖

Brant St

| Cyclists | Trucks | Cars | Totals |
|---|---|---|---|
| 13 | 41 | 732 | 786 |

| Cars | Trucks | Cyclists | Totals |
|---|---|---|---|
| 780 | 24 | 1 | 805 |
| 90 | 2 | 9 | 101 |
| 498 | 5 | 3 | 506 |
| 1368 | 31 | 13 | |

Grahams Ln

N
W E
S

| Cyclists | Trucks | Cars | Totals |
|---|---|---|---|
| 1 | 37 | 633 | 671 |
| 5 | 0 | 100 | 105 |
| 3 | 13 | 153 | 169 |
| 9 | 50 | 886 | |

Prospect St

| Cars | Trucks | Cyclists | Totals |
|---|---|---|---|
| 961 | 15 | 6 | 982 |

Brant St

Peds Cross: ⧖
West Peds: 146
West Entering: 945
West Leg Total: 1731

| | |
|---|---|
| Cars | 6685 |
| Trucks | 154 |
| Cyclists | 31 |
| Totals | 6870 |

| | | | | |
|---|---|---|---|---|
| Cars | 147 | 6539 | 303 | 6989 |
| Trucks | 9 | 165 | 4 | 178 |
| Cyclists | 0 | 23 | 1 | 24 |
| Totals | 156 | 6727 | 308 | |

Peds Cross: ⋈
South Peds: 81
South Entering: 7191
South Leg Total: 14061

### Comments

## Caelan Weber-Martin

**From:** Rail Data Requests <RailDataRequests@metrolinx.com>
**Sent:** Wednesday, February 14, 2024 11:39 AM
**To:** Amy Patenaude
**Cc:** Caelan Weber-Martin
**Subject:** RE: 1393 Grahams Ln Burlington, ON Rail Data Request (RWDI Project #2303584)

Good afternoon Amy,

Further to your request dated Jan 26, 2024, the subject lands (1393 Grahams Ln, Burlington) are located within 300 metres of the CN and Metrolinx Oakville Subdivision (which carries Lakeshore West GO rail service).

It's anticipated that GO rail service on this Subdivision will be comprised of diesel and electric trains. The GO rail fleet combination on this Subdivision will consist of up to 1 locomotive and 5 passenger cars. The typical GO rail weekday train volume forecast near the subject lands, including both revenue and equipment trips is in the order of 398 trains. *The planned detailed trip breakdown is listed below:

| | 1 Diesel Locomotive | 1 Electric Locomotive | | 1 Diesel Locomotive | 1 Electric Locomotive |
|---|---|---|---|---|---|
| Day (0700-2300) | 132 | 192 | Night (2300-0700) | 20 | 54 |

The current track design speed near the subject lands is 95 mph (153 km/h).

There are no *anti-whistling by-laws* in affect near the subject lands.

With respect to future electrified rail service, Metrolinx is committed to finding the most sustainable solution for electrifying the GO rail network and we are currently working towards the next phase.

Options have been studied as part of the Transit Project Assessment Process (TPAP) for the GO Expansion program, currently in the Development Phase. ONxpress will be responsible for selecting and delivering the right trains and infrastructure to unlock the benefits of GO Expansion. Construction to support GO Expansion is currently underway.

However, we can advise that train noise is dominated by the powertrain at lower speeds and by the wheel- track interaction at higher speeds. Hence, the noise level and spectrum of electric trains is expected to be very similar at higher speeds, if not identical, to those of equivalent diesel trains.

Given the above considerations, it would be prudent at this time, for the purposes of acoustical analyses for development in proximity to Metrolinx corridors, to assume that the acoustical characteristics of electrified and diesel trains are equivalent. In light of the aforementioned information, acoustical models should employ diesel train parameters as the basis for analyses. We anticipate that additional information regarding specific operational parameters for electrified trains will become available in the future once the proponent team is selected.

Operational information is subject to change and may be influenced by, among other factors, service planning priorities, operational considerations, funding availability and passenger demand.

It should be noted that this information only pertains to Metrolinx rail service. It would be prudent to contact other rail operators in the area directly for rail traffic information pertaining to non-Metrolinx rail service.

I trust this information is useful. Should you have any questions or concerns, please do not hesitate to contact me.

*At this time we do not expect the frequency of trains to increase beyond 2032. It is expected that the number of passenger cars may increase during peak periods to increase capacity as required. Exact numbers are unknown at this time.

Best regards,

**Farah Faroque (she/her)**
Project Analyst, Third Party Projects Review
Real Estate & Development
Metrolinx
10 Bay Street | Toronto | Ontario | M5J 2N8
T: 437.900.2291

METROLINX

**From:** Amy Patenaude <Amy.Patenaude@rwdi.com>
**Sent:** January 26, 2024 3:14 PM
**To:** Rail Data Requests <RailDataRequests@metrolinx.com>
**Cc:** Caelan Weber-Martin <Caelan.Weber-Martin@rwdi.com>
**Subject:** 1393 Grahams Ln Burlington, ON Rail Data Request (RWDI Project #2303584)

EXTERNAL SENDER: Do not click any links or open any attachments unless you trust the sender and know the content is safe.
EXPÉDITEUR EXTERNE: Ne cliquez sur aucun lien et n'ouvrez aucune pièce jointe à moins qu'ils ne proviennent d'un expéditeur fiable, ou que vous ayez l'assurance que le contenu provient d'une source sûre.

Good Day,

We are doing a noise study for the above-noted address and require the following rail data:

- Growth rate per annum for a 10-year period
- Day and night train volumes
- Average number of cars per train
- Number of Locomotives per train
- Maximum permissible speed
- Whistles used at crossings in the area
- Type of track (continuously welded, or jointed)

An image of the area is below.

Thanks.

Amy

**Amy Patenaude** (she/her) | Senior Technical Administrative Assistant **RWDI**
**Climate & Performance Engineering**
600 Southgate Drive, Guelph, ON N1G 4P6 Canada
T: +1.519.823.1311 | D: +226-314-1280 | E: amy.patenaude@rwdi.com | rwdi.com

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**Date:** 2017/10/30 Project Number: OAK – 32.30 – Plains Road E, Burlington, ON

Dear [redacted]:

**Re: Train Traffic Data – CN Oakville Subdivision near Plains Road E in Burlington, ON**

The following is provided in response to [redacted] 2017/10/12 request for information regarding rail traffic in the vicinity of Plains Road E in Burlington, ON at approximately Mile 32.30 on CN's Oakville Subdivision.

Typical daily traffic volumes are recorded below. However, traffic volumes may fluctuate due to overall economic conditions, varying traffic demands, weather conditions, track maintenance programs, statutory holidays and traffic detours that when required may be heavy although temporary. For the purpose of noise and vibration reports, train volumes must be escalated by 2.5% per annum for a 10-year period.

Typical daily traffic volumes at this site location are as follows:

***Maximum train speed is given in Miles per Hour**

| | 0700-2300 | | | |
|---|---|---|---|---|
| Type of Train | Volumes | Max.Consist | Max. Speed | Max. Power |
| Freight | 0 | 140 | 80 | 4 |
| Way Freight | 4 | 25 | 80 | 4 |
| Passenger | 14 | 10 | 80 | 2 |

| | 2300-0700 | | | |
|---|---|---|---|---|
| Type of Train | Volumes | Max.Consist | Max. Speed | Max. Power |
| Freight | 0 | 140 | 80 | 4 |
| Way Freight | 2 | 25 | 80 | 4 |
| Passenger | 0 | 10 | 80 | 2 |

The volumes recorded reflect westbound and eastbound freight and passenger operations on CN's Oakville Subdivision.

Except where anti-whistling bylaws are in effect, engine-warning whistles and bells are normally sounded at all at-grade crossings. There are no at-grade crossing in the immediate vicinity of the study area at Mile 32.30 (Plains Road E). Anti-whistling bylaws are in effect at this crossing. Please note that engine warning whistles may be sounded in cases of emergency, as a safety and or warning precaution at station locations and pedestrian crossings and occasionally for operating requirements.

With respect to equipment restrictions, the gross weight of the heaviest permissible car is 286,000 lbs.

The double mainline track is considered to be continuously welded rail throughout the study area. The presence of 8 (Eight) switches located at Mile 32.48, 32.40, 32.38, 3

(three) at 32.25, 32.17 and 32.14 may exacerbate the noise and vibration caused by train movements.

The Canadian National Railway continues to be strongly opposed to locating developments near railway facilities and rights-of-way due to potential safety and environmental conflicts. Development adjacent to the Railway Right-of-Way is not appropriate without sound impact mitigation measures to reduce the incompatibility. For confirmation of the applicable rail noise, vibration and safety standards, Adjacent Development, Canadian National Railway Properties at Proximity@cn.ca should be contacted directly.

I trust the above information will satisfy your current request.

