

Noise and Vibration Impact Study

239 Dundas Street West, Belleville, ON

February 2026



WSE CONSULTING INC.

EXECUTIVE SUMMARY

WSE Consulting Inc. was retained in response to requirements by The Canadian Pacific Railway and the requirements of the City of Bellville to complete a noise and vibration impact study for the proposed development at 239 Dundas Street West, in Belleville, Ontario.

The purpose of this study is to provide an assessment of the proposed land use's compatibility from a noise and vibration perspective. In addition to the impacts of the environment onto the proposed development, we also conducted a feasibility level assessment of the proposed development's impacts onto the surroundings.

WSE Consulting assessed the impacts from road and rail traffic, as well as potential stationary sources, on the proposed development based on the applicable guidelines of the Ministry of the Environment document *NPC-300 Environmental Noise Guideline Stationary and Transportation Sources – Approval and Planning*, and the guideline document prepared for

The Railway Association of Canada and the Federation of Canadian Municipalities titled *Guidelines for New Development in Proximity to Railway Operations*.

Construction noise is generally exempt from most provincial noise guidelines and is largely constrained by municipal noise by-laws.

Our assessment results show that some areas of the development will require specific considerations for noise, as well as deed or lease agreement warning clauses. The results of this noise and vibration impact study indicate the proposed development is feasible under the defined conditions, assumptions, and recommendations within this report. We advise the issuance of warning clauses to all perspective buyers for potential elevated noise levels, and a general requirement for implementation of central air conditioning in all units. We also provide noise reduction requirements of the building façade construction. We submit at a feasibility level that the facility shall be capable of operating in compliance with NPC-300 and Ontario Regulation 419/05, if the design deviates from that design evaluated in this report, then updated noise analysis will be required prior to final design to ensure the impacts are controlled effectively.

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1.0 INTRODUCTION

WSE Consulting Inc. (WSE) was retained to complete a noise and vibration impact study for the proposed development at 239 Dundas Street West, in Belleville, Ontario (the Site). Based on requirements by The Canadian Pacific Railway (CP Rail) and the requirements of the City of Belleville (Belleville) The purpose of this study is to provide an assessment of the proposed land use's compatibility from a noise and vibration perspective.

WSE assessed the impacts from road and rail traffic, as well as potential stationary sources, on the proposed development based on the applicable guidelines of the Ministry of the Environment, Conservation, and Parks (The Ministry) document *NPC-300 Environmental Noise Guideline Stationary and Transportation Sources – Approval and Planning* (MOECC, 2017), and the guideline document prepared for The Railway Association of Canada and the Federation of Canadian Municipalities titled *Guidelines for New Development in Proximity to Railway Operations* (RAC and FCM, 2013).

WSE did not identify any significant airports in the vicinity justifying assessment of aircraft noise. The proposed development is outside of the noise exposure forecast contours for airport at Canadian Forces Base, Trenton.

WSE received rail traffic data from CP Rail to calculate noise impacts using The Ministry calculation method *Sound from Trains Environmental Analysis Method* (Ontario Ministry of the Environment, Conservation, and Parks, 1999) considering current rail traffic volumes and estimated future volumes. In addition, WSE personnel conducted a site visit to collect noise and vibration measurements of train pass-bys at the site. The results of the measured and calculated noise and vibration impacts were assessed against applicable guidelines to assess the potential impact on residential dwellings.

We reviewed the potential noise impacts from the adjacent arterial road, Dundas Street West, as well as stationary noise sources. We screened other offsite noise and vibration influencing operations from assessment due to their distance from the development.

We also assessed the potential for impacts from the proposed development onto the surroundings based on preliminary assumed noise data and in reference to NPC-216

(MOEE, 1993).

Typically, construction activities are exempt from provincial noise guidelines related to land use compatibility. We have summarized the local bylaws relating to construction noise as well as good practice considerations for construction vibration.

All of these assessments are required in order to ensure the proposed development will be in compliance with noise and vibration guideline criteria, therefore supporting the anticipated amendments to the Official Plan and the Zoning Bylaw.

2.0 SITE DESCRIPTION

The proposed development is located at 239 Dundas Street West, in Belleville. The Site includes a single story residential building. The Site is located in a shoreline urban area, fronts onto Dundas Street West, and is adjacent to existing parkland, residential and commercial development. The CP Rail, Belleville Subdivision is located approximately 10 meters south of the property line.

A site location plan showing nearby transportation and stationary noise sources is depicted in Figure 1.

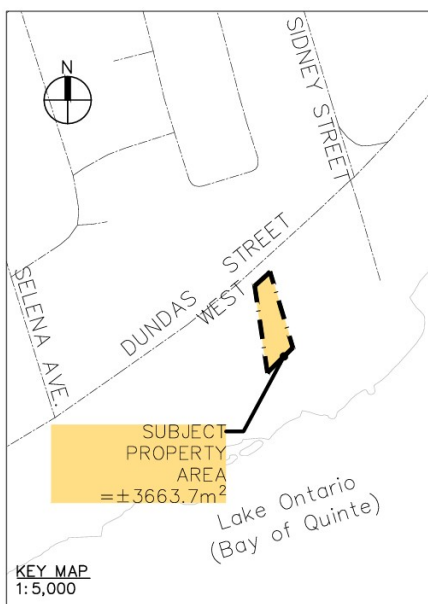


Figure 1 – Site Location Plan

For the purposes of assessment WSE has assumed the Facility's potential operating hours will be 24 hours per day seven days per week.

The North American Industrial Classification System (NAICS) codes that best applies to this facility are 531111 (Lessors of residential buildings and dwellings), 531310 (Real estate property managers) and/or 814110 (Private households).

3.0 IMPACT OF THE ENVIRONMENT ON THE PROPOSED DEVELOPMENT

We completed an assessment of the potential for noise and vibration impacts onto the proposed development from the surrounding environment, including rail vibration, rail noise, road noise, and stationary noise sources.

3.1 Assessment Criteria

For land use planning purposes, the criteria related to noise are detailed in NPC-300. Guideline limits are set for rail and road noise impacts onto a proposed noise sensitive land use, as well as limits for the impacts of stationary noise sources (commercial/industrial operations).

In the case of this proposed developments, the important limits are:

- Sound level limits for rail and road noise impacts onto the proposed facility;
- Sound level limits for stationary noise sources;

An assessment of the existing ambient sound levels due to rail and road traffic in the area is also relevant. The limits for stationary noise sources can be increased in the case of high ambient sound levels. Specifically, if the ambient noise in an area exceeds the exclusionary limits published in NPC-300 that ambient noise level may act as the new sound level limit. This only applies to stationary noise sources.

3.1.1 Rail and Road Noise

The criteria for acceptable levels of rail and road traffic noise at residential development are provided in NPC-300. It requires that for land use compatibility, a future sound level be

used for assessment. Generally, a 10 year prediction is considered appropriate noise controls, or warning clauses are not specifically required if predicted sound levels are less than or equal to 55 dBA in outdoor living areas, and less than or equal to 50 dBA in the plane of bedroom windows during daytime or nighttime.

If the sound level thresholds listed above are exceeded, the recommended outdoor and indoor sound level criteria for road noise impacts for different residential impacts are included in the table below. In the case of interior noise limits, these values assume closed windows and doors.

Table 1 Rail and Road Noise Criteria

Type of Space	Sound Level Criteria (dBA, Leq)			
	07:00 to 23:00		23:00 to 07:00	
	Road	Rail	Road	Rail
Outdoor Living Area	55 (combined)		-	-
Living/Dining/Den Areas of Residence	45	40	45	40
Sleeping Quarters	45	40	40	35

In NPC-300, an outdoor living area (OLA) is part of a noise sensitive land use (e.g. residential dwelling) that is intended and designed for the quiet enjoyment of the outdoor environment, and is readily accessible from the building. In the context of low rise developments, examples of OLAs include balconies with a minimum depth of 4 m, terraces, and common OLAs such as shared terraces, yards, and gardens. For the proposed development, a rooftop patio OLA is considered.

If the 16 hour equivalent sound level ($L_{eq(16)}$) for an OLA is greater than 55 dBA and less than or equal to 60 dBA, then noise control measures may be applied to reduce the sound level to 55 dBA, or, if noise control measures are not applied, then prospective purchasers or tenants shall be informed of potential noise concerns by a warning clause (Type A as defined in NPC300).

If the $L_{eq(16)}$ for an OLA is greater than 60 dBA, then noise control measures shall be applied to reduce the sound level to 55 dBA. In cases where noise control measures are

not feasible for technical, economic, or administrative purposes, then an excess above the 55 dBA limit is acceptable with a warning clause (Type B as defined in NPC-300); though excesses above 60 dBA are not acceptable.

For indoor living areas and sleeping quarters, the sound level criteria are used to determine transmission loss requirements for the building facade based on the predicted sound level at the plane of a window (POW). If the $L_{eq(16)}$ daytime sound level in the plane of a window is less than or equal to 55 dBA, then typical facade constructions are generally sufficient to achieve the indoor sound level criteria, and additional noise controls may not be required. If the sound level in the plane of a window is greater than 55 dBA and less than or equal to 65 dBA, the dwelling shall be designed with a provision for the installation of central air conditioning in the future, at the occupant's discretion, and prospective purchasers or tenants shall be informed of potential noise concerns by a warning clause (Type C as defined in NPC-300).

If the daytime 16 hour equivalent sound level ($L_{eq(16)}$) in the plane of a window is greater than 65 dBA, installation of central air conditioning shall be implemented, and prospective purchasers or tenants shall be informed of potential noise concerns by a warning clause (Type D as defined in NPC-300). Additionally, building facade components shall be designed so that the indoor sound level criterion can be achieved when doors and windows are closed.

In addition, for indoor living areas and sleeping quarters the sound level criteria are used to determine transmission loss requirements for the building facade based on the predicted sound level at the plane of a window (POW). If the eight hour equivalent ($L_{eq(8)}$) nighttime sound level in the plane of a window is less than or equal to 50 dBA, then typical facade constructions are generally sufficient to achieve the indoor sound level criteria, and additional noise controls may not be required. If the sound level in the plane of a window is greater than 50 dBA and less than or equal to 60 dBA, then the dwelling shall be designed with a provision for the installation of central air conditioning in the future, at the occupant's discretion, and prospective purchasers or tenants shall be informed of potential noise concerns by a warning clause (Type C as defined in NPC-300).

If the nighttime $L_{eq(8)}$ in the plane of a window is greater than 60 dBA, installation of central air conditioning shall be implemented, and prospective purchasers or tenants shall be informed of potential noise concerns by a warning clause (Type D as defined in NPC-300). Additionally, building facade components shall be designed so that the indoor sound level criterion can be achieved when doors and windows are closed. The purpose of central air conditioning is to allow the occupant to keep windows and doors closed to achieve a quiet indoor acoustic environment, if required. Installation of all central air conditioning shall comply with ministry guidelines.