Sincerely,

Michael Vallins P.Eng
Manager of Public Works
public_works_gld@cn.ca

# APPENDIX D

# NOISE MITIGATION GUIDANCE

## Acoustic/Noise Barrier

### Transportation Noise

Generally, noise controls to attenuate transportation sound levels at Outdoor Living Areas (OLAs) would consist of the implementation of acoustic/noise barriers with materials that would meet the guidance included in NPC-300, for example:

- A wall, berm, wall/berm combination or similar structure, used as a noise control measure, and high enough to break the line-of-sight between the source and the receptor.
- The minimum surface density (face weight) is 20 kg/$m^2$
    - Many materials could satisfy the surface density requirement, e.g. wood, glass, concrete, Plexiglas, Acrylite.
    - The required thickness can be determined by dividing the 20 kg/$m^2$ face weight by the material density (kg/$m^3$). Typically, this would imply:
        - 50 mm (2”) thickness of wood
        - 13 mm (0.5") thickness of lighter plastic (like Plexiglas or PVC)
        - 10 mm (0.4") thickness of heavier material (like aluminum, glass, concrete)
- The barrier should be structurally sound, appropriately designed to withstand wind and snow load, and constructed without cracks or surface gaps. Joints between panels may need to be overlapped to ensure surfaces are free of gaps, particularly for wood construction.
- Any gaps under the barrier that are necessary for drainage purposes should be minimized and localized, so that the acoustical performance of the barrier is maintained.
- If a sound absorptive face is to be included in the barrier design, the minimum noise reduction coefficient is recommended to be NRC 0.7.

### Mechanical Equipment

Noise controls to attenuate mechanical equipment sound levels at Outdoor Points of Reception (OPOR) would consistent with the of the implementation of acoustic/noise barriers for Transportation sources, with the exception of the following:

- The minimum surface density (face weight) is **10** kg/$m^2$.

All other barrier quality and characteristics would be consistent with the details provided above.

## Building Ventilation and Air Conditioning

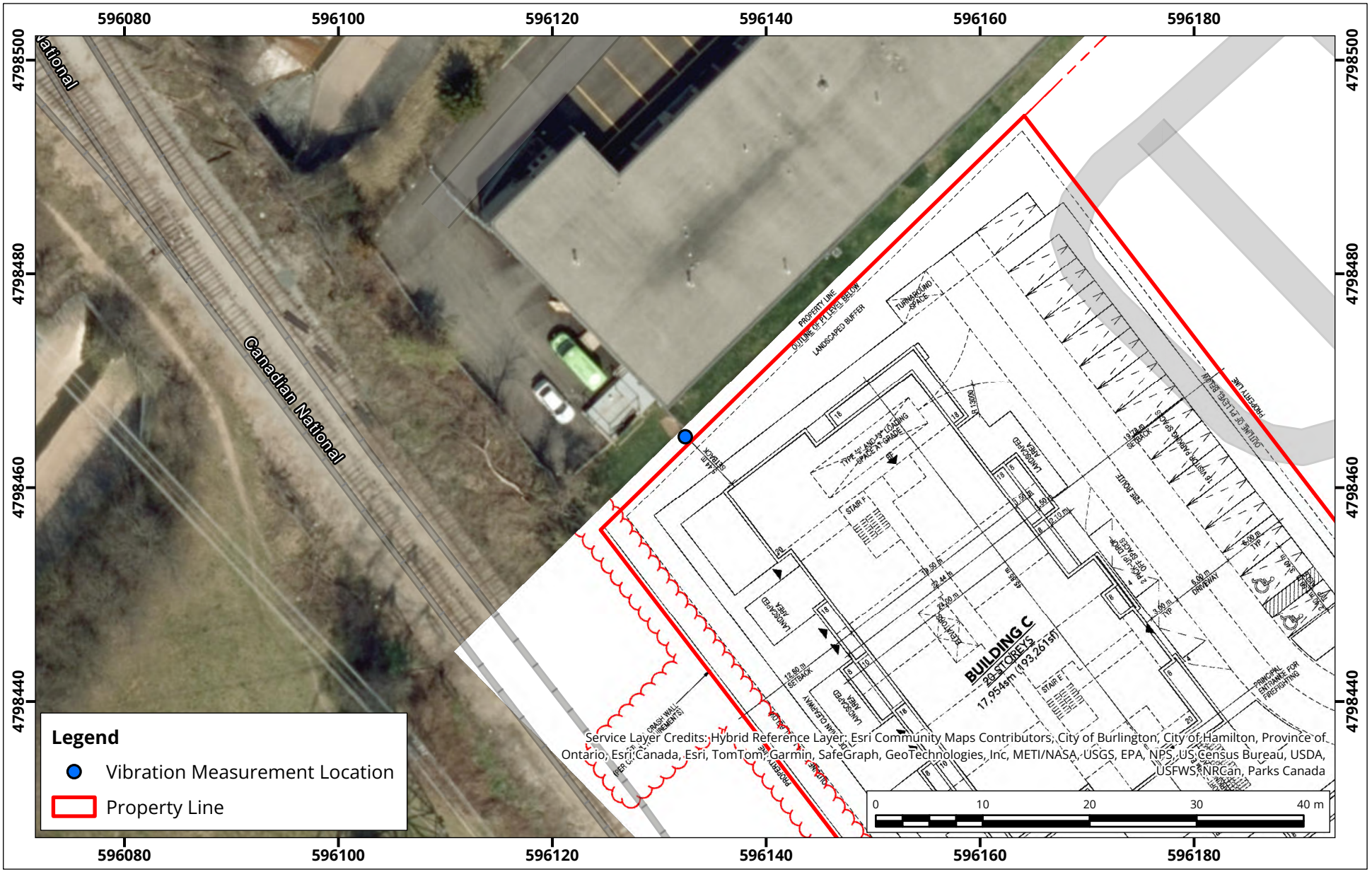
The use of air conditioning itself is not a noise control measure; however, it allows for windows and doors to remain closed, thereby reducing the indoor sound levels.

NPC-300 provides the following guidance with respect to implementation of building ventilation and air conditioning:

a. the noise produced by the proposed ventilation system in the space served does not exceed 40 dBA. In practice, this condition usually implies that window air conditioning units are not acceptable;
b. the ventilation system complies with all national, provincial and municipal standards and codes;
c. the ventilation system is designed by a heating and ventilation professional; and
d. the ventilation system enables the windows and exterior doors to remain closed.

Air conditioning systems also need to comply with Publication NPC-216, and/or any local municipal noise by-law that has provisions relating to air conditioning equipment.

# APPENDIX E




# Vibration Measurement Location

True North

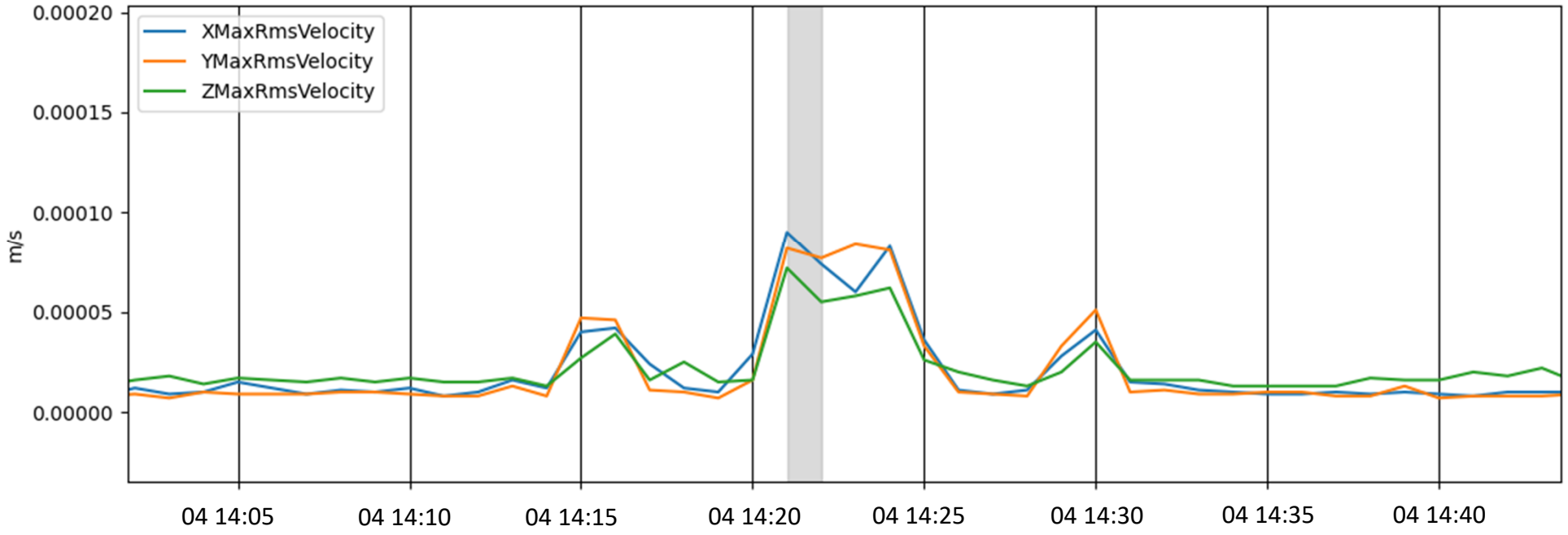
| | |
|---|---|
| Drawn by:CWM | Figure: E.1 |
| Approx. Scale: | 1:500 |
| Date Revised: | Mar 1, 2024 |

Map Projection: NAD 1983 UTM Zone 17N

1393 Grahams Lane - Burlington, Ontario

Project #: 2303584

Map Document: \\rwdgroup\guelph\AM_Jobs\2023\2303584\03WorkItems\06EnvironmentalNoiseAnalysis\ArcGIS\1393 Grahams Lane - Burlington, Ontario.aprx

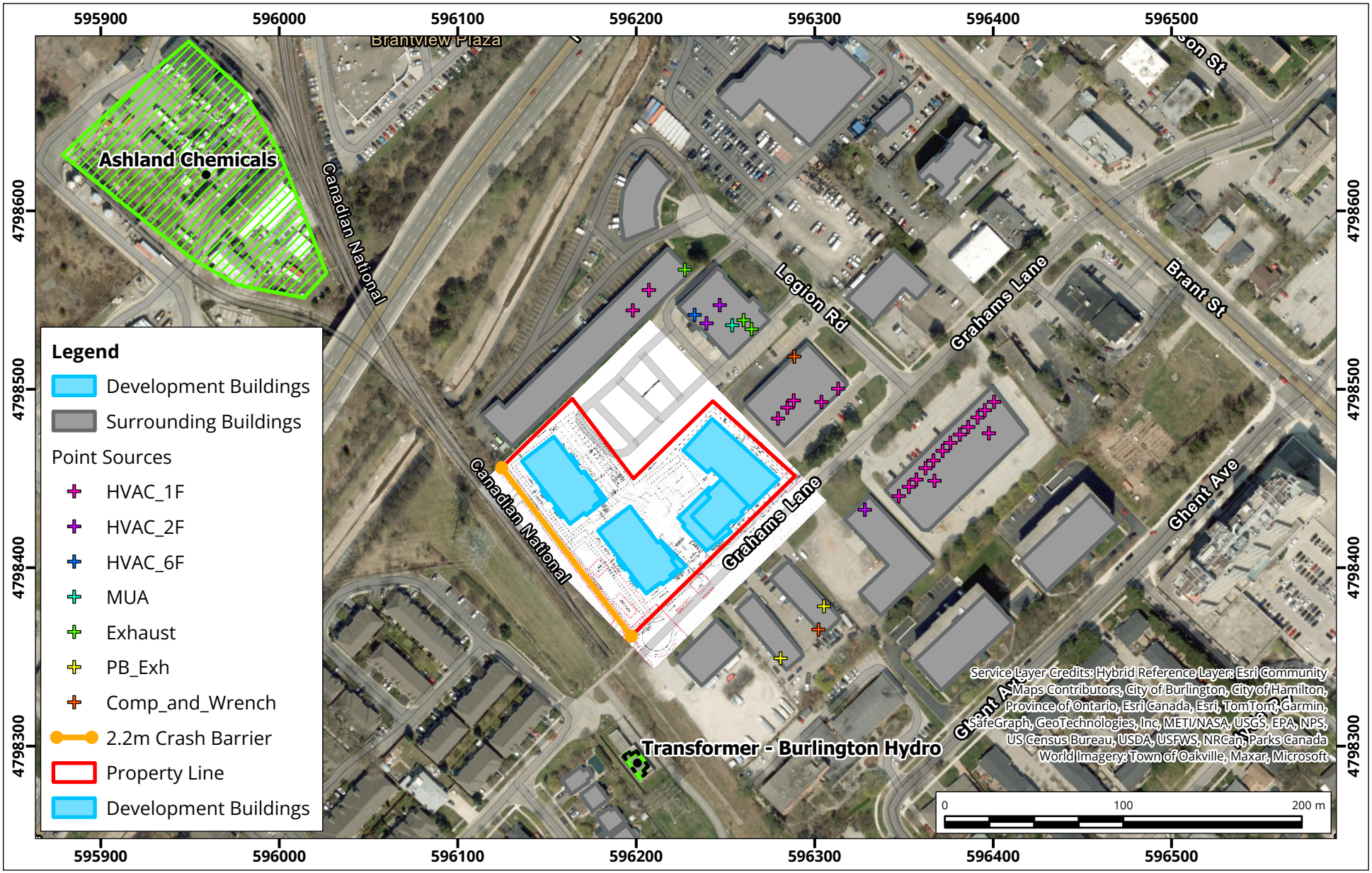



# Vibration Measurement – February 4, 2024

1393 Grahams Lane – Burlington, Ontario

| | | | |
|---|---|---|---|
| Drawn by: CWM | Figure: | E.2 | |
| Project #: | | 2303584 | |
| Date: | | 2024-03-04 | |

# APPENDIX F




# Stationary Sources

## Location of Stationary Sources in Relation to the Proposed Development

Map Projection: NAD 1983 UTM Zone 17N

1393 Grahams Lane - Burlington, Ontario

True North

Project #: 2303584

| | |
|---|---|
| Drawn by:CWM | Figure: F.1 |
| Approx. Scale: | 1:3,000 |
| Date Revised: | Mar 1, 2024 |

Map Document: \\rwdgroup\guelph\AM_Jobs\2023\2303584\03WorkItems\06EnvironmentalNoiseAnalysis\ArcGIS\1393 Grahams Lane - Burlington, Ontario.aprx

# APPENDIX G

## Cadna/A ISO-9613 Calculation Protocol - Definitions

| Parameter | Unit | Definition |
|---|---|---|
| **Nr** | | Ray Number |
| **X** | **(m)** | X-axis Cartesian Coordinate |
| **Y** | **(m)** | Y-axis Cartesian Coordinate |
| **Z** | **(m)** | Z-axis Cartesian Coordinate |
| **Refl.** | **order** | Order of Reflection |
| **DEN** | **D/E/N** | Time of Day (Day, Evening, or Night) |
| **Freq.** | **(Hz)** | 1/1 Octave Band Dominant Frequency or Frequency Type ("A" for A-weighted) |
| **Lw** | **(dBA)** | Overall Sound Power Level |
| **I/a** | **dB** | Line/Area Source Correction |
| **Optime** | **dB** | Operating Time Correction |
| **K0** | **(dB)** | D_omega in ISO 9613-2 (correction for radiation into solid angles less than 4 Pi) |
| **Di** | **(dB)** | Directivity Index |
| **Adiv** | **(dB)** | Attenuation Due to Divergence |
| **Aatm** | **(dB)** | Atmospheric Attenuation |
| **Agr** | **(dB)** | Ground Attenuation |
| **Afol** | **(dB)** | Attenuation Due to Foliage |
| **Ahous** | **(dB)** | Attenuation from Houses |
| **Abar** | **(dB)** | Barrier Attenuation |
| **Cmet** | **(dB)** | Meteorological Correction |
| **RL** | **(dB)** | Reflection Loss |
| **Lr** | **(dBA)** | Resulting Noise Impact at Receptor - Leq (1-Hr) |

Receiver
Name: Building A East Facade
ID: FacadeCheck
X: 596247.92 m
Y: 4798478.70 m
Z: 13.50 m

| Point Source, ISO 9613, Name: "HVAC-6F - Royal Canadian Legion", ID: "!0701!" | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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) |
| 42 | 596232.73 | 4798541.75 | 8.50 | 0 | DEN | A | 93.5 | 0.0 | 0.0 | 0.0 | 0.0 | 47.3 | 0.4 | -3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 48.9 |
| 45 | 596232.73 | 4798541.75 | 8.50 | 1 | DEN | A | 93.5 | 0.0 | 0.0 | 0.0 | 0.0 | 56.5 | 0.9 | -3.0 | 0.0 | 0.0 | 25.0 | 0.0 | 2.2 | 11.9 |

| Point Source, ISO 9613, Name: "Compressor and Wrench - SWC Auto", ID: "!0701!" | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | 596288.59 | 4798518.37 | 1.50 | 0 | D | A | 100.3 | 0.0 | -7.8 | 0.0 | -4.9 | 46.3 | 3.0 | -3.0 | 0.0 | 0.0 | 4.2 | 0.0 | 0.0 | 37.1 |

| Point Source, ISO 9613, Name: "HVAC-2F - Royal Canadian Legion", ID: "!0701!" | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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) |
| 55 | 596239.39 | 4798536.98 | 8.50 | 0 | DEN | A | 85.0 | 0.0 | 0.0 | 0.0 | 0.0 | 46.4 | 0.1 | -3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 41.5 |
| 58 | 596239.39 | 4798536.98 | 8.50 | 1 | DEN | A | 85.0 | 0.0 | 0.0 | 0.0 | 0.0 | 56.5 | 0.4 | -3.0 | 0.0 | 0.0 | 25.0 | 0.0 | 2.0 | 4.1 |

| Point Source, ISO 9613, Name: "HVAC-2F - Royal Canadian Legion", ID: "!0701!" | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | 596246.82 | 4798547.21 | 8.50 | 0 | DEN | A | 85.0 | 0.0 | 0.0 | 0.0 | 0.0 | 47.7 | 0.1 | -3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 40.1 |
| 68 | 596246.82 | 4798547.21 | 8.50 | 1 | DEN | A | 85.0 | 0.0 | 0.0 | 0.0 | 0.0 | 57.1 | 0.4 | -3.0 | 0.0 | 0.0 | 25.0 | 0.0 | 2.0 | 3.5 |

| Point Source, ISO 9613, Name: "HVAC-1F - 1425 Grahams Ln", ID: "!0701!" | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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) |
| 76 | 596279.46 | 4798483.61 | 6.50 | 0 | D | A | 82.0 | 0.0 | 0.0 | 0.0 | 0.0 | 41.3 | 0.1 | -3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 43.7 |