3.1.2 Rail and Road Vibration

Vibrations from railways are caused by the wheel-rail interface, and are transferred to the ground and propagate in all directions. Ground-borne vibration propagation is heavily dependent on local soil conditions, and there are no universally accepted methods or guidelines for either the prediction of vibrations, or acceptable levels. The *Guidelines for New Development in Proximity to Railway Operations* recommends that train vibrations be measured for developments within 75 m of a rail line, and that mitigation measures be provided if vibration levels within the building are expected to exceed 0.14 mm/s RMS Slow response (1 second averaging) (0.1 mm/s peak particle velocity (ppv)) at frequencies between 4 Hz and 200 Hz (the generally accepted human threshold of perception).

Due to the nature of road vehicles, with pneumatic tires and suspension systems, it is generally accepted that road traffic will not be a significant source of vibration. In cases where roadway vibration may be an issue this is most commonly be due to a roadway maintenance issues (potholes), in WSE's opinion it is reasonable to assume that roadways will be maintained for land use compatibility studies.

3.2 Noise Assessment

Our noise assessment was conducted using predictive calculations of road and rail noise developed by the Ministry: *Ontario Road Noise Analysis Method for Environment and Transportation* (ORNAMENT) (Ontario Ministry of the Environment, 1999) and *Sound from*

Trains Environmental Analysis Method (STEAM) (Ontario Ministry of the Environment, Conservation, and Parks, 1999).

We evaluated noise impact at the upper story plane of window receptor locations, and at a potential outdoor living area located on the building rooftop.

Where,

- POW – Plane of window receptors representative of the worst case exposure on each side of the buildings in the proposed development.
- OLA – Potential outdoor living area receptor located on the building rooftop.

Our observations and measurements near the Site indicate local road traffic has a significant contribution to local noise levels. The most significant local roadway is Dundas Street West. This arterial type roadway in Belleville has a heightened traffic volume compared to other nearby roads.

Traffic data used for the road noise assessment was obtained from data provided by the Town of Belleville. In relation to development planning, Dundas Street West has an Annual Average Daily Traffic count of 13,296. We applied an assumed increase in traffic volume of 2% per year over 13 years to all traffic counts, to extrapolate future 2031 traffic levels from the 2018 date of the data. We calculated the composition of both roads using a vehicle makeup of 7% medium sized trucks, and 5% heavy trucks. This conservative assumption is based on the City of Ottawa published Noise Control Guidance (City Of Ottawa, 2016). The Town of Belleville does not have detailed noise guidance for reports of this type and so we have utilized City of Ottawa guidance as a best practice. We used ORNAMENT (Ontario Ministry of the Environment, 1999) recommended day/night split of 90%/10% for regional roads, which assumes 90 percent of the daily traffic occurs between 07:00 and 23:00.

Rail traffic data was provided by CP Rail for their operations. Future traffic volumes were predicted from the 2020 data using an increase of 2.5% of traffic per year for 11 years.

We provide traffic data requests and responses Appendix A. STEAM and ORNAMENT calculations are provided in Appendix B.

3.2.1 Noise Impacts – Outdoor Living Spaces

Road noise must be assessed using potential future traffic conditions. The rooftop patio on the building is assumed as a worst case location of the OLA as per the site plan. As noted in Section 3.1.1, if predicted impacts at the OLA due to road traffic are less than or equal to 55 dBA then noise controls would not be required, levels between 55 dBA and 60 dBA would require either noise controls, or warning clauses. Sound levels above 60 dBA would require noise controls and warning clauses.

Based on the noise prediction calculations completed using STAMSON software, the noise impact from nearby major roadways is expected to be greater than 60 dBA for the worst case OLA location on the property. Therefore, both the warning clause A, and a specific noise control measure needs to be considered. As shown in Table 5 a 2 metres tall noise barrier, along the rooftop patio edge (a parapet) will reduce the potential future noise impact to less than 60 dBA which is acceptable according to NPC-300.

Any noise barrier should be constructed to be at least 20 kilograms per metres squared, and constructed with no cracks or gaps, to be 'air tight'.

3.2.2 Noise Impacts – Building Facade

Noise impacts from nearby major roadways are calculated at the building facade and are used to compare to the limits and then potentially to estimate facade requirements needed to achieve the indoor noise criteria.

Proposed controls in the form of a 2.5 m high berm, with 3 m noise barrier on top, along the south property line are included in the calculations as they match the proximity development recommendations for noise and safety contained in The Railway Association of Canada and the Federation of Canadian Municipalities guidelines (RAC and FCM, 2013).

Under NPC-300 requirements any receptor that is within 100 metres of the railway and exposed to a 24 hour sound level greater than 60 dBA must have a façade constructed of masonry from foundation to rafters. In this case the East, South and West Facades meet this requirement for Masonry construction or equivalent. This is typically accepted as a

minimum STC 55 construction. The North side, facing away from the railway does not require masonry however, WSE has provided STC ratings for that façade as well.

The results of WSE's analysis are summarized in appended Table 4 and Table 5.

- Daytime noise levels at all windows (IPOR01 – IPOR04) have the potential to be greater than 65 dBA. Therefore, as per NPC-300, all units must be constructed with the central air conditioning installed. Additionally, the building facade construction shall meet the sound transmission class (STC) values provided in Table 6. Prospective purchasers or tenants should be informed of potential noise concerns by a warning clause (Type D as defined in NPC-300).
- Nighttime noise levels at all windows (IPOR01 – IPOR04) have the potential to be greater than 60 dBA. Therefore, as per NPC-300, all units must be constructed with the central air conditioning installed. Additionally, the building facade construction shall meet the sound transmission class (STC) values provided in Table 6. Prospective purchasers or tenants should be informed of potential noise concerns by a warning clause (Type D as defined in NPC-300).

All the required warning clauses are summarized in Table 5 and detailed in Appendix C.

3.3 Vibration Assessment

Site visits were conducted on November 4th and November 11th, 2025, to collect train pass by vibration measurements. During the site visits, five train pass bys were measured and recorded.

The vertical vibration measurements of train pass bys were measured at a location 30 metres from the rail track. This location was deemed representative of the closest potential structure at the time of the measurements. The actual design setback from the closest edge of the proposed building is approximately 45 metres from the rail track. The ground mounting consisted of digging out the top soil and mounting a 750 mm square plate on the ground with four 150 mm stakes driven in each corner.

Measurements were completed using a PCB Piezotronics integrated circuit piezoelectric accelerometer, modal 393A03, field calibrated with a PCB Piezotronics, model 699B02

handheld shaker. WSE assessed the maximum recorded velocity based on Slow (1 second averaging) signal. Measurement data is provided in Table 7. It was noted that all train passes were below the CP Rail limit at the measurement location. This would suggest that vibration from railway pass bys are not expected to be a concern for the proposed residential development.

3.4 Stationary Noise Sources

NPC-300 Part C provides limits for stationary noise source impacts onto proposed developments. Receptors are classified as Class 1, Class 2, Class 3 or Class 4. The definitions of these classifications are:

- Class 1: an area with an acoustical environment typical of a major population centre, where the background sound level is dominated by the activities of people, usually road traffic, often referred to as "urban hum."
 - Class 2: an area with an acoustical environment that has qualities representative of both Class 1 and Class 3 areas:
 - Sound levels characteristic of Class 1 during daytime (07:00 to 19:00 or to 23:00); and,
 - Low evening and night background sound level defined by natural environment and infrequent human activity starting as early as 19:00 (19:00 or 23:00 to 07:00).
 - Class 3: a rural area with an acoustical environment that is dominated by natural sounds having little or no road traffic, such as:
 - A small community;
 - Agricultural area;
 - A rural recreational area such as a cottage or a resort area; or
 - A wilderness area.
-

- Class 4: an area or specific site that would otherwise be defined as Class 1 or 2 and which:
 - Is an area intended for development with new noise sensitive land use(s) that are not yet built;
 - Is in proximity to existing, lawfully established stationary source(s); and
 - Has formal confirmation from the land use planning authority with the Class 4 area classification which is determined during the land use planning process.
 - Additionally, areas with existing noise sensitive land use(s) cannot be classified as Class 4 areas.

Based on a review of the traffic analysis and on-site sound level measurements and observations, it is WSE's opinion that the proposed development is a Class 1 receptor. Designation as a Class 4 receptor may also be made but would require specific confirmation from the land use planning authority. The stationary noise source limits for each of the receptor classes are included in the following tables:

Table 2 Stationary Noise Criteria Outdoor Living Areas

	Class 1	Class 2	Class 3	Class 4
Time of Day	(dBA)	(dBA)	(dBA)	(dBA)
07:00-19:00	50	50	45	55
19:00-23:00	50	45	40	55

Table 3 Stationary Noise Criteria Plane of Window

	Class 1	Class 2	Class 3	Class 4
Time of Day	(dBA)	(dBA)	(dBA)	(dBA)
07:00-19:00	50	50	45	60
19:00-23:00	50	50	40	60
23:00-07:00	45	45	40	55

These limits are exclusionary for each class and time period under NPC-300, the higher of either the exclusionary limits, or the current ambient noise levels measured or predicted in accordance with Ministry guidelines in the area shall be used as the sound level limits.

This means, if the ambient noise level is in fact higher than the sound levels listed above as the exclusionary limits, then the ambient noise level will be the sound level limit. No long term monitoring has been conducted.

3.4.1 Types of Stationary Noise Sources

This section relates to the impacts of existing stationary noise sources in the vicinity to the proposed development. NPC-300 says a proposed sensitive land use is required to ensure that compliance is maintained for any nearby approved stationary noise source. Ontario Regulation 524/98 exempts many types of smaller stationary noise sources from approval, therefore many nearby businesses may not have approvals in place. Exemption from approval does not mean exemption from noise guidelines and so we reviewed nearby smaller commercial operations, as well as those that have approvals or registrations in place.

3.4.2 Negligible and Exempt Stationary Sources

Along Dundas Street West, there are: existing residential developments, retail stores, restaurants, and offices. While most of these operations have rooftop air handling units, these types of operations are typically exempt from environmental approvals. Also, all these operations are located such that there are existing noise sensitive points of reception located nearer to them than the proposed development. This means it is unlikely the proposed development will create a new noise compliance issue.

Ambient noise measurements and observations indicate that the area is one with an urban hum background noise.

3.4.3 Approved Stationary Sources

We conducted a search for existing Ministry Air and Noise Environmental Compliance Approvals, and Activity and Sector Registrations in the vicinity. Air and noise approvals were identified at approximately at 200 metres to the Southeast for the City of Belleville sewage pumping station at 325 Dundas Street West. These approvals have existing sensitive receptors located much closer to them than the proposed development, and since the guidelines require compliance for these sites at these much closer noise sensitive receptors, compliance will be achieved at the proposed development.

4.0 IMPACT OF THE PROPOSED DEVELOPMENT ONTO THE ENVIRONMENT

This assessment is to confirm that the facility is likely capable of complying with NPC-300, NPC-216, and local bylaws at the nearby sensitive receptors. The regular road traffic as a result of this proposed development will not be significant in comparison to existing traffic levels in the area.

The City of Belleville By-Law (2011-180) to Regulate Noise (The Corporation of the City of Belleville, 2011) will be applicable to certain activities at the Site. The specifics of the by-laws is detailed in section 4.4.

It is noted again that the majority of the operations proposed on site would not normally be assessed using NPC-300 since they will likely be exempt from approval under Ontario Regulation 524/98, however, that exemption does not apply to land use planning, therefore WSE has applied NPC-300 to assess the Site as recommended in NPC-300. Note that NPC-300 specifically does not address residential air conditioning units, referring the reader instead to NPC-216. Any heating, ventilation, and air conditioning (HVAC) equipment that serves one single dwelling unit would generally be considered under NPC-216 rather than NPC-300. Any equipment at the proposed development that serves common areas, or the entirety of the building should be considered under NPC-300.

With respect to specific sound level limits, WSE has applied NPC-216 in relation to the residential HVAC units proposed to be used at the Site. Typically, it is anticipated this type of operation would be controlled by local noise bylaws and the land use planning process.

4.1 Noise Source Summary

The building is proposed; therefore direct measurements of the operations were not completed. Based on WSE's experience with similar buildings and in discussion with the developer, we utilized manufacturer's specifications to develop a representative design. The definitions of NPC-300 indicate that general parking lot vehicle activity would not be considered a significant noise source. WSE also understands that the building will utilize a "Condo Pack" type HVAC unit for each dwelling, meaning that NPC-216 will apply to those sources. At this time WSE understands there are no common element systems that need to be considered under NPC-300, if they do enter the design at a later date, they should be addressed for compliance with NPC-300.

The significant majority of the noise produced by this type of facility is produced by HVAC units, and ventilation fans. Representative potential sources are summarized in Appendix D and detailed below. The worst case potential locations of these sources can be found on Figure 2.

- AHU01, AHU02, AHU03, AHU04 – These stationary sources represent potential HVAC units located in the west facing exterior wall of the residential units of the building. Manufacturer's Specifications are provided for Napoleon 'Condo Pack' units.
- AHU05, AHU06, AHU07 – These stationary sources represent potential HVAC units located in the east facing exterior wall of the residential units of the building. Manufacturer's Specifications are provided for Napoleon 'Condo Pack' units.

If the Site ensures it does not select equipment outside of the descriptions provided in O.Reg 524/98, the building will not be required to obtain approval or registration from the Ministry. However it should be designed to comply with the sound level limits of NPC-300 and/or NPC216 where applicable.

This analysis shall be updated to confirm compliance with NPC-300 and NPC-216 during the detailed design stage. Alternatively, the final design may be reviewed in comparison to the sound levels and equipment layout used in this report to confirm compliance.

Detailed design of the proposed development has not yet been completed; therefore this assessment shall be reviewed by a qualified person prior to finalization of the detailed building design. This assessment is only related to the outdoor noise as per the Ministry guideline; no consideration has been made for building code requirements internal to the building, or internal sound levels, or transmission. These details should also be considered during the detailed design process.

4.2 Point of Reception Summary

Four PORs were identified as being representative of the most sensitive receptors in the vicinity of the Site, labeled as POR01 through POR04 depicted on Figure 1 and Figure 2. Ministry noise guidelines say a “Point of Reception” is a sensitive noise receptor including residential buildings, schools, places of worship, and hospitals (an office or commercial building is not considered a Point of Reception). WSE also designated ‘self-impact’ receptors to represent the points of reception of the neighbouring units of the development itself. For assessment purposes we selected the points with the predictable worst case noise impacts as follows:

- POR1_A represents a class 1 plane of window receptor, modeled at 1.5 metres, for a one story private residential building located at 418 Dundas Street West, north of the Site;
 - POR1_B represents a class 1 outdoor living area receptor, modeled at 1.5 metres, at the property line in the direction of the Site.
 - POR2_A represents a class 1 plane of window receptor, modeled at 7.5 metres, for a three-story private residential building located at 414 Dundas Street West, north of the Site;
 - POR3_A represents a class 1 plane of window receptor, modeled at 4.5 metres, for a two-story private residential building located at 411 Dundas Street West, east of the Site;
-

- POR3_B represents a class 1 outdoor living area receptor, modeled at 1.5 metres, along the property line to the southeast.
- POR4_A represents a class 1 plane of window receptor, modeled at 4.5 metres, for a two-story private residential building located at 423 Dundas Street West, west of the Site;
 - POR4_B represents a class 1 outdoor living area receptor, modeled at 1.5 metres, along the property line to the southwest.
- IPOR01 – IPOR05 – Represent the potential worst-case locations of same structure receptors. These receptors are related to preliminary design specifications. It is recommended that an acoustic consultant review the final design with respect to environmental noise self-impacts to ensure the applicable limits will be achieved. Potential structural sound transmission concerns were not assessed.

4.3 Assessment Criteria

The proposed Facility and surrounding receptors are located in close proximity to Dundas Street West in Belleville, Ontario and are best defined as Class 1 area based on traffic noise predications. The Site and all receptors have been characterized as per NPC-300 and per NPC-216.

In NPC-216, with respect to window or through-the wall type HVAC devices, the specific sound level limits for Class 1 areas is a one hour Leq of 50 dBA.

However, if the residential type HVAC devices are mandatory requirements for noise control in the interior spaces of new land use developments, as they are in the case of this development per section 3.2.2 of this report, than the specific sound level limit is a one hour Leq of 55 dBA.

4.4 Municipal By-Laws

The City of Belleville By-Law to Regulate Noise will apply to the Site and makes the following general prohibition in Section 2:

-
- “No person shall, at any time, make, cause or permit a noise that is likely to disturb the inhabitants of the City of Belleville.”

The following section 3, elaborates:

- “Without limiting the generality of Section 2 of this by-law, the noise from the sources described in Schedule ‘A’ are noises which in the opinion of Council are unreasonable and are or could become public nuisances.”
- Where schedule A lists various noise sources and their related prohibited periods such as;

Table 4 Bylaw Details

Particulars of Noise	Prohibited Period
General construction	7:00 pm of one day to 7:00 am of the next day, and All day Sundays and Statutory Holidays
Un-muffled construction equipment	At any time
Fireworks	11:00 pm of one day to 7:00 am of the next day...
Persistent barking, calling	At any time
Racing motor vehicles	At any time
Etc.	

Section 4 and 5 of the bylaw provide some exceptions such as: church bells, audible traffic signals, police, fire, and emergency vehicles, and the operation of construction equipment under certain conditions.

The bylaw specifics with respect to construction noise is further explored in section 4.6 of this report.

It is generally assumed that compliance with Ministry sound level limits would imply that the Facility is not disturbing nearby land uses. It should be noted that these by-law prohibitions should also be applied to the Site during construction.

4.5 Noise Impact Assessment

Our acoustic analysis at the PORs incorporates the noise emission points as described in Section 4.1. We based sound power levels for equipment on manufacturers' specifications. We detail the corresponding sound power level calculations from each noise producing unit. The assumed, most conservative, sound power levels in accordance with the Ministry's requirement for "worst case" noise source sound power levels are summarized in Appendix D.

As a design planning report, the sound powers used in this assessment are for feasibility only and shall be updated based on final design.

In this case, WSE used manufacturer data to set power levels, however we used measurements of similar HVAC equipment to create a useful spectrum of noise, since the manufacturer data did not include octave band information. Two different power levels are assigned to the HVAC equipment representing the "straight out" noise path toward the offsite receptors, and the "along wall horizontally" noise path potentially toward the same structure receptors of other residential units in the same building as the source.

We do not expect any of the sources to be tonal in nature.

The calculated minimum separation distance between a source and an offsite receiver, that results in a "straight out" noise impact which is less than the applicable limit as defined in section 4.3 is 3.8 metres.

As per the current site plans provided by the developer, the minimum separation distance defined above is achieved for all offsite receptors.

With respect to same structure impacts, the "along wall horizontally" sound power level results in a minimum separation distance of 1.6 metres.

Table 5 Minimum Separation Distances

Receptor Type	Minimum Separation Distance (m)
Offsite POR "Straight out"	3.8
Same Structure IPOR "along wall horizontally"	1.6

The above assessment considered a worst-case point of reception for indoor and outdoor receptors, and a worst case sound level from operations, thereby indicating conservative estimates for potential noise impact.

Full verification at this level of detail is not possible without finalized designs, though this study demonstrates that the proposed development is feasible, and unlikely to exceed guideline noise limits at nearby off-site sensitive receptors. Note that if the final construction proceeds using the same units listed in this report, an updated assessment may not be required.

Additionally, units could be selected to match the sound power levels provided in this report.

4.6 Construction Noise

Typically, construction activities are not included in noise studies as they are usually exempt from guidelines. Despite this the Ministry and the City both have guidelines and by-laws that would apply as follows:

- As noted in Section 4.4 the City of Belleville By-Law to Regulate Noise will apply to the Site and makes the following prohibition: "No person shall, at any time, make, cause or permit a noise that is likely to disturb the inhabitants of the City of Belleville." However, this statement is further qualified with definitions, and a schedule "Schedule A" relating sounds of specific origin to prohibited time periods. Construction specifically is defined as:
 - "construction" means the erection, alteration, repair, painting, maintenance, relocation, demolition, or removal of a building or other structure and includes all land clearing, landscaping, earth moving, grading, excavating, all

public works activities, the erection or laying of lines, cable, pipes and conduit (whether above or below ground level), street building, paving, concerting and similar activities on a site and the installation, alteration, or removal of construction equipment, components and materials in any form or for any purpose, and any work being done in connection therewith.”

- Exceptions are provided for construction such as:
 - The provisions of the Bylaw shall not apply to any sound caused by:
 - The noise caused by the erection, demolition, alternation or repair of a building or by construction or earth-moving equipment working upon a site highway when such work is undertaken by forces of The Corporation of the City of Belleville, any other public utility, or their agents or servants
 - The noise arising from the operation of construction or construction equipment on any day other than a Sunday or holiday between the hours of 7:00 am and 7:00 pm. This exemption shall not apply to construction equipment being operated without the originally installed muffling devices or their equivalent in good working order and in constant operation;
- Any construction equipment used on site should comply with Ministry guideline NPC-115 “Noise Due to Construction Equipment”, which provides specific sound level requirements for construction equipment. Most modern construction equipment will meet this requirement provided mufflers are maintained.

4.7 Construction Vibration

The following preliminary evaluations are made for the construction vibrations related to the Proposed Development.

For evaluating the potential damage effects due to vibration from construction activities at the Site, the calculation procedure was used as defined in Chapter 12 of the *Transit Noise and Vibration Impact Assessment* (US DOT, 2006). The assessment criteria defined in this document is less conservative than as defined in the *City of Toronto by-law Number 514-*

2008 (City of Toronto, 2008), therefore the city of Toronto criteria was used as a local best practice. The city of Toronto criteria defines the ‘zone of influence’ as the area potentially impacted by vibrations emanating from the construction activity where the peak particle velocity measured at the point of reception is equal to or greater than 5 mm/sec.