| Area Source, ISO 9613, Name: "Ashland Chemicals", ID: "!0701!" | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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) |
| 85 | 595976.12 | 4798608.35 | 3.50 | 0 | DEN | A | 61.0 | 34.5 | 0.0 | 0.0 | 0.0 | 60.6 | 0.8 | -3.0 | 0.0 | 0.0 | 10.2 | 0.0 | 0.0 | 26.8 |
| 106 | 595917.63 | 4798626.35 | 3.50 | 0 | DEN | A | 61.0 | 34.5 | 0.0 | 0.0 | 0.0 | 62.2 | 1.0 | -3.0 | 0.0 | 0.0 | 10.6 | 0.0 | 0.0 | 24.8 |
| 126 | 595973.02 | 4798645.49 | 3.50 | 0 | DEN | A | 61.0 | 32.8 | 0.0 | 0.0 | 0.0 | 61.1 | 0.9 | -3.0 | 0.0 | 0.0 | 8.2 | 0.0 | 0.0 | 26.6 |
| 147 | 595954.53 | 4798601.24 | 3.50 | 0 | DEN | A | 61.0 | 32.4 | 0.0 | 0.0 | 0.0 | 61.1 | 0.9 | -3.0 | 0.0 | 0.0 | 11.1 | 0.0 | 0.0 | 23.4 |
| 229 | 596010.16 | 4798572.11 | 3.50 | 0 | DEN | A | 61.0 | 27.8 | 0.0 | 0.0 | 0.0 | 59.2 | 0.7 | -3.0 | 0.0 | 0.0 | 11.5 | 0.0 | 0.0 | 20.5 |
| 1183 | 595951.20 | 4798678.81 | 3.50 | 0 | DEN | A | 61.0 | 28.3 | 0.0 | 0.0 | 0.0 | 62.1 | 1.0 | -3.0 | 0.0 | 0.0 | 7.1 | 0.0 | 0.0 | 22.2 |
| 1304 | 596009.81 | 4798557.53 | 3.50 | 0 | DEN | A | 61.0 | 23.0 | 0.0 | 0.0 | 0.0 | 59.0 | 0.7 | -3.0 | 0.0 | 0.0 | 12.3 | 0.0 | 0.0 | 15.0 |
| 1625 | 595998.19 | 4798632.07 | 3.50 | 0 | DEN | A | 61.0 | 21.0 | 0.0 | 0.0 | 0.0 | 60.3 | 0.8 | -3.0 | 0.0 | 0.0 | 8.1 | 0.0 | 0.0 | 15.8 |
| 1780 | 595971.64 | 4798562.88 | 3.50 | 0 | DEN | A | 61.0 | 18.2 | 0.0 | 0.0 | 0.0 | 60.2 | 0.8 | -3.0 | 0.0 | 0.0 | 12.6 | 0.0 | 0.0 | 8.6 |

| Point Source, ISO 9613, Name: "HVAC-1F - 1425 Grahams Ln", ID: "!0701!" | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | 596284.70 | 4798489.74 | 6.50 | 0 | D | A | 82.0 | 0.0 | 0.0 | 0.0 | 0.0 | 42.8 | 0.1 | -3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 42.1 |

| Point Source, ISO 9613, Name: "HVAC-1F - 1425 Grahams Ln", ID: "!0701!" | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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) |
| 138 | 596288.26 | 4798493.73 | 6.50 | 0 | D | A | 82.0 | 0.0 | 0.0 | 0.0 | 0.0 | 43.8 | 0.1 | -3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 41.1 |

| Point Source, ISO 9613, Name: "Compressor and Wrench - 905 Tire", ID: "!0701!" | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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) |
| 159 | 596302.18 | 4798365.34 | 1.50 | 0 | D | A | 100.3 | 0.0 | -7.8 | 0.0 | -4.9 | 53.0 | 4.8 | -3.0 | 0.0 | 0.0 | 24.4 | 0.0 | 0.0 | 8.5 |

| Point Source, ISO 9613, Name: "Exhaust Fan - Royal Canadian Legion", ID: "!0701!" | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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) |
| 168 | 596264.66 | 4798533.71 | 8.50 | 0 | DEN | A | 77.9 | 0.0 | 0.0 | 0.0 | 0.0 | 46.2 | 0.2 | -3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 34.4 |
| 175 | 596264.66 | 4798533.71 | 8.50 | 1 | DEN | A | 77.9 | 0.0 | 0.0 | 0.0 | 0.0 | 57.3 | 0.6 | -3.0 | 0.0 | 0.0 | 24.9 | 0.0 | 7.2 | -9.1 |

| Point Source, ISO 9613, Name: "HVAC-1F - 1425 Grahams Ln", ID: "!0701!" | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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) |
| 181 | 596303.78 | 4798492.91 | 6.50 | 0 | D | A | 82.0 | 0.0 | 0.0 | 0.0 | 0.0 | 46.3 | 0.1 | -3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 38.6 |

| Point Source, ISO 9613, Name: "PB Exhaust - Smit Auto Body", ID: "!0701!" | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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) |
| 191 | 596305.22 | 4798378.37 | 6.50 | 0 | D | A | 90.4 | 0.0 | 0.0 | 0.0 | 0.0 | 52.3 | 0.8 | -3.0 | 0.0 | 0.0 | 19.7 | 0.0 | 0.0 | 20.7 |

| Point Source, ISO 9613, Name: "Exhaust Fan - Royal Canadian Legion", ID: "!0701!" | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | 596260.17 | 4798538.77 | 8.50 | 0 | DEN | A | 77.9 | 0.0 | 0.0 | 0.0 | 0.0 | 46.8 | 0.2 | -3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 33.9 |
| 205 | 596260.17 | 4798538.77 | 8.50 | 1 | DEN | A | 77.9 | 0.0 | 0.0 | 0.0 | 0.0 | 57.2 | 0.6 | -3.0 | 0.0 | 0.0 | 24.9 | 0.0 | 3.9 | -5.7 |

| Point Source, ISO 9613, Name: "HVAC-2F - Arctic Traveler Ltd", ID: "!0701!" | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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) |
| 215 | 596328.10 | 4798432.45 | 6.50 | 0 | D | A | 85.0 | 0.0 | 0.0 | 0.0 | 0.0 | 50.4 | 0.2 | -3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 37.5 |
| 219 | 596328.10 | 4798432.45 | 6.50 | 1 | D | A | 85.0 | 0.0 | 0.0 | 0.0 | 0.0 | 59.0 | 0.5 | -3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.0 | 26.5 |

| Point Source, ISO 9613, Name: "HVAC-1F - 1425 Grahams Ln", ID: "!0701!" | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | 596313.20 | 4798500.34 | 6.50 | 0 | D | A | 82.0 | 0.0 | 0.0 | 0.0 | 0.0 | 47.8 | 0.1 | -3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 37.1 |

| Point Source, ISO 9613, Name: "PB Exhaust - Burlington Automotive Centre", ID: "!0701!" | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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) |
| 257 | 596280.87 | 4798349.20 | 8.00 | 0 | D | A | 90.4 | 0.0 | 0.0 | 0.0 | 0.0 | 53.5 | 0.9 | -3.0 | 0.0 | 0.0 | 22.2 | 0.0 | 0.0 | 16.7 |

| Point Source, ISO 9613, Name: "MUA - Royal Canadian Legion", ID: "!0701!" | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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) |
| 264 | 596253.80 | 4798535.91 | 8.50 | 0 | DEN | A | 75.0 | 0.0 | 0.0 | 0.0 | 0.0 | 46.2 | 0.1 | -3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 31.7 |
| 267 | 596253.80 | 4798535.91 | 8.50 | 1 | DEN | A | 75.0 | 0.0 | 0.0 | 0.0 | 0.0 | 56.9 | 0.4 | -3.0 | 0.0 | 0.0 | 25.0 | 0.0 | 2.0 | -6.3 |

| vert. Area Source, ISO 9613, Name: "Transformer - Side", ID: "!0701!" | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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) |
| 274 | 596200.49 | 4798296.61 | 0.50 | 0 | D | A | 70.7 | 1.9 | 0.0 | 3.0 | 0.0 | 56.5 | 0.5 | -3.0 | 0.0 | 0.0 | 24.4 | 0.0 | 0.0 | -2.7 |
| 277 | 596201.39 | 4798295.46 | 0.50 | 0 | D | A | 70.7 | 1.4 | 0.0 | 3.0 | 0.0 | 56.6 | 0.5 | -3.0 | 0.0 | 0.0 | 24.4 | 0.0 | 0.0 | -3.3 |
| 286 | 596204.25 | 4798291.83 | 0.50 | 0 | D | A | 70.7 | 9.0 | 0.0 | 3.0 | 0.0 | 56.7 | 0.5 | -3.0 | 0.0 | 0.0 | 24.3 | 0.0 | 0.0 | 4.2 |
| 333 | 596200.49 | 4798296.61 | 1.50 | 0 | D | A | 70.7 | 1.9 | 0.0 | 3.0 | 0.0 | 56.5 | 0.5 | -3.0 | 0.0 | 0.0 | 24.4 | 0.0 | 0.0 | -2.7 |
| 338 | 596201.39 | 4798295.46 | 1.50 | 0 | D | A | 70.7 | 1.4 | 0.0 | 3.0 | 0.0 | 56.5 | 0.5 | -3.0 | 0.0 | 0.0 | 24.4 | 0.0 | 0.0 | -3.3 |
| 347 | 596204.25 | 4798291.83 | 1.50 | 0 | D | A | 70.7 | 9.0 | 0.0 | 3.0 | 0.0 | 56.7 | 0.5 | -3.0 | 0.0 | 0.0 | 24.3 | 0.0 | 0.0 | 4.2 |