The required setbacks can be calculated using the reference vibration source levels given in Chapter 12 of the *Transit Noise and Vibration Impact Assessment* and the associated equation:

$$PPV_{\text{equip}} = PPV_{\text{ref}} \times (25/D)^{1.5}$$

Where,

- PPV (equip) is the peak particle velocity in in/sec of the equipment adjusted for distance;
- PPV (ref) is the reference vibration level in in/sec at 25 feet (7.6 metres) from Table 122; and
- D is the setback distance from the equipment to the receiver.

The following table summarizes the vibration impact of various potential construction processes and the resulting zone of influence setback distances in order to maintain compliance with the construction vibration criteria.

Table 6 Summary of Construction Vibration Setbacks

Standard Potential Equipment	PPV _{ref} at 25 ft (in/sec)	Zone of Influence Setback (m) ¹
Pile Driver (impact, upper range))	1.518	29.93
Pile Driver (Sonic, upper range)	0.734	18.44
Clam shovel drop (slurry wall)	0.202	7.80
Vibratory Roller	0.210	8.01
Hoe Ram	0.089	4.52
Large bulldozer	0.089	4.52

Caisson drilling	0.089	4.52
Loaded trucks	0.076	4.07
Jackhammer	0.035	2.42
Hydromill (slurry wall, in rock)	0.017	1.50
Hydromill (slurry wall, in soil)	0.008	0.91
Small bulldozer	0.003	0.47

¹ Criteria of PPV = 5 mm/sec (0.195 in/sec), as per City of Toronto by-law Number 514-2008.

Once the construction methods of the proposed Facility have been decided, the locations of specific activities should be reviewed along with zone of influence setbacks to confirm whether or not pre-construction condition surveys and vibration monitoring are required.

The nearest existing structure is the residential building directly to the east (235 Dundas Street West). The structure is potentially less than 15 meters from the nearest area of construction.

The foundation construction method selected will be critical to ensure damage does not occur. As a site in a built-up area, it is recommended that construction methods be selected to be as low impact as possible.

Again, it should be noted that the setbacks indicated here are the zone of influence setbacks as defined in the City of Toronto By-law (City of Toronto, 2008). This by-law was selected as a best practice based on the fact that a search for local by-laws did not indicate specific construction vibration by-law locally.

These setback distances do not preclude construction but only indicate that if a structure or underground utility is within this distance it should be considered for pre-construction survey and monitoring during construction. The City of Toronto limits for construction vibration are provided below:

Table 7 Prohibited Construction Vibrations

Frequency of Vibraton (Hz)	Vibration Peak Particle Velocity (PPV) (mm/sec)	PPV (in/s)
Less than 4	8	0.31
4 to 10	15	0.59
More than 10	25	0.98

- As per City of Toronto by-law Number 514-2008.

We believe that construction vibration should be re-visited once detailed design as well as specific construction methods and equipment use locations are known in order to confirm that preconstruction surveys and monitoring are not required. Depending on the location and type of equipment used in construction, many more structures could be impacted during the construction process.

Any assessment of construction vibration shall also assess the appropriate limits to apply to the nearby structures. Sensitive structures may require even lower limits, however that is beyond this scope of work.

We have only assessed visible above grade structures; it is possible that there are below grade utilities that shall be considered.

5.0 RECOMMENDATIONS

In summary WSE has made the following recommendations:

- Layout of equipment and building features may affect noise impacts, and therefore the controls required. Receptors and buildings shall be laid out as shown in this report or calculations would require revision;
- We have provided extensive recommendations regarding warning clauses for the building. Please review section 3.2 and Table 5 of this report for the detailed descriptions and warning clause selections. All the required warning clauses are detailed in Appendix C.

- We have defined required controls due to the noise impact from local road and rail traffic. Please review Section 3.2 and Table 6 of this report for the detailed descriptions.
- Any deviation from the preliminary Mechanical designs provided to create this report should be reviewed by a qualified person to confirm compliance with NPC-300 and/or NPC-216.
- Construction activity may not occur outside of 07:00 to 19:00, or on Sundays and statutory holidays, as per the noise by-law; and
- Construction vibration shall be assessed once construction methods are finalized, confirming the potential zone of influence and requirement for any pre-construction condition surveys and vibration monitoring. It is possible that selecting low impact construction methods could negate this requirement.
- It is recommended that some type of certification procedure be in place to confirm the implementation and consideration of the recommendations of this report are implemented during construction either by design team professionals, or acoustic professionals.

6.0 CONCLUSIONS

WSE Consulting Inc. (WSE) was retained to complete a noise and vibration impact study for the proposed development at 239 Dundas Street West, in Belleville, Ontario (the Site). Based on requirements by The Canadian Pacific Railway (CP Rail) and the requirements of the City of Bellville (Belleville) The purpose of this study is to provide an assessment of the proposed land use's compatibility from a noise and vibration perspective.

The results of this Noise Impact Study indicate based on the information provided to WSE that the proposed development can be constructed in accordance with NPC-300 under the defined conditions, assumptions, and recommendations. This report was also prepared to support the proposed building design and feasibility related to official plan and zoning amendment. The contents of this report, including its analysis, shall be reviewed during the

final design to ensure any alterations made will not affect compliance.

This report outlines detailed warning clause considerations, and noise control requirements. As well as a preliminary assessment of the facility's impacts onto the surroundings.

Based on the terms, conditions and assumptions in this report, it is our opinion that the proposed development is feasible from a noise perspective provided that the Recommendations and warning clauses of this report are implemented.

We trust the above information meets your needs at this time and should you have any further questions or concerns, please do not hesitate to contact our office.

Sincerely,

WSE Consulting



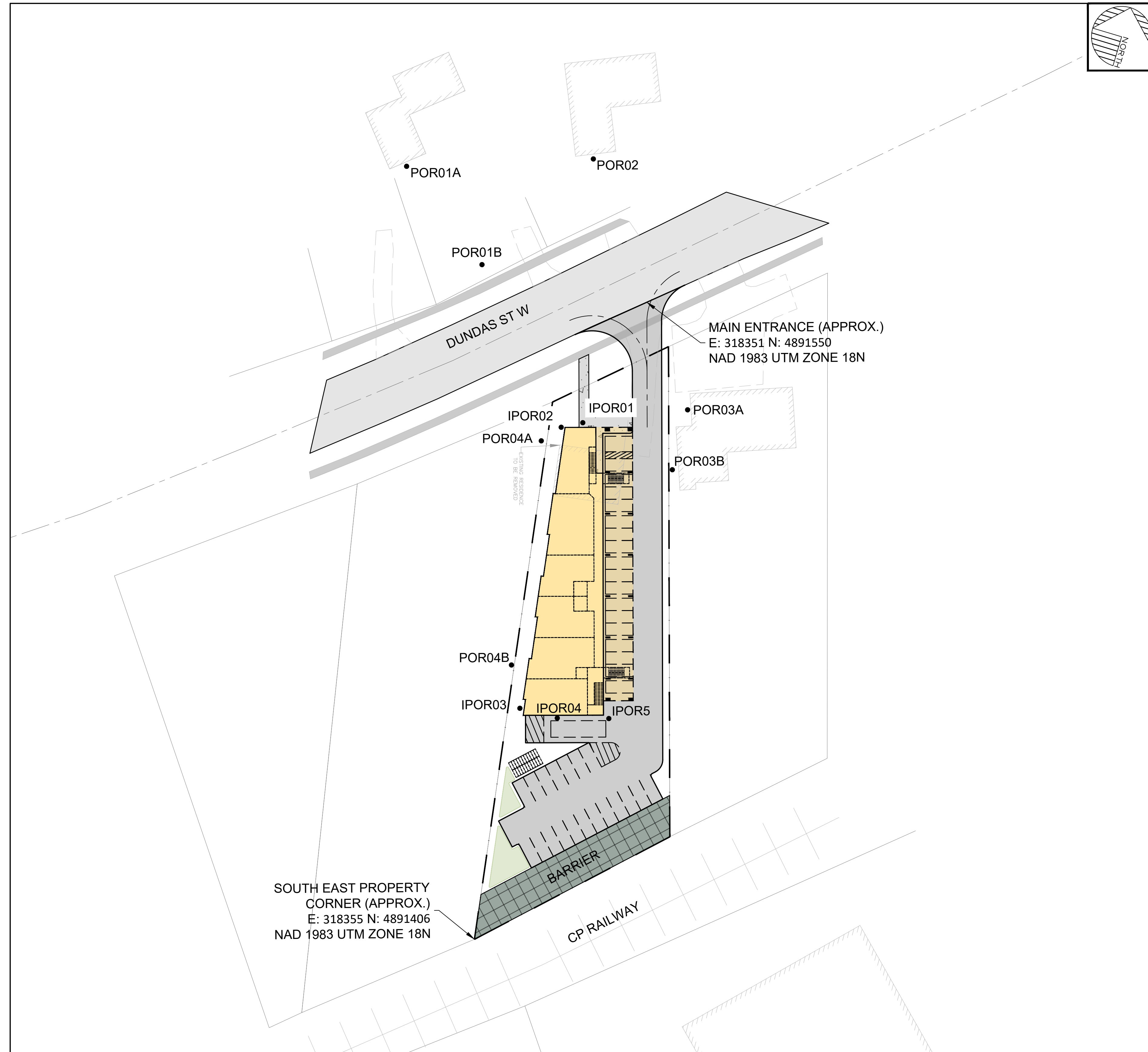
Adam Wilson, P. Eng.
Principal/Senior Engineer

7.0 REFERENCES

- Bies, D. A. (2003). *Engineering Noise Control Theory and Practice*. New York: Spon Press.
- City Of Ottawa. (2016). *Environmental Noise Control Guidelines*.
- City of Toronto. (2008). *By-Law No. 514-2008, Vibration from Construction Activity*.
- ISO. (1996). *ISO 9613-2 Acoustics - Attenuation of Sound During Propagation Outdoors - Part 2: General Method of Calculation*. International Organization for Standardization.
- MOECC. (2017). *NPC-300 - Environmental Noise Guideline Stationary and Transportation Sources - Approval and Planning*. Ontario Ministry of the Environment and Climate Change.
- MOEE. (1993). *NPC-216 - Residential Air Conditioning Devices*. Ministry of the Environment and Energy.
- Ontario Ministry of the Environment. (1999). *ORNAMENT Ontario Road Noise Analysis Method for Environment and Transportation*.
- Ontario Ministry of the Environment, Conservation, and Parks. (1995). Publication NPC-205:
Sound Level Limits for Stationary Sources in Class 1 and 2 Areas (Urban).
- Ontario Ministry of the Environment, Conservation, and Parks. (1999). *STEAM Sound from Trains Environmental Analysis Method*.
- Quirt, J. D. (1985). *Controlling Sound Transmission into Buildings*. NRC Publications Archive.
- RAC and FCM. (2013). *Guidelines for New Development in Proximity to Railway Operations*.
Railway Association of Canada and Federation of Canadian Municipalities.
- The Corporation of the City of Belleville. (2011). *By-Law No. 2011-180*.
- US DOT. (2006). *Transit Noise and Vibration Impact Assessment*. US Department of Transportation.
-

APPENDED FIGURES





LEGEND

- Approximate Subject Property
- Building
- Receiver

- Major Road
- Minor Road
- ++++ Railroad

REV.#	REVISIONS	DATE	INITIAL
0	PRELIMINARY DESIGN	02/10/26	CCS

Not Valid Unless Signed And Dated

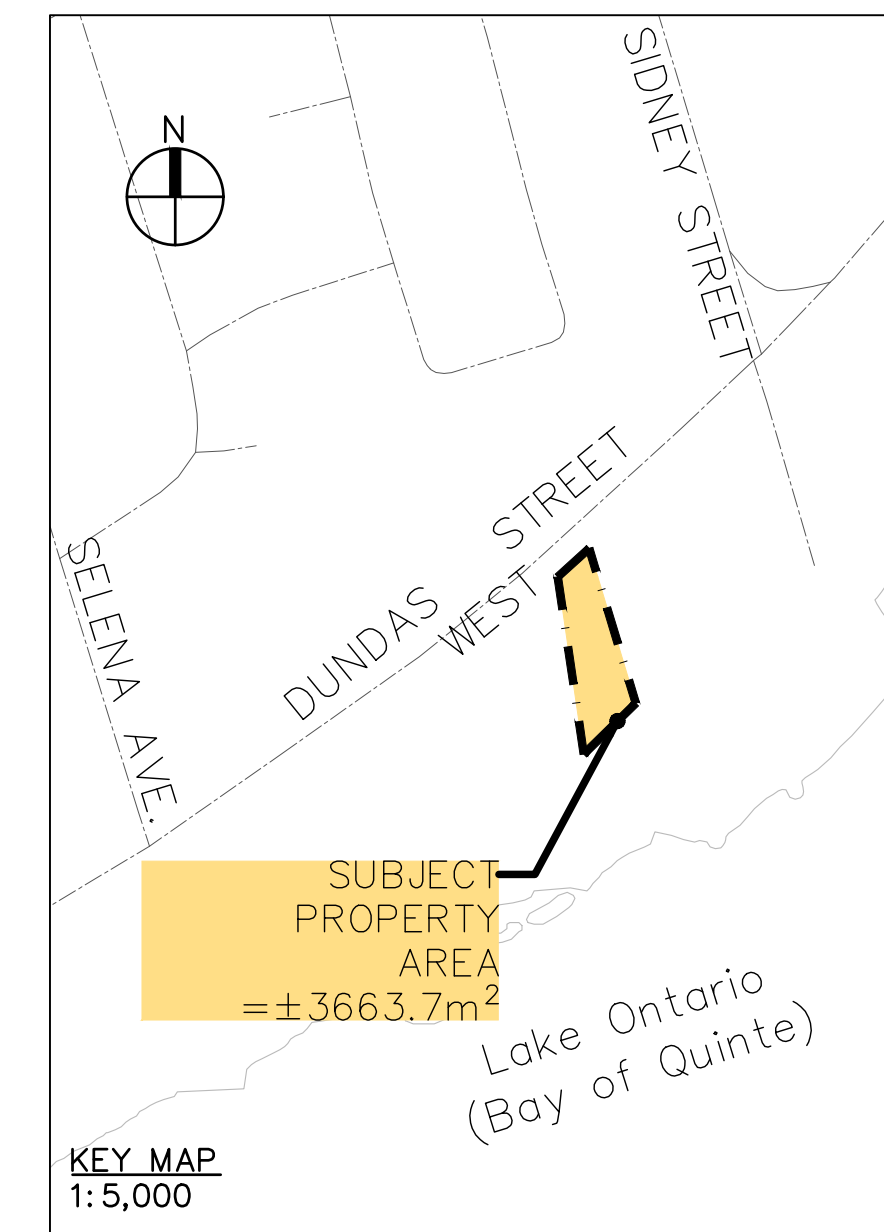
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 DATE: JAN 2026

293 DUNDAS STREET WEST
 CITY OF BELLEVILLE

FIGURE 1 - SITE PLAN

WSE

DWG



ID	EASTING	NORTHING	HEIGHT (m)
AHU01	308341	4891515	4.5
AHU02	308344	4891494	4.5
AHU03	308347	4891473	4.5
AHU04	308349	4891460	4.5
AHU05	308371	4891475	4.5
AHU06	308365	4891493	4.5
AHU07	308360	4891510	4.5

NOTES:
1. Property Boundaries are approximate.

LEGEND
 - - - - - Approximate Subject Property
 ■ Building
 ● Point Source

— Major Road
 - - - Minor Road
 + + + + + Railroad

■ Barrier

REV.#	REVISIONS	DATE	INITIAL
0	PRELIMINARY DESIGN	02/10/26	CCS

Not Valid Unless Signed And Dated

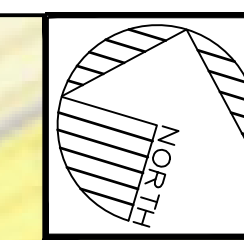
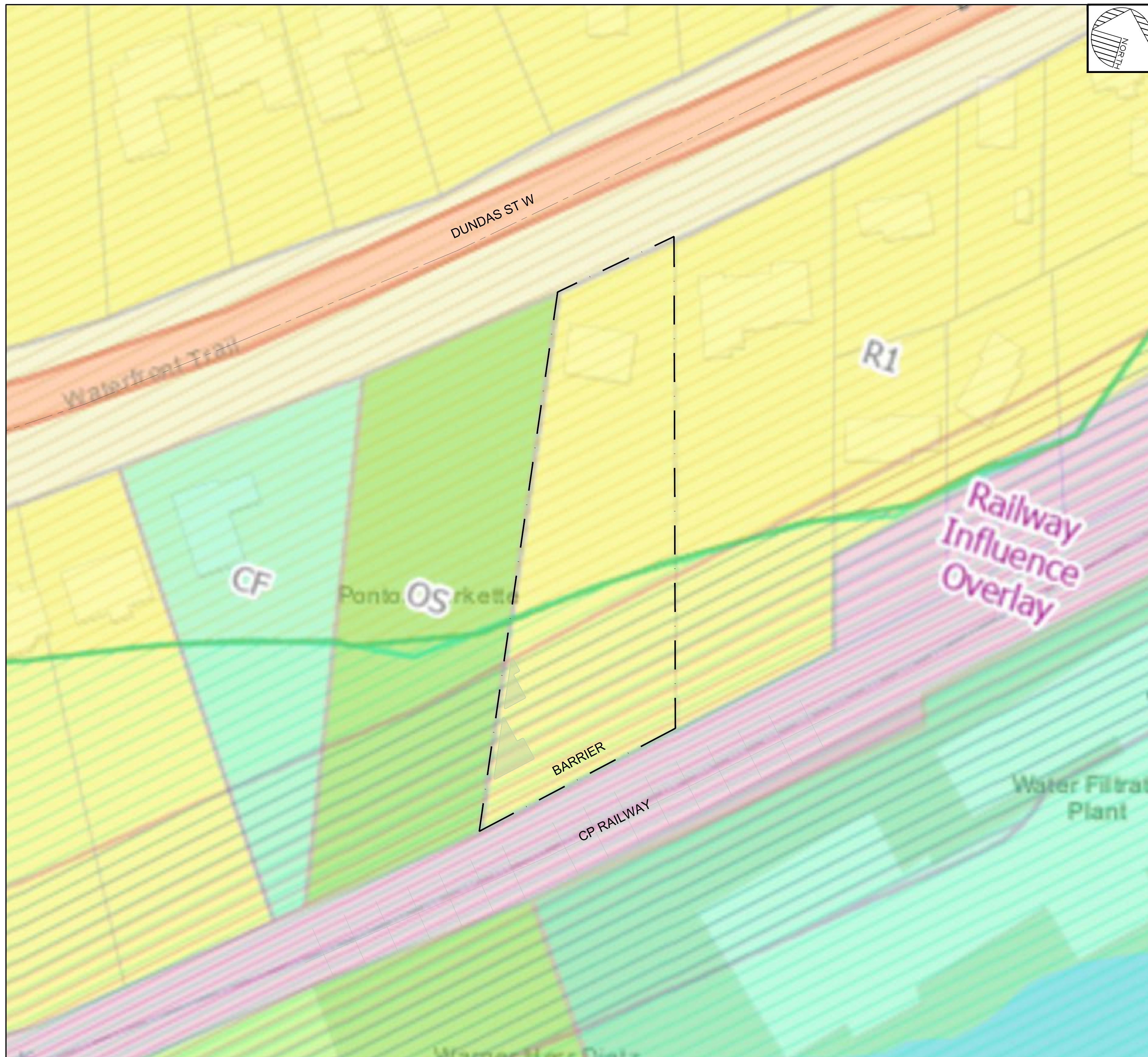
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 CHECKED: AJW
 DATE: JAN 2026

293 DUNDAS STREET WEST
 CITY OF BELLEVILLE

FIGURE 2 - SITE PLAN

WSE

DWG



NOTES:
 1. Property Boundaries are approximate.

LEGEND
 [---] Subject Property
 [---] Standard Parking Space (6m x 2.7m)

▶ Proposed At Grade Entrance
 — Existing Contour Elevations (0.5m approx.)

REV.#	REVISIONS	DATE	INITIAL
0	PRELIMINARY DESIGN	02/10/26	CCS

Not Valid Unless Signed And Dated

SCALE: 1:500
 DESIGN: CCS
 DRAWN: CCS
 CHECKED: AJW
 DATE: JAN 2026

293 DUNDAS STREET WEST
 CITY OF BELLEVILLE

FIGURE 3 - ZONING

WSE

DWG

APPENDED TABLES



Noise and Vibration Impact Study – 239 Dundas St. W.

Table 1 - Traffic Noise Results Summary – Current

Source	Time	Minimum hourly traffic	Traffic Breakdown, (Day/Night)			Receptor	Notes	Impact due to background traffic (dBA)
			Cars	Med. Trucks	Heavy Trucks			
Dundas St W, east of Wallbridge	Day	283	249	20	14	22 metres	13.5 m Height	62.2
Dundas St W, east of Wallbridge	Evening	61	54	4	3	22 metres	13.5 m Height	55.5
Dundas St W, east of Wallbridge	Night	7	6	0	0	22 metres	13.5 m Height	-
Dundas St W, east of Wallbridge	Day	283	249	20	14	65 metres	13.5 m Height, Side	53.1
Dundas St W, east of Wallbridge	Evening	61	54	4	3	65 metres	13.5 m Height, Side	46.3
Dundas St W, east of Wallbridge	Night	7	6	0	0	65 metres	13.5 m Height, Side	-

Noise and Vibration Impact Study – 239 Dundas St. W.