| vert. Area Source, ISO 9613, Name: "Transformer - Side", ID: "!0701!" | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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) |
| 399 | 596198.54 | 4798296.18 | 1.50 | 0 | D | A | 75.6 | 5.4 | 0.0 | 3.0 | 0.0 | 56.6 | 0.5 | -3.0 | 0.0 | 0.0 | 24.4 | 0.0 | 0.0 | 5.7 |
| 416 | 596198.13 | 4798295.88 | 1.50 | 1 | D | A | 75.6 | 3.9 | 0.0 | 3.0 | 0.0 | 56.7 | 0.5 | -3.0 | 0.0 | 0.0 | 24.9 | 0.0 | 4.3 | -0.8 |
| 430 | 596198.54 | 4798296.18 | 0.50 | 0 | D | A | 75.6 | 5.4 | 0.0 | 3.0 | 0.0 | 56.6 | 0.5 | -3.0 | 0.0 | 0.0 | 24.4 | 0.0 | 0.0 | 5.7 |
| 452 | 596198.13 | 4798295.88 | 0.50 | 1 | D | A | 75.6 | 3.9 | 0.0 | 3.0 | 0.0 | 56.7 | 0.5 | -3.0 | 0.0 | 0.0 | 25.0 | 0.0 | 4.2 | -0.8 |

| vert. Area Source, ISO 9613, Name: "Transformer - Side", ID: "!0701!" | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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) |
| 466 | 596194.41 | 4798295.54 | 0.50 | 0 | D | A | 75.3 | 5.8 | 0.0 | 3.0 | 0.0 | 56.6 | 0.5 | -3.0 | 0.0 | 0.0 | 24.3 | 0.0 | 0.0 | 5.6 |
| 495 | 596193.14 | 4798294.59 | 0.50 | 1 | D | A | 75.3 | -2.3 | 0.0 | 3.0 | 0.0 | 56.9 | 0.5 | -3.0 | 0.0 | 0.0 | 25.0 | 0.0 | 4.5 | -7.9 |

| vert. Area Source, ISO 9613, Name: "Transformer - Side", ID: "!0701!" | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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) |
| 503 | 596194.41 | 4798295.54 | 1.50 | 0 | D | A | 75.3 | 5.8 | 0.0 | 3.0 | 0.0 | 56.6 | 0.5 | -3.0 | 0.0 | 0.0 | 24.3 | 0.0 | 0.0 | 5.6 |
| 534 | 596193.14 | 4798294.59 | 1.50 | 1 | D | A | 75.3 | -2.3 | 0.0 | 3.0 | 0.0 | 56.9 | 0.5 | -3.0 | 0.0 | 0.0 | 25.0 | 0.0 | 4.5 | -7.9 |

| vert. Area Source, ISO 9613, Name: "Transformer - Side", ID: "!0701!" | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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) |
| 545 | 596196.56 | 4798295.89 | 1.50 | 0 | D | A | 78.3 | 2.8 | 0.0 | 3.0 | 0.0 | 56.6 | 0.5 | -3.0 | 0.0 | 0.0 | 24.3 | 0.0 | 0.0 | 5.6 |
| 569 | 596196.56 | 4798295.89 | 1.50 | 1 | D | A | 78.3 | 2.8 | 0.0 | 3.0 | 0.0 | 56.6 | 0.5 | -3.0 | 0.0 | 0.0 | 24.9 | 0.0 | 4.3 | 0.7 |
| 579 | 596196.56 | 4798295.89 | 0.50 | 0 | D | A | 78.3 | 2.8 | 0.0 | 3.0 | 0.0 | 56.6 | 0.5 | -3.0 | 0.0 | 0.0 | 24.3 | 0.0 | 0.0 | 5.6 |
| 599 | 596196.56 | 4798295.89 | 0.50 | 1 | D | A | 78.3 | 2.8 | 0.0 | 3.0 | 0.0 | 56.6 | 0.5 | -3.0 | 0.0 | 0.0 | 25.0 | 0.0 | 4.2 | 0.7 |

| Point Source, ISO 9613, Name: "HVAC-1F - 1425 Grahams Ln", ID: "!0701!" | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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) |
| 610 | 596198.07 | 4798544.26 | 5.50 | 0 | D | A | 82.0 | 0.0 | 0.0 | 0.0 | 0.0 | 49.4 | 0.2 | -3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 35.5 |
| 620 | 596198.07 | 4798544.26 | 5.50 | 1 | D | A | 82.0 | 0.0 | 0.0 | 0.0 | 0.0 | 55.9 | 0.3 | -3.0 | 0.0 | 0.0 | 25.0 | 0.0 | 2.0 | 1.7 |

| vert. Area Source, ISO 9613, Name: "Transformer - Side", ID: "!0701!" | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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) |
| 638 | 596194.99 | 4798291.52 | 1.50 | 0 | D | A | 69.2 | 8.5 | 0.0 | 3.0 | 0.0 | 56.8 | 0.5 | -3.0 | 0.0 | 0.0 | 24.3 | 0.0 | 0.0 | 2.0 |
| 642 | 596197.83 | 4798287.69 | 1.50 | 0 | D | A | 69.2 | 4.0 | 0.0 | 3.0 | 0.0 | 56.9 | 0.5 | -3.0 | 0.0 | 0.0 | 24.6 | 0.0 | 0.0 | -2.9 |
| 646 | 596199.01 | 4798286.09 | 1.50 | 0 | D | A | 69.2 | 1.7 | 0.0 | 3.0 | 0.0 | 57.0 | 0.5 | -3.0 | 0.0 | 0.0 | 24.6 | 0.0 | 0.0 | -5.3 |
| 650 | 596200.78 | 4798283.69 | 1.50 | 0 | D | A | 69.2 | 6.5 | 0.0 | 3.0 | 0.0 | 57.1 | 0.5 | -3.0 | 0.0 | 0.0 | 24.6 | 0.0 | 0.0 | -0.5 |
| 693 | 596201.61 | 4798282.57 | 1.50 | 1 | D | A | 69.2 | 2.2 | 0.0 | 3.0 | 0.0 | 57.2 | 0.5 | -3.0 | 0.0 | 0.0 | 25.0 | 0.0 | 4.5 | -9.9 |
| 696 | 596202.11 | 4798281.89 | 1.50 | 1 | D | A | 69.2 | -14.4 | 0.0 | 3.0 | 0.0 | 57.2 | 0.5 | -3.0 | 0.0 | 0.0 | 24.9 | 0.0 | 4.7 | -26.5 |
| 706 | 596201.30 | 4798282.99 | 1.50 | 2 | D | A | 69.2 | 3.9 | 0.0 | 3.0 | 0.0 | 57.3 | 0.5 | -3.0 | 0.0 | 0.0 | 24.9 | 0.0 | 10.3 | -14.0 |
| 722 | 596193.72 | 4798293.26 | 1.50 | 1 | D | A | 69.2 | 4.4 | 0.0 | 3.0 | 0.0 | 56.9 | 0.5 | -3.0 | 0.0 | 0.0 | 24.9 | 0.0 | 4.6 | -7.4 |
| 724 | 596195.69 | 4798290.58 | 1.50 | 1 | D | A | 69.2 | 5.9 | 0.0 | 3.0 | 0.0 | 57.0 | 0.5 | -3.0 | 0.0 | 0.0 | 24.9 | 0.0 | 4.6 | -5.9 |
| 740 | 596198.48 | 4798286.80 | 1.50 | 1 | D | A | 69.2 | 7.4 | 0.0 | 3.0 | 0.0 | 57.1 | 0.5 | -3.0 | 0.0 | 0.0 | 24.9 | 0.0 | 4.7 | -4.6 |
| 743 | 596200.53 | 4798284.03 | 1.50 | 1 | D | A | 69.2 | 1.6 | 0.0 | 3.0 | 0.0 | 57.2 | 0.5 | -3.0 | 0.0 | 0.0 | 24.9 | 0.0 | 4.7 | -10.5 |
| 746 | 596201.54 | 4798282.66 | 1.50 | 1 | D | A | 69.2 | 2.9 | 0.0 | 3.0 | 0.0 | 57.2 | 0.5 | -3.0 | 0.0 | 0.0 | 24.9 | 0.0 | 4.7 | -9.2 |
| 756 | 596202.06 | 4798281.96 | 1.50 | 2 | D | A | 69.2 | -6.8 | 0.0 | 3.0 | 0.0 | 57.3 | 0.5 | -3.0 | 0.0 | 0.0 | 24.9 | 0.0 | 8.7 | -23.0 |
| 765 | 596195.74 | 4798290.52 | 0.50 | 0 | D | A | 69.2 | 9.8 | 0.0 | 3.0 | 0.0 | 56.8 | 0.5 | -3.0 | 0.0 | 0.0 | 24.3 | 0.0 | 0.0 | 3.3 |
| 769 | 596199.01 | 4798286.09 | 0.50 | 0 | D | A | 69.2 | 1.7 | 0.0 | 3.0 | 0.0 | 57.0 | 0.5 | -3.0 | 0.0 | 0.0 | 24.3 | 0.0 | 0.0 | -4.9 |
| 772 | 596200.78 | 4798283.69 | 0.50 | 0 | D | A | 69.2 | 6.5 | 0.0 | 3.0 | 0.0 | 57.1 | 0.5 | -3.0 | 0.0 | 0.0 | 24.3 | 0.0 | 0.0 | -0.2 |
| 812 | 596201.61 | 4798282.57 | 0.50 | 1 | D | A | 69.2 | 2.2 | 0.0 | 3.0 | 0.0 | 57.2 | 0.5 | -3.0 | 0.0 | 0.0 | 25.0 | 0.0 | 4.5 | -9.9 |
| 814 | 596202.11 | 4798281.89 | 0.50 | 1 | D | A | 69.2 | -14.4 | 0.0 | 3.0 | 0.0 | 57.2 | 0.5 | -3.0 | 0.0 | 0.0 | 25.0 | 0.0 | 4.5 | -26.5 |
| 816 | 596200.06 | 4798284.67 | 0.50 | 2 | D | A | 69.2 | 2.4 | 0.0 | 3.0 | 0.0 | 57.4 | 0.5 | -3.0 | 0.0 | 0.0 | 25.0 | 0.0 | 12.4 | -17.7 |
| 817 | 596201.30 | 4798282.99 | 0.50 | 2 | D | A | 69.2 | 3.9 | 0.0 | 3.0 | 0.0 | 57.3 | 0.5 | -3.0 | 0.0 | 0.0 | 24.9 | 0.0 | 10.3 | -14.0 |
| 818 | 596193.72 | 4798293.26 | 0.50 | 1 | D | A | 69.2 | 4.4 | 0.0 | 3.0 | 0.0 | 56.9 | 0.5 | -3.0 | 0.0 | 0.0 | 25.0 | 0.0 | 4.5 | -7.4 |
| 819 | 596195.69 | 4798290.58 | 0.50 | 1 | D | A | 69.2 | 5.9 | 0.0 | 3.0 | 0.0 | 57.0 | 0.5 | -3.0 | 0.0 | 0.0 | 25.0 | 0.0 | 4.5 | -5.9 |
| 821 | 596198.48 | 4798286.80 | 0.50 | 1 | D | A | 69.2 | 7.4 | 0.0 | 3.0 | 0.0 | 57.1 | 0.5 | -3.0 | 0.0 | 0.0 | 25.0 | 0.0 | 4.5 | -4.6 |
| 824 | 596200.53 | 4798284.03 | 0.50 | 1 | D | A | 69.2 | 1.6 | 0.0 | 3.0 | 0.0 | 57.2 | 0.5 | -3.0 | 0.0 | 0.0 | 25.0 | 0.0 | 4.5 | -10.5 |
| 831 | 596201.54 | 4798282.66 | 0.50 | 1 | D | A | 69.2 | 2.9 | 0.0 | 3.0 | 0.0 | 57.2 | 0.5 | -3.0 | 0.0 | 0.0 | 25.0 | 0.0 | 4.5 | -9.2 |
| 838 | 596202.06 | 4798281.96 | 0.50 | 2 | D | A | 69.2 | -6.8 | 0.0 | 3.0 | 0.0 | 57.3 | 0.5 | -3.0 | 0.0 | 0.0 | 25.0 | 0.0 | 8.6 | -23.0 |