Table 2 - Traffic Noise Impact Summary – Future

Source	Ref. 2018 AADT Traffic Volume 1	Forecasted 2031 Traffic Breakdown, (Day/Night) ²			Receptor	Notes	Impact due to background traffic (dBA)	
		Cars	Med. Trucks	Heavy Trucks			Day	Night
IPOR01	13296	13622/1514	1084/120	774/86	22 metres From Dundas St W, Front	13.5 m Height	67.6	61.0
IPOR02	13296	13622/1514	1084/120	774/86	22 metres From Dundas St W, Side	13.5 m Height	64.6	58.0
IPOR03	13296	13622/1514	1084/120	774/86	65 metres From Dundas St W, Side	13.5 m Height, Side	58.4	51.9
IPOR04	13296	13622/1514	1084/120	774/86	65 metres From Dundas St W, Back	13.5 m Height, Back	46.4	39.9
IPOR5_A - OLA North	13296	13622/1514	1084/120	774/86	29 metres From Dundas St W, 2 m parapet	16.5 m Height, Rooftop	54.2	47.7
IPOR5_B - OLA South	13296	13622/1514	1084/120	774/86	65 metres From Dundas St W, Back	13.5 m Height, Back	46.4	39.9

Noise and Vibration Impact Study – 239 Dundas St. W.

Table 3 - Train Noise Impact Summary – Future

Source	Number of Trains 2020 (Day/Night) ¹	Forecasted 2031 Trains (Day/Night) ¹	Speed (km/h)	Locomotives per train ¹	Cars per train ¹	Receptor	Notes	Impact from trains (dBA)	
								Day	Night
IPOR01	7/3	9.2/3.9	60	4	211	85 metres From CP Rail Track, Back, Barrier	16.5 m Height, Back	50.11	49.39
IPOR02	7/3	9.2/3.9	60	4	211	85 metres From CP Rail Track, Side, Barrier	16.5 m Height, Side	62.11	61.39
IPOR03	7/3	9.2/3.9	60	4	211	45 metres From CP Rail Track, Side, Barrier	16.5 m Height, Side	65.48	63.33
IPOR04	7/3	9.2/3.9	60	4	211	45 metres From CP Rail Track, Front, Barrier	16.5 m Height	68.48	66.33
IPOR5_A - OLA North	7/3	9.2/3.9	60	4	211	85 metres From CP Rail Track, Back, Barrier	16.5 m Height, Back	50	49
IPOR5_B - OLA South	7/3	9.2/3.9	60	4	211	50 metres From CP Rail Track, Front, Barrier 2 m parapet	19.5 m Height, on Rooftop	58.2	57.6

Noise and Vibration Impact Study – 239 Dundas St. W.

Table 4 - Combined Traffic Noise Results Summary and Noise Controls

Receptor	Description	Road	Rail	Noise Impact (dBA, Leq)					
				07:00 to 23:00		23:00 to 07:00			
				Combined	Minimum Controls	Road	Rail	Combined	Minimum Controls
IPOR01	North Facing Windows	67.6	50.1	67.6	WC D + Install AC +STC	61.0	49.4	61.3	WC D + Install AC +STC
IPOR02	East, West Facing Windows	64.6	62.1	66.5	WC D + Install AC +STC+ Masonry	58.0	61.4	63.0	WC D + Install AC +STC+ Masonry
IPOR03	East, West Facing Windows	58.4	65.5	66.3	WC D + Install AC +STC+ Masonry	51.9	63.3	63.6	WC D + Install AC +STC+ Masonry
IPOR04	South Facing Windows	46.4	68.5	68.5	WC D + Install AC +STC+ Masonry	39.9	66.3	66.3	WC D + Install AC +STC+ Masonry
IPOR05_A	OLA - Rooftop North	54.2	50.1	55.7	WC A + Controls	47.7	49.4	51.6	WC A + Controls
IPOR05_B	OLA - Rooftop South	46.4	58.2	58.4	WC A + Controls	39.9	57.6	57.6	WC A + Controls

Table 5 - Noise Control Summary

<p>IPOR1 (North Windows)</p>	<p>Warning Clause D is required. Also required is the installation of central air conditioning and building façade construction with specified noise reductions STC 39 walls, STC 33 windows.</p>
<p>IPOR2 (North End Side Windows)</p>	<p>Warning Clause D is required. Also required is the installation of central air conditioning and building façade construction with specified noise reductions STC 55 walls, STC 32 windows.</p>
<p>IPOR3 (South End Side Windows)</p>	<p>Warning Clause D is required. Also required is the installation of central air conditioning and building façade construction with specified noise reductions STC 55 walls, STC 33 windows.</p>
<p>IPOR4 (South Windows)</p>	<p>Warning Clause D is required. Also required is the installation of central air conditioning and building façade construction with specified noise reductions STC 55 walls, STC 35 windows.</p>
<p>IPOR5 (Rooftop Patio OLA)</p>	<p>Warning Clause A is required. Also required is the installation of a 2 metre parapet around the rooftop patio area or at the edge of the building.</p>

Table 6 - Required STC Calculations (BPN 56 Calculation)

POR1A Windows

Day Time Sound Level		Units	Notes
Outdoor Sound Level		67.6 dBA	
Free Field Correction		3 dBA	
Required Indoor Sound Level		40 dBA	
Required Reduction		30.6 dBA	
Incident Sound Angle	0-90	degrees	
Angle Correction Factor (BPN 56)		0 dB	BPN 56 Table 2
Percentage of Transmission Wall		50 %	
		3 dB	BPN 56 Table 3
Percentage of Transmission Window		50 %	
Transmission Calculations (assumed dimensions)		3 dB	BPN 56 Table 3
Wall Percent of floor		50.00% assumed	
Window Percent of floor		25.00% assumed	
Room Absorption		Intermediate	
Room Correction - Wall		-2 dB	BPN 56 Table 4
Room Correction - Window		-5 dB	BPN 56 Table 4
Spectrum type		D	BPN 56 Figure 1
Component Category		d, c	BPN 56 Table 5
Frequency correction – Wall		7 dB	BPN 56 Table 5
Frequency correction – Window		4 dB	BPN 56 Table 5
Min Required STC Rating Wall		39	
Min Required STC Rating Window		33	

Night Time Sound Level		Units	Notes
Outdoor Sound Level		61.3 dBA	
Free Field Correction		3 dBA	
Required Indoor Sound Level		35 dBA	
Required Reduction		29.3 dBA	
Incident Sound Angle	0-90	degrees	
Angle Correction Factor (BPN 56)		0 dB	BPN 56 Table 2
Percentage of Transmission Wall		50 %	
		3 dB	BPN 56 Table 3
Percentage of Transmission Window		50 %	
Transmission Calculations (assumed dimensions)		3 dB	BPN 56 Table 3
Wall Percent of floor		50.00% assumed	
Window Percent of floor		25.00% assumed	
Room Absorption		Intermediate	
Room Correction - Wall		-2 dB	BPN 56 Table 4
Room Correction - Window		-5 dB	BPN 56 Table 4
Spectrum type		D	BPN 56 Figure 1
Component Category		d, c	BPN 56 Table 5
Frequency correction – Wall		7 dB	BPN 56 Table 5
Frequency correction – Window		4 dB	BPN 56 Table 5
Min Required STC Rating Wall		37	
Min Required STC Rating Window		31	

POR2A Windows

Day Time Sound Level		Units	Notes
Outdoor Sound Level		66.5 dBA	
Free Field Correction		3 dBA	
Required Indoor Sound Level		40 dBA	
Required Reduction		29.5 dBA	
Incident Sound Angle	0-90	degrees	
Angle Correction Factor (BPN 56)		0 dB	BPN 56 Table 2
Percentage of Transmission Wall		2.5 %	
		16 dB	BPN 56 Table 3
Percentage of Transmission Window		97.5 %	
Transmission Calculations (assumed dimensions)		0 dB	BPN 56 Table 3
Wall Percent of floor		50.00% assumed	
Window Percent of floor		25.00% assumed	
Room Absorption		Intermediate	
Room Correction - Wall		-2 dB	BPN 56 Table 4
Room Correction - Window		-5 dB	BPN 56 Table 4
Spectrum type		F	BPN 56 Figure 1
Component Category		d, c	BPN 56 Table 5
Frequency correction – Wall		10 dB	BPN 56 Table 5
Frequency correction – Window		6 dB	BPN 56 Table 5
Min Required STC Rating Wall		54 Masonry	
Min Required STC Rating Window		31	

Night Time Sound Level	Units	Notes
Outdoor Sound Level	63.0 dBA	
Free Field Correction	3 dBA	
Required Indoor Sound Level	35 dBA	
Required Reduction	31.0 dBA	
Incident Sound Angle	0-90 degrees	
Angle Correction Factor (BPN 56)	0 dB	BPN 56 Table 2
Percentage of Transmission Wall	2.5 %	
	16 dB	BPN 56 Table 3
Percentage of Transmission Window	97.5 %	
Transmission Calculations (assumed dimensions)	0 dB	BPN 56 Table 3
Wall Percent of floor	50.00% assumed	
Window Percent of floor	25.00% assumed	
Room Absorption	Intermediate	
Room Correction - Wall	-2 dB	BPN 56 Table 4
Room Correction - Window	-5 dB	BPN 56 Table 4
Spectrum type	F	BPN 56 Figure 1
Component Category	d, c	BPN 56 Table 5
Frequency correction – Wall	10 dB	BPN 56 Table 5
Frequency correction – Window	6 dB	BPN 56 Table 5
Min Required STC Rating Wall	55 Masonry	
Min Required STC Rating Window	32	

POR3A Windows

Day Time Sound Level		Units	Notes
Outdoor Sound Level		66.3 dBA	
Free Field Correction		3 dBA	
Required Indoor Sound Level		40 dBA	
Required Reduction		29.3 dBA	
Incident Sound Angle	0-90	degrees	
Angle Correction Factor (BPN 56)		0 dB	BPN 56 Table 2
Percentage of Transmission Wall		3 %	
		15 dB	BPN 56 Table 3
Percentage of Transmission Window		97 %	
Transmission Calculations (assumed dimensions)		0 dB	BPN 56 Table 3
Wall Percent of floor		50.00% assumed	
Window Percent of floor		25.00% assumed	
Room Absorption		Intermediate	
Room Correction - Wall		-2 dB	BPN 56 Table 4
Room Correction - Window		-5 dB	BPN 56 Table 4
Spectrum type		F	BPN 56 Figure 1
Component Category		d, c	BPN 56 Table 5
Frequency correction – Wall		10 dB	BPN 56 Table 5
Frequency correction – Window		6 dB	BPN 56 Table 5
Min Required STC Rating Wall		53 Masonry	
Min Required STC Rating Window		30	

Noise and Vibration Impact Study – 239 Dundas St. W.

Night Time Sound Level		Units	Notes
Outdoor Sound Level		63.0 dBA	
Free Field Correction		3 dBA	
Required Indoor Sound Level		35 dBA	
Required Reduction		31.6 dBA	
Incident Sound Angle	0-90	degrees	
Angle Correction Factor (BPN 56)		0 dB	BPN 56 Table 2
Percentage of Transmission Wall		3 %	
		16 dB	BPN 56 Table 3
Percentage of Transmission Window		97 %	
Transmission Calculations (assumed dimensions)		0 dB	BPN 56 Table 3
Wall Percent of floor		50.00% assumed	
Window Percent of floor		25.00% assumed	
Room Absorption		Intermediate	
Room Correction - Wall		-2 dB	BPN 56 Table 4
Room Correction - Window		-5 dB	BPN 56 Table 4
Spectrum type		F	BPN 56 Figure 1
Component Category		d, c	BPN 56 Table 5
Frequency correction – Wall		10 dB	BPN 56 Table 5
Frequency correction – Window		6 dB	BPN 56 Table 5
Min Required STC Rating Wall		55 Masonry	
Min Required STC Rating Window		33	

POR4A Windows

Day Time Sound Level		Units	Notes
Outdoor Sound Level		68.5 dBA	
Free Field Correction		3 dBA	
Required Indoor Sound Level		40 dBA	
Required Reduction		31.5 dBA	
Incident Sound Angle	0-90	degrees	
Angle Correction Factor (BPN 56)		0 dB	BPN 56 Table 2
Percentage of Transmission Wall		5 %	
		13 dB	BPN 56 Table 3
Percentage of Transmission Window		95 %	
Transmission Calculations (assumed dimensions)		0 dB	BPN 56 Table 3
Wall Percent of floor		50.00% assumed	
Window Percent of floor		25.00% assumed	
Room Absorption		Intermediate	
Room Correction - Wall		-2 dB	BPN 56 Table 4
Room Correction - Window		-5 dB	BPN 56 Table 4
Spectrum type		F	BPN 56 Figure 1
Component Category		d, c	BPN 56 Table 5
Frequency correction – Wall		10 dB	BPN 56 Table 5
Frequency correction – Window		6 dB	BPN 56 Table 5
Min Required STC Rating Wall		53 Masonry	
Min Required STC Rating Window		33	

Noise and Vibration Impact Study – 239 Dundas St. W.

Night Time Sound Level		Units	Notes
Outdoor Sound Level		66.3 dBA	
Free Field Correction		3 dBA	
Required Indoor Sound Level		35 dBA	
Required Reduction		31.0 dBA	
Incident Sound Angle	0-90	degrees	
Angle Correction Factor (BPN 56)		0 dB	BPN 56 Table 2
Percentage of Transmission Wall		5 %	
		13 dB	BPN 56 Table 3
Percentage of Transmission Window		95 %	
Transmission Calculations (assumed dimensions)		0 dB	BPN 56 Table 3
Wall Percent of floor		50.00% assumed	
Window Percent of floor		25.00% assumed	
Room Absorption		Intermediate	
Room Correction - Wall		-2 dB	BPN 56 Table 4
Room Correction - Window		-5 dB	BPN 56 Table 4
Spectrum type		F	BPN 56 Figure 1
Component Category		d, c	BPN 56 Table 5
Frequency correction – Wall		10 dB	BPN 56 Table 5
Frequency correction – Window		6 dB	BPN 56 Table 5
Min Required STC Rating Wall		55 Masonry	
Min Required STC Rating Window		35	

Table 7 - Rail Vibration Monitoring Results

File ID	Description	Train Type	CN rail Limit (4-200 Hz) (mm/s)	Location B (30 meters)	
				Max 1 Second RMS Velocity (mm/s)	% of CP rail Criteria
Project 001	Eastbound, 2 engines (1 mid train), 80+ cars, estimated speed 40-50 km/hr	CP Frieght CP	0.14	0.062	44.29%
Project 002	Eastbound, 2 engines (1 mid train), 80+ cars, estimated speed 40-50 km/hr	CP Frieght CP	0.14	0.074	52.86%
Project 003	Westbound, 2 engine, 120+ cars, estimated speed 40-50 km/hr	CP Frieght CP	0.14	0.044	31.43%
Project 004	Westbound, 1 engine, 3 cars, partial train, estimated speed 60-70 km/hr	CP Partial Train	0.14	0.032	22.86%
Project 005	Eastbound, 2 engine, 120+ cars, estimated speed 50-60 km/hr	CP Frieght CP	0.14	0.069	49.29%

APPENDIX A
Road and Rail Traffic Data

Station ID: V38
 293 Dundas St W
 Date Start: 18-Sep-26
 Date End: 21-Sep-26

Start	18-Sep-25	EB	WB	Combined	21-Sep-26	EB	WB	Combined	Time	Thu	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	Fri	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
12:00	9			145	10			144	19					*	*	*	*	*	*	*	*	*	*
12:15	9			143	15			174	24					*	*	*	*	*	*	*	*	*	*
12:30	7			125	15			134	22					*	*	*	*	*	*	*	*	*	*
12:45	10			135	9			156	19					*	*	*	*	*	*	*	*	*	*
01:00	4			129	9			146	13					*	*	*	*	*	*	*	*	*	*
01:15	4			143	2			135	6					*	*	*	*	*	*	*	*	*	*
01:30	6			133	3			151	9					*	*	*	*	*	*	*	*	*	*
01:45	4			127	3			142	7					*	*	*	*	*	*	*	*	*	*
02:00	4			139	0			134	4					*	*	*	*	*	*	*	*	*	*
02:15	4			145	5			149	9					*	*	*	*	*	*	*	*	*	*
02:30	4			136	4			138	8					*	*	*	*	*	*	*	*	*	*
02:45	4			154	5			157	9					*	*	*	*	*	*	*	*	*	*
03:00	3			163	1			141	4					*	*	*	*	*	*	*	*	*	*
03:15	2			156	6			166	8					*	*	*	*	*	*	*	*	*	*
03:30	3			168	13			152	16					*	*	*	*	*	*	*	*	*	*
03:45	8			147	4			178	12					*	*	*	*	*	*	*	*	*	*
04:00	5			155	5			163	10					*	*	*	*	*	*	*	*	*	*
04:15	10			173	10			197	20					*	*	*	*	*	*	*	*	*	*
04:30	6			184	7			184	13					*	*	*	*	*	*	*	*	*	*
04:45	6			166	15			209	21					*	*	*	*	*	*	*	*	*	*
05:00	13			175	15			177	28					*	*	*	*	*	*	*	*	*	*
05:15	12			164	15			189	27					*	*	*	*	*	*	*	*	*	*
05:30	18			154	18			168	36					*	*	*	*	*	*	*	*	*	*
05:45	30			129	24			126	54					*	*	*	*	*	*	*	*	*	*
06:00	33			135	30			137	63					*	*	*	*	*	*	*	*	*	*
06:15	41			85	46			127	87					*	*	*	*	*	*	*	*	*	*
06:30	58			102	54			116	112					*	*	*	*	*	*	*	*	*	*
06:45	56			76	97			121	153					*	*	*	*	*	*	*	*	*	*
07:00	89			92	89			97	178					*	*	*	*	*	*	*	*	*	*
07:15	96			84	139			103	235					*	*	*	*	*	*	*	*	*	*
07:30	132			52	133			87	265					*	*	*	*	*	*	*	*	*	*
07:45	167			65	202			96	369					*	*	*	*	*	*	*	*	*	*
08:00	162			61	190			75	352					*	*	*	*	*	*	*	*	*	*
08:15	178			54	141			68	319					*	*	*	*	*	*	*	*	*	*
08:30	199			43	145			53	344					*	*	*	*	*	*	*	*	*	*
08:45	182			49	134			73	316					*	*	*	*	*	*	*	*	*	*
09:00	163			53	164			66	327					*	*	*	*	*	*	*	*	*	*
09:15	125			37	128			51	253					*	*	*	*	*	*	*	*	*	*
09:30	111			46	148			48	259					*	*	*	*	*	*	*	*	*	*
09:45	128			41	157			59	285					*	*	*	*	*	*	*	*	*	*
10:00	136			29	127			37	263					*	*	*	*	*	*	*	*	*	*
10:15	117			33	98			42	215					*	*	*	*	*	*	*	*	*	*
10:30	111			26	132			30	243					*	*	*	*	*	*	*	*	*	*
10:45	127			23	135			23	262					*	*	*	*	*	*	*	*	*	*
11:00	135			20	162			25	297					*	*	*	*	*	*	*	*	*	*
11:15	134			16	149			31	283					*	*	*	*	*	*	*	*	*	*
11:30	131			23	147			26	278					*	*	*	*	*	*	*	*	*	*
11:45	138			14	147			20	285					*	*	*	*	*	*	*	*	*	*

Total	3134	4847	3307	5421	6441	10268								0	0	0	0	0	0	0	0	0	0
Day Total	7981		8728		16709									0	0	0	0	0	0	0	0	0	0
% Total	18.8%	29.0%	19.8%	32.4%										0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Peak	08:15	04:15	07:45	04:15	07:45	04:15																	
Vol.	722	698	678	767	1384	1465																	
P.H.F.	0.907	0.948	0.839	0.917	0.938	0.977																	

ADT	ADT 13,296	AADT 13,296
-----	------------	-------------



800 - 1290 Central Parkway West
Mississauga, Ontario, L5C 4R3

T 905 803 3201
E simon_deschamps@cpr.ca

September 4, 2025

Via email: WSEconsulting@outlook.com

Adam Wilson
WSE Consulting Inc.
205 Dundas St E #301, Belleville ON, K8N
5A2

Dear Sir/Madam:

**Re: Rail Traffic Volumes, CP Mileage 94.38, Belleville Subdivision,
County Rd 2 - Dundas Street W, Belleville**

This is in reference to your request for rail traffic data in the vicinity of County Rd 2 - Dundas St W in the City of Belleville. The study area is located at mile 94.38 of our Belleville Subdivision, which is classified as a Principal Main line.

The information requested is as follows:

1. Number of freight trains between 0700 & 2300: 7
Number of freight trains between 2300 & 0700: 3
2. Maximum cars per train freight: 211
3. Number of locomotives per train: 2 (4 max.)
4. Maximum permissible train speed: 60 mph
5. The whistle signal is prohibited approaching public grade crossings from the east up to Wilkie Street (93.72 Belleville Sub) and then is sounded at the Champagne Drive grade crossing (94.28 Belleville Sub). Please note, the whistle may be sounded if deemed necessary by the train crew for safety reasons at any time.
6. There is 1 main line track with continuously welded rail.