| vert. Area Source, ISO 9613, Name: "Transformer - Side", ID: "!0701!" | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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) |
| 850 | 596205.30 | 4798287.54 | 1.50 | 0 | D | A | 75.6 | 5.5 | 0.0 | 3.0 | 0.0 | 56.9 | 0.5 | -3.0 | 0.0 | 0.0 | 24.7 | 0.0 | 0.0 | 5.0 |
| 874 | 596204.18 | 4798286.62 | 1.50 | 1 | D | A | 75.6 | -2.0 | 0.0 | 3.0 | 0.0 | 57.1 | 0.5 | -3.0 | 0.0 | 0.0 | 24.9 | 0.0 | 6.3 | -9.2 |
| 877 | 596204.90 | 4798287.22 | 1.50 | 2 | D | A | 75.6 | 4.0 | 0.0 | 3.0 | 0.0 | 57.2 | 0.5 | -3.0 | 0.0 | 0.0 | 24.9 | 0.0 | 8.3 | -5.3 |
| 893 | 596205.30 | 4798287.54 | 0.50 | 0 | D | A | 75.6 | 5.5 | 0.0 | 3.0 | 0.0 | 56.9 | 0.5 | -3.0 | 0.0 | 0.0 | 24.3 | 0.0 | 0.0 | 5.4 |
| 913 | 596204.18 | 4798286.62 | 0.50 | 1 | D | A | 75.6 | -2.0 | 0.0 | 3.0 | 0.0 | 57.1 | 0.5 | -3.0 | 0.0 | 0.0 | 25.0 | 0.0 | 6.2 | -9.2 |
| 916 | 596204.90 | 4798287.22 | 0.50 | 2 | D | A | 75.6 | 4.0 | 0.0 | 3.0 | 0.0 | 57.2 | 0.5 | -3.0 | 0.0 | 0.0 | 25.0 | 0.0 | 8.2 | -5.3 |

| vert. Area Source, ISO 9613, Name: "Transformer - Side", ID: "!0701!" | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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) |
| 925 | 596204.65 | 4798285.55 | 0.50 | 0 | D | A | 77.6 | 3.5 | 0.0 | 3.0 | 0.0 | 56.9 | 0.5 | -3.0 | 0.0 | 0.0 | 24.3 | 0.0 | 0.0 | 5.3 |
| 954 | 596204.65 | 4798285.55 | 0.50 | 1 | D | A | 77.6 | 3.5 | 0.0 | 3.0 | 0.0 | 57.1 | 0.5 | -3.0 | 0.0 | 0.0 | 25.0 | 0.0 | 6.2 | -1.7 |
| 961 | 596204.10 | 4798286.21 | 0.50 | 2 | D | A | 77.6 | -3.0 | 0.0 | 3.0 | 0.0 | 57.1 | 0.5 | -3.0 | 0.0 | 0.0 | 25.0 | 0.0 | 8.2 | -10.3 |

| vert. Area Source, ISO 9613, Name: "Transformer - Side", ID: "!0701!" | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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) |
| 972 | 596204.65 | 4798285.55 | 1.50 | 0 | D | A | 77.6 | 3.5 | 0.0 | 3.0 | 0.0 | 56.9 | 0.5 | -3.0 | 0.0 | 0.0 | 24.2 | 0.0 | 0.0 | 5.4 |
| 1000 | 596204.65 | 4798285.55 | 1.50 | 1 | D | A | 77.6 | 3.5 | 0.0 | 3.0 | 0.0 | 57.1 | 0.5 | -3.0 | 0.0 | 0.0 | 24.9 | 0.0 | 6.3 | -1.7 |

| vert. Area Source, ISO 9613, Name: "Transformer - Side", ID: "!0701!" | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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) |
| 1019 | 596203.77 | 4798283.24 | 0.50 | 0 | D | A | 74.8 | 6.2 | 0.0 | 3.0 | 0.0 | 57.1 | 0.5 | -3.0 | 0.0 | 0.0 | 24.3 | 0.0 | 0.0 | 5.2 |
| 1069 | 596204.52 | 4798283.89 | 0.50 | 1 | D | A | 74.8 | 3.5 | 0.0 | 3.0 | 0.0 | 57.1 | 0.5 | -3.0 | 0.0 | 0.0 | 25.0 | 0.0 | 4.5 | -2.9 |
| 1073 | 596202.93 | 4798282.52 | 0.50 | 1 | D | A | 74.8 | 3.0 | 0.0 | 3.0 | 0.0 | 57.2 | 0.5 | -3.0 | 0.0 | 0.0 | 25.0 | 0.0 | 4.5 | -3.4 |
| 1080 | 596203.11 | 4798282.67 | 0.50 | 1 | D | A | 74.8 | 3.7 | 0.0 | 3.0 | 0.0 | 57.3 | 0.5 | -3.0 | 0.0 | 0.0 | 25.0 | 0.0 | 6.2 | -4.5 |
| 1084 | 596202.20 | 4798281.89 | 0.50 | 1 | D | A | 74.8 | -12.7 | 0.0 | 3.0 | 0.0 | 57.2 | 0.5 | -3.0 | 0.0 | 0.0 | 25.0 | 0.0 | 4.5 | -19.2 |
| 1088 | 596204.82 | 4798284.14 | 0.50 | 2 | D | A | 74.8 | 1.6 | 0.0 | 3.0 | 0.0 | 57.4 | 0.5 | -3.0 | 0.0 | 0.0 | 25.0 | 0.0 | 10.2 | -10.7 |
| 1091 | 596203.23 | 4798282.77 | 0.50 | 2 | D | A | 74.8 | 4.4 | 0.0 | 3.0 | 0.0 | 57.3 | 0.5 | -3.0 | 0.0 | 0.0 | 24.9 | 0.0 | 10.3 | -7.8 |
| 1101 | 596204.23 | 4798283.64 | 1.50 | 0 | D | A | 74.8 | 4.8 | 0.0 | 3.0 | 0.0 | 57.0 | 0.5 | -3.0 | 0.0 | 0.0 | 24.6 | 0.0 | 0.0 | 3.4 |
| 1107 | 596202.64 | 4798282.27 | 1.50 | 0 | D | A | 74.8 | 0.9 | 0.0 | 3.0 | 0.0 | 57.1 | 0.5 | -3.0 | 0.0 | 0.0 | 24.6 | 0.0 | 0.0 | -0.6 |
| 1150 | 596204.52 | 4798283.89 | 1.50 | 1 | D | A | 74.8 | 3.5 | 0.0 | 3.0 | 0.0 | 57.1 | 0.5 | -3.0 | 0.0 | 0.0 | 24.9 | 0.0 | 4.7 | -2.9 |
| 1154 | 596202.93 | 4798282.52 | 1.50 | 1 | D | A | 74.8 | 3.0 | 0.0 | 3.0 | 0.0 | 57.1 | 0.5 | -3.0 | 0.0 | 0.0 | 24.9 | 0.0 | 4.7 | -3.4 |
| 1162 | 596203.11 | 4798282.67 | 1.50 | 1 | D | A | 74.8 | 3.7 | 0.0 | 3.0 | 0.0 | 57.3 | 0.5 | -3.0 | 0.0 | 0.0 | 25.0 | 0.0 | 6.2 | -4.5 |
| 1166 | 596202.20 | 4798281.89 | 1.50 | 1 | D | A | 74.8 | -12.7 | 0.0 | 3.0 | 0.0 | 57.2 | 0.5 | -3.0 | 0.0 | 0.0 | 24.9 | 0.0 | 4.7 | -19.2 |
| 1171 | 596203.23 | 4798282.77 | 1.50 | 2 | D | A | 74.8 | 4.4 | 0.0 | 3.0 | 0.0 | 57.3 | 0.5 | -3.0 | 0.0 | 0.0 | 24.9 | 0.0 | 10.3 | -7.8 |

| Point Source, ISO 9613, Name: "HVAC-1F - 1425 Grahams Ln", ID: "!0701!" | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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) |
| 1202 | 596207.08 | 4798555.66 | 5.50 | 0 | D | A | 82.0 | 0.0 | 0.0 | 0.0 | 0.0 | 49.8 | 0.2 | -3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 35.0 |
| 1207 | 596207.08 | 4798555.66 | 5.50 | 1 | D | A | 82.0 | 0.0 | 0.0 | 0.0 | 0.0 | 56.6 | 0.4 | -3.0 | 0.0 | 0.0 | 25.0 | 0.0 | 2.0 | 1.0 |

| Point Source, ISO 9613, Name: "Exhaust Fan - 1425 Grahams Ln", ID: "!0701!" | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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) |
| 1219 | 596227.26 | 4798567.04 | 5.50 | 0 | DEN | A | 77.9 | 0.0 | 0.0 | 0.0 | 0.0 | 50.2 | 0.3 | -3.0 | 0.0 | 0.0 | 4.8 | 0.0 | 0.0 | 25.6 |
| 1228 | 596227.26 | 4798567.04 | 5.50 | 1 | DEN | A | 77.9 | 0.0 | 0.0 | 0.0 | 0.0 | 57.5 | 0.6 | -3.0 | 0.0 | 0.0 | 24.8 | 0.0 | 2.0 | -4.0 |

| Point Source, ISO 9613, Name: "HVAC-1F - 1440 Grahams Ln", ID: "!0701!" | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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) |
| 1242 | 596347.15 | 4798440.16 | 7.50 | 0 | D | A | 82.0 | 0.0 | 0.0 | 0.0 | 0.0 | 51.6 | 0.2 | -3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 33.2 |
| 1258 | 596347.15 | 4798440.16 | 7.50 | 1 | D | A | 82.0 | 0.0 | 0.0 | 0.0 | 0.0 | 58.8 | 0.5 | -3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.0 | 23.7 |

| Point Source, ISO 9613, Name: "HVAC-1F - 1440 Grahams Ln", ID: "!0701!" | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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) |
| 1261 | 596352.81 | 4798445.35 | 7.50 | 0 | D | A | 82.0 | 0.0 | 0.0 | 0.0 | 0.0 | 51.8 | 0.2 | -3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 32.9 |
| 1278 | 596352.81 | 4798445.35 | 7.50 | 1 | D | A | 82.0 | 0.0 | 0.0 | 0.0 | 0.0 | 58.9 | 0.5 | -3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.0 | 23.6 |

| Point Source, ISO 9613, Name: "HVAC-1F - 1440 Grahams Ln", ID: "!0701!" | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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) |
| 1285 | 596357.01 | 4798449.40 | 7.50 | 0 | D | A | 82.0 | 0.0 | 0.0 | 0.0 | 0.0 | 52.1 | 0.2 | -3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 32.7 |
| 1296 | 596357.01 | 4798449.40 | 7.50 | 1 | D | A | 82.0 | 0.0 | 0.0 | 0.0 | 0.0 | 58.9 | 0.5 | -3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.0 | 23.6 |

| Point Source, ISO 9613, Name: "HVAC-1F - 1440 Grahams Ln", ID: "!0701!" | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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) |
| 1326 | 596362.12 | 4798455.79 | 7.50 | 0 | D | A | 82.0 | 0.0 | 0.0 | 0.0 | 0.0 | 52.3 | 0.2 | -3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 32.4 |

| Point Source, ISO 9613, Name: "HVAC-1F - 1440 Grahams Ln", ID: "!0701!" | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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) |
| 1345 | 596366.53 | 4798460.08 | 7.50 | 0 | D | A | 82.0 | 0.0 | 0.0 | 0.0 | 0.0 | 52.6 | 0.2 | -3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 32.2 |

| Point Source, ISO 9613, Name: "HVAC-1F - 1440 Grahams Ln", ID: "!0701!" | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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) |
| 1367 | 596367.13 | 4798448.74 | 7.50 | 0 | D | A | 82.0 | 0.0 | 0.0 | 0.0 | 0.0 | 52.8 | 0.2 | -3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 32.0 |

| Point Source, ISO 9613, Name: "HVAC-1F - 1440 Grahams Ln", ID: "!0701!" | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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) |
| 1383 | 596371.70 | 4798465.51 | 7.50 | 0 | D | A | 82.0 | 0.0 | 0.0 | 0.0 | 0.0 | 52.9 | 0.2 | -3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 31.8 |

| Point Source, ISO 9613, Name: "HVAC-1F - 1440 Grahams Ln", ID: "!0701!" | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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) |
| 1401 | 596376.05 | 4798470.01 | 7.50 | 0 | D | A | 82.0 | 0.0 | 0.0 | 0.0 | 0.0 | 53.2 | 0.2 | -3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 31.6 |

| Point Source, ISO 9613, Name: "HVAC-1F - 1440 Grahams Ln", ID: "!0701!" | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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) |
| 1420 | 596381.39 | 4798474.62 | 7.50 | 0 | D | A | 82.0 | 0.0 | 0.0 | 0.0 | 0.0 | 53.5 | 0.3 | -3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 31.2 |

| Point Source, ISO 9613, Name: "HVAC-1F - 1440 Grahams Ln", ID: "!0701!" | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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) |
| 1432 | 596386.03 | 4798478.86 | 7.50 | 0 | D | A | 82.0 | 0.0 | 0.0 | 0.0 | 0.0 | 53.8 | 0.3 | -3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 30.9 |
| 1449 | 596386.03 | 4798478.86 | 7.50 | 1 | D | A | 82.0 | 0.0 | 0.0 | 0.0 | 0.0 | 59.4 | 0.5 | -3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.0 | 23.0 |

| Point Source, ISO 9613, Name: "HVAC-1F - 1440 Grahams Ln", ID: "!0701!" | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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) |
| 1454 | 596391.24 | 4798484.21 | 7.50 | 0 | D | A | 82.0 | 0.0 | 0.0 | 0.0 | 0.0 | 54.1 | 0.3 | -3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 30.6 |
| 1477 | 596391.24 | 4798484.21 | 7.50 | 1 | D | A | 82.0 | 0.0 | 0.0 | 0.0 | 0.0 | 59.5 | 0.5 | -3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.0 | 22.9 |

| Point Source, ISO 9613, Name: "HVAC-1F - 1440 Grahams Ln", ID: "!0701!" | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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) |
| 1485 | 596395.33 | 4798488.30 | 7.50 | 0 | D | A | 82.0 | 0.0 | 0.0 | 0.0 | 0.0 | 54.4 | 0.3 | -3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 30.3 |
| 1500 | 596395.33 | 4798488.30 | 7.50 | 1 | D | A | 82.0 | 0.0 | 0.0 | 0.0 | 0.0 | 59.6 | 0.5 | -3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.0 | 22.8 |

| Point Source, ISO 9613, Name: "HVAC-1F - 1440 Grahams Ln", ID: "!0701!" | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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) |
| 1506 | 596397.59 | 4798475.38 | 7.50 | 0 | D | A | 82.0 | 0.0 | 0.0 | 0.0 | 0.0 | 54.5 | 0.3 | -3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 30.2 |
| 1528 | 596397.59 | 4798475.38 | 7.50 | 1 | D | A | 82.0 | 0.0 | 0.0 | 0.0 | 0.0 | 59.2 | 0.5 | -3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.0 | 23.3 |

| Area Source, ISO 9613, Name: "Transformer - Top", ID: "!0701!" | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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) |
| 1537 | 596195.31 | 4798293.28 | 2.10 | 0 | D | A | 64.1 | 9.6 | 0.0 | 0.0 | 0.0 | 56.7 | 0.5 | -3.0 | 0.0 | 0.0 | 24.2 | 0.0 | 0.0 | -4.7 |
| 1545 | 596197.60 | 4798290.63 | 2.10 | 0 | D | A | 64.1 | 11.3 | 0.0 | 0.0 | 0.0 | 56.8 | 0.5 | -3.0 | 0.0 | 0.0 | 24.2 | 0.0 | 0.0 | -3.1 |
| 1550 | 596199.31 | 4798287.38 | 2.10 | 0 | D | A | 64.1 | 4.4 | 0.0 | 0.0 | 0.0 | 56.9 | 0.5 | -3.0 | 0.0 | 0.0 | 24.2 | 0.0 | 0.0 | -10.1 |
| 1558 | 596200.54 | 4798285.04 | 2.10 | 0 | D | A | 64.1 | 5.7 | 0.0 | 0.0 | 0.0 | 57.0 | 0.5 | -3.0 | 0.0 | 0.0 | 24.2 | 0.0 | 0.0 | -8.9 |
| 1585 | 596201.68 | 4798282.80 | 2.10 | 1 | D | A | 64.1 | -5.2 | 0.0 | 0.0 | 0.0 | 57.2 | 0.5 | -3.0 | 0.0 | 0.0 | 24.9 | 0.0 | 4.7 | -25.4 |
| 1592 | 596201.60 | 4798282.94 | 2.10 | 1 | D | A | 64.1 | -3.9 | 0.0 | 0.0 | 0.0 | 57.2 | 0.5 | -3.0 | 0.0 | 0.0 | 24.9 | 0.0 | 4.7 | -24.0 |
| 1598 | 596200.95 | 4798284.08 | 2.10 | 1 | D | A | 64.1 | -0.6 | 0.0 | 0.0 | 0.0 | 57.2 | 0.5 | -3.0 | 0.0 | 0.0 | 24.9 | 0.0 | 4.7 | -20.7 |
| 1604 | 596199.23 | 4798287.15 | 2.10 | 1 | D | A | 64.1 | 8.9 | 0.0 | 0.0 | 0.0 | 57.1 | 0.5 | -3.0 | 0.0 | 0.0 | 24.9 | 0.0 | 4.7 | -11.2 |
| 1637 | 596203.11 | 4798285.12 | 2.10 | 0 | D | A | 64.1 | 2.0 | 0.0 | 0.0 | 0.0 | 57.0 | 0.5 | -3.0 | 0.0 | 0.0 | 24.2 | 0.0 | 0.0 | -12.5 |
| 1643 | 596201.65 | 4798286.54 | 2.10 | 0 | D | A | 64.1 | 11.4 | 0.0 | 0.0 | 0.0 | 56.9 | 0.5 | -3.0 | 0.0 | 0.0 | 24.2 | 0.0 | 0.0 | -3.1 |
| 1649 | 596199.96 | 4798289.74 | 2.10 | 0 | D | A | 64.1 | 4.6 | 0.0 | 0.0 | 0.0 | 56.8 | 0.5 | -3.0 | 0.0 | 0.0 | 24.2 | 0.0 | 0.0 | -9.8 |
| 1655 | 596198.75 | 4798292.02 | 2.10 | 0 | D | A | 64.1 | 5.8 | 0.0 | 0.0 | 0.0 | 56.7 | 0.5 | -3.0 | 0.0 | 0.0 | 24.2 | 0.0 | 0.0 | -8.5 |
| 1678 | 596202.16 | 4798282.78 | 2.10 | 1 | D | A | 64.1 | -2.1 | 0.0 | 0.0 | 0.0 | 57.2 | 0.5 | -3.0 | 0.0 | 0.0 | 24.9 | 0.0 | 4.7 | -22.2 |
| 1685 | 596202.16 | 4798282.94 | 2.10 | 1 | D | A | 64.1 | -0.7 | 0.0 | 0.0 | 0.0 | 57.2 | 0.5 | -3.0 | 0.0 | 0.0 | 24.9 | 0.0 | 4.7 | -20.8 |
| 1694 | 596205.04 | 4798288.38 | 2.10 | 0 | D | A | 64.1 | 6.2 | 0.0 | 0.0 | 0.0 | 56.8 | 0.5 | -3.0 | 0.0 | 0.0 | 24.2 | 0.0 | 0.0 | -8.2 |
| 1700 | 596202.75 | 4798289.65 | 2.10 | 0 | D | A | 64.1 | 10.5 | 0.0 | 0.0 | 0.0 | 56.8 | 0.5 | -3.0 | 0.0 | 0.0 | 24.2 | 0.0 | 0.0 | -3.9 |
| 1705 | 596200.49 | 4798291.82 | 2.10 | 0 | D | A | 64.1 | 2.8 | 0.0 | 0.0 | 0.0 | 56.7 | 0.5 | -3.0 | 0.0 | 0.0 | 24.2 | 0.0 | 0.0 | -11.5 |
| 1711 | 596199.05 | 4798293.21 | 2.10 | 0 | D | A | 64.1 | 4.1 | 0.0 | 0.0 | 0.0 | 56.7 | 0.5 | -3.0 | 0.0 | 0.0 | 24.2 | 0.0 | 0.0 | -10.2 |
| 1743 | 596198.73 | 4798295.32 | 2.10 | 0 | D | A | 64.1 | 5.9 | 0.0 | 0.0 | 0.0 | 56.6 | 0.5 | -3.0 | 0.0 | 0.0 | 24.3 | 0.0 | 0.0 | -8.3 |
| 1747 | 596200.03 | 4798294.97 | 2.10 | 0 | D | A | 64.1 | 6.2 | 0.0 | 0.0 | 0.0 | 56.6 | 0.5 | -3.0 | 0.0 | 0.0 | 24.3 | 0.0 | 0.0 | -8.1 |

| Area Source, ISO 9613, Name: "Transformer - Top", ID: "!0701!" | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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) |
| 1750 | 596201.01 | 4798294.04 | 2.10 | 0 | D | A | 64.1 | 4.9 | 0.0 | 0.0 | 0.0 | 56.6 | 0.5 | -3.0 | 0.0 | 0.0 | 24.3 | 0.0 | 0.0 | -9.5 |
| 1755 | 596203.20 | 4798291.97 | 2.10 | 0 | D | A | 64.1 | 9.0 | 0.0 | 0.0 | 0.0 | 56.7 | 0.5 | -3.0 | 0.0 | 0.0 | 24.3 | 0.0 | 0.0 | -5.4 |
| 1790 | 596203.77 | 4798284.33 | 2.10 | 0 | D | A | 64.1 | 6.8 | 0.0 | 0.0 | 0.0 | 57.0 | 0.5 | -3.0 | 0.0 | 0.0 | 24.2 | 0.0 | 0.0 | -7.8 |
| 1800 | 596203.76 | 4798284.03 | 2.10 | 1 | D | A | 64.1 | 3.7 | 0.0 | 0.0 | 0.0 | 57.1 | 0.5 | -3.0 | 0.0 | 0.0 | 24.9 | 0.0 | 4.7 | -16.3 |
| 1803 | 596202.80 | 4798282.77 | 2.10 | 1 | D | A | 64.1 | -2.1 | 0.0 | 0.0 | 0.0 | 57.2 | 0.5 | -3.0 | 0.0 | 0.0 | 24.9 | 0.0 | 4.7 | -22.2 |
| 1810 | 596195.34 | 4798295.34 | 2.10 | 0 | D | A | 64.1 | 5.7 | 0.0 | 0.0 | 0.0 | 56.6 | 0.5 | -3.0 | 0.0 | 0.0 | 24.3 | 0.0 | 0.0 | -8.6 |

| Point Source, ISO 9613, Name: "HVAC-1F - 1440 Grahams Ln", ID: "!0701!" | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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) |
| 1613 | 596400.51 | 4798492.98 | 7.50 | 0 | D | A | 82.0 | 0.0 | 0.0 | 0.0 | 0.0 | 54.7 | 0.3 | -3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 30.0 |
| 1619 | 596400.51 | 4798492.98 | 7.50 | 1 | D | A | 82.0 | 0.0 | 0.0 | 0.0 | 0.0 | 59.7 | 0.5 | -3.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.0 | 22.7 |

# APPENDIX H

# WARNING CLAUSES

Warning clauses are recommended to be included on all development agreements, offers of purchase and agreements of purchase and sale or lease. Warning clauses may be used individually or in combination.

The following warning clauses are recommended based on the applicable guidelines; however, wording may be modified/customized during consultation with the planning authority to best suit the proposed development:

## Transportation Sources

**NPC-300 Type A:** Recommended to address surface transportation sound levels in OLAs if sound level is in the range of >55 dBA but ≤ 60 dBA, and noise controls have not been provided.

*"Purchasers/tenants are advised that sound levels due to increasing road traffic (rail traffic) (air traffic) may occasionally interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the Municipality and the Ministry of the Environment."*

**NPC-300 Type C:** Applicable for low and medium density developments only, recommended to address transportation sound levels at the plane of window.

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

**NPC-300 Type D:** Recommended to address transportation sound levels at the plane of window.

*"This dwelling unit has been supplied with a central air conditioning system which will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment."*

**Proximity to Railway Line:** Metrolinx/CN/CP/VIA Warning Clause for developments that are within 300 metres of the right-of-way

*"Warning: [Canadian National Railway Company] [Metrolinx / GO] [Canadian Pacific Railway Company] [VIA Rail Canada Inc.] or its assigns or successors in interest has or have a right-of-way within 300 metres from the land the subject hereof. There may be alterations to or expansions of the rail facilities on such right-of-way in the future including the possibility that the railway or its assigns or successors as aforesaid may expand its operations, which expansion may affect the living environment of the residents in the vicinity, notwithstanding the inclusion of any noise and vibration attenuating measures in the design of the development and individual dwelling(s). CNR/Metrolinx/GO/CPR/VIA will not responsible for any complaints or claims arising from use of such facilities and/or operations on, over or under the aforesaid right-of-way."*

## Stationary Sources

**NPC-300 Type E:** Recommended to address proximity to commercial/industrial land-use

*"Purchasers/tenants are advised that due to the proximity of the adjacent industrial/commercial land-uses, noise from the industrial/commercial land-uses may at times be audible."*

**NPC-300 Type F:** Recommended to for Class 4 Area Notification

*"Purchasers/tenants are advised that sound levels due to the adjacent industry (facility) (utility) are required to comply with sound level limits that are protective of indoor areas and are based on the assumption that windows and exterior doors are closed. This dwelling unit has been supplied with a ventilation/air conditioning system which will allow windows and exterior doors to remain closed."*