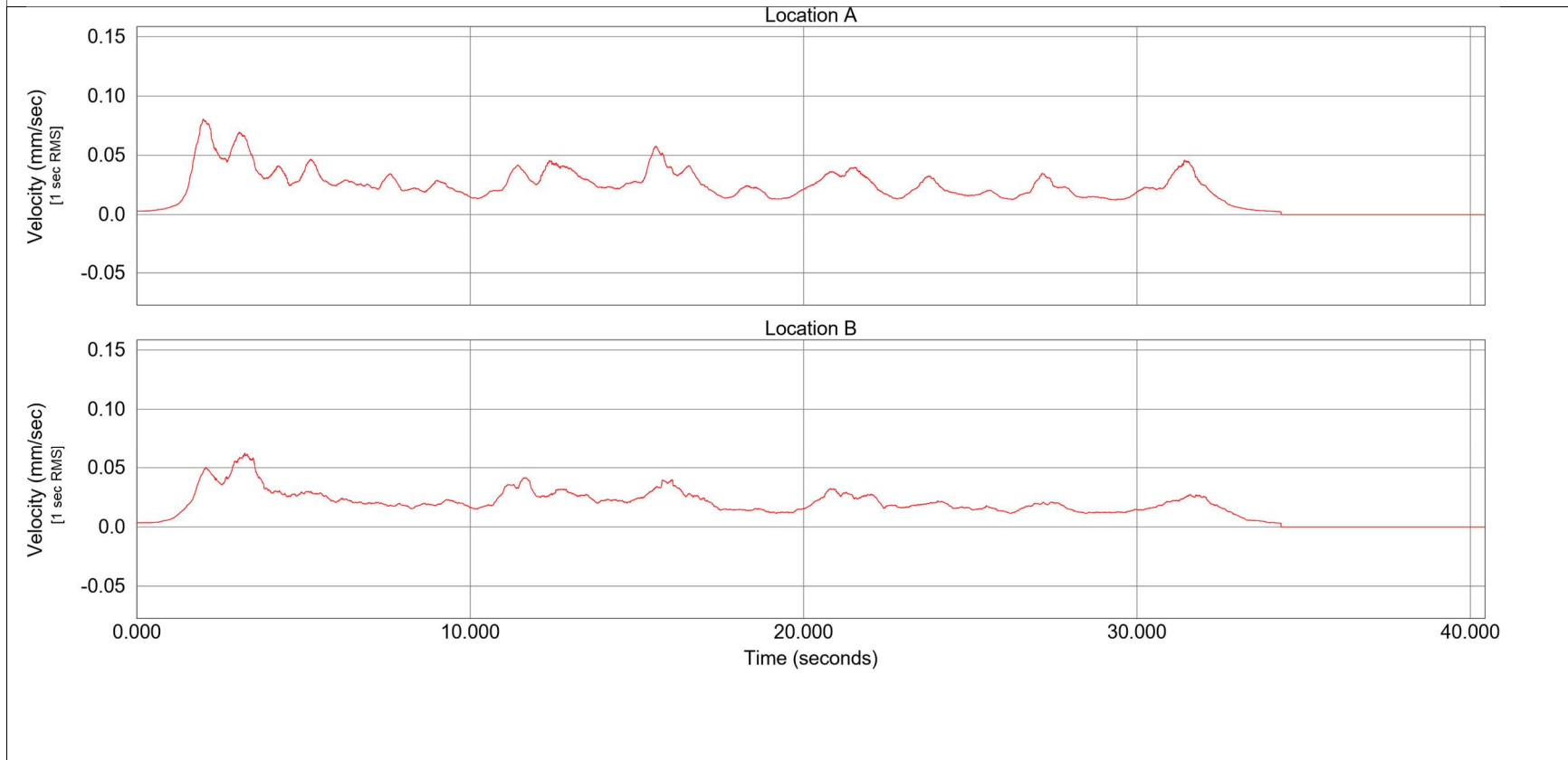
The information provided is based on recent rail traffic. Variations of the above may exist on a day-to-day basis. Specific measurements may also vary significantly depending on customer needs. Yours truly,

Simon Deschamps
Specialist Real Estate

Both Left & Right
Sampling Rate: 44100
FFT size: 8192
Averaging: Infinite
Window: Flattop

Train 1 Passby
WSE Consulting

Printed By: SpectraPLUS-SC Sound Card Edition

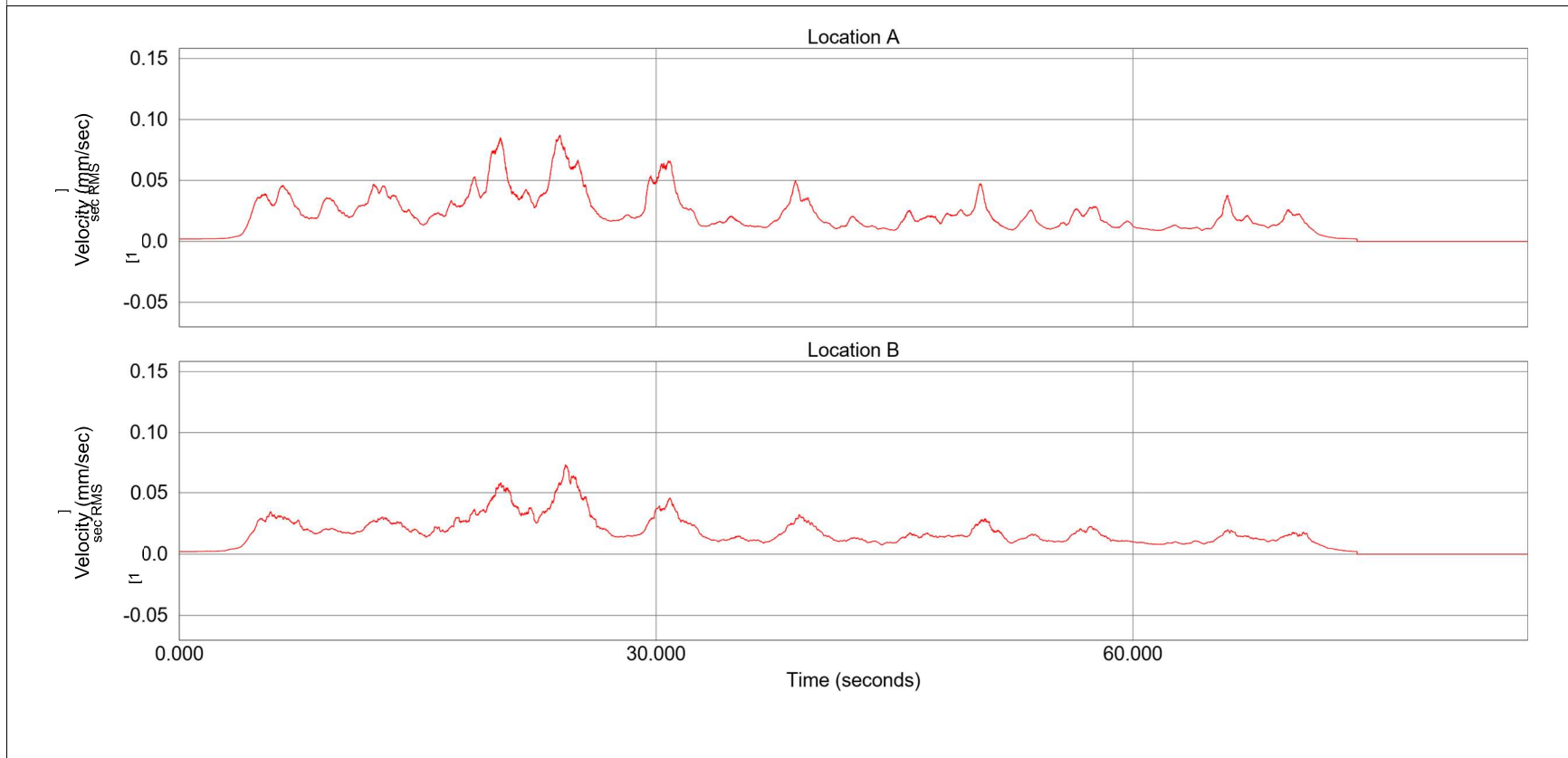


Freight Train 2 Engines

Both Left & Right
Sampling Rate: 44100
FFT size: 8192
Averaging: Infinite
Window: Flattop

Train 2 Passby
WSE Consulting

Printed By: SpectraPLUS-SC Sound Card Edition

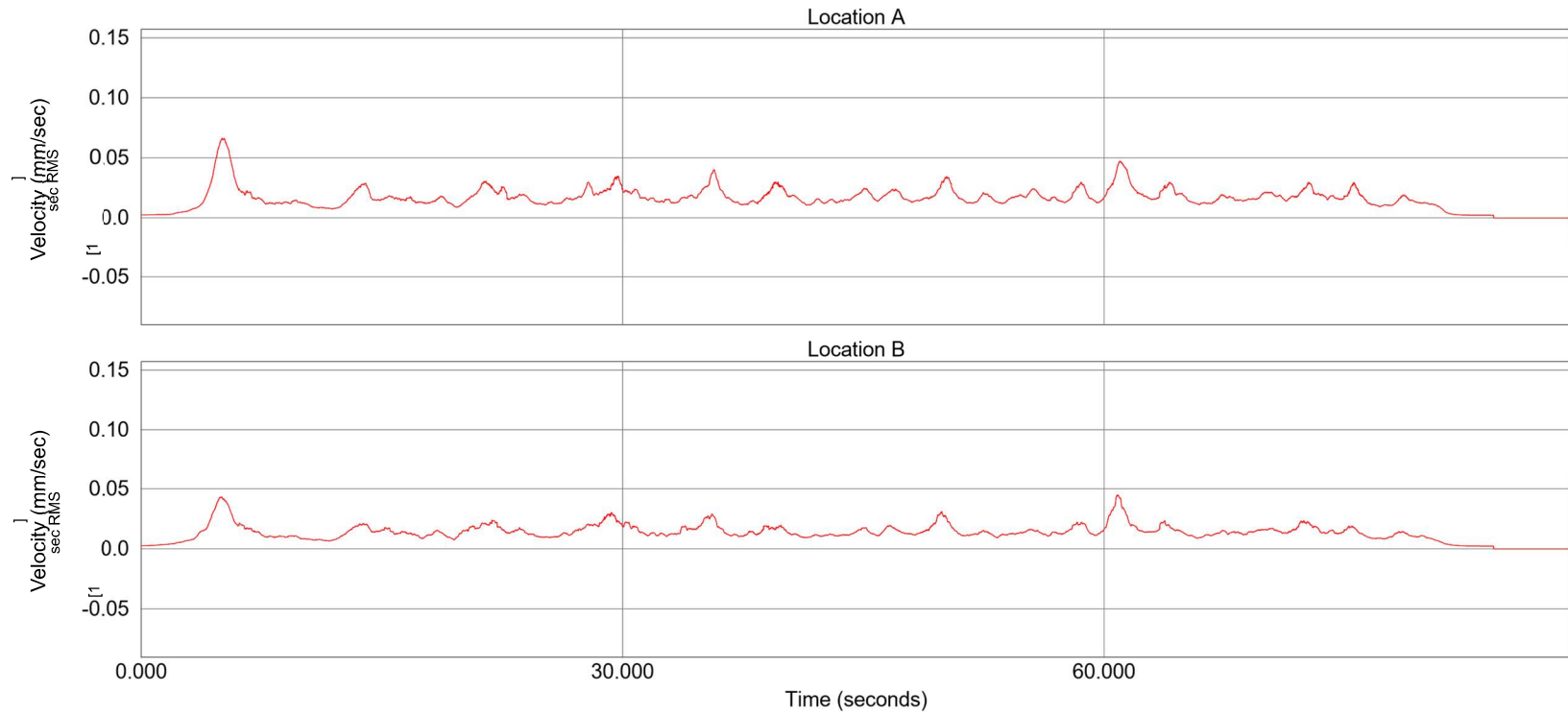


Freight Train 2 Engines

Both Left & Right
Sampling Rate: 44100
FFT size: 8192
Averaging: Infinite
Window: Flattop

Train 3 Passby
WSE Consulting

Printed By: SpectraPLUS-SC Sound Card Edition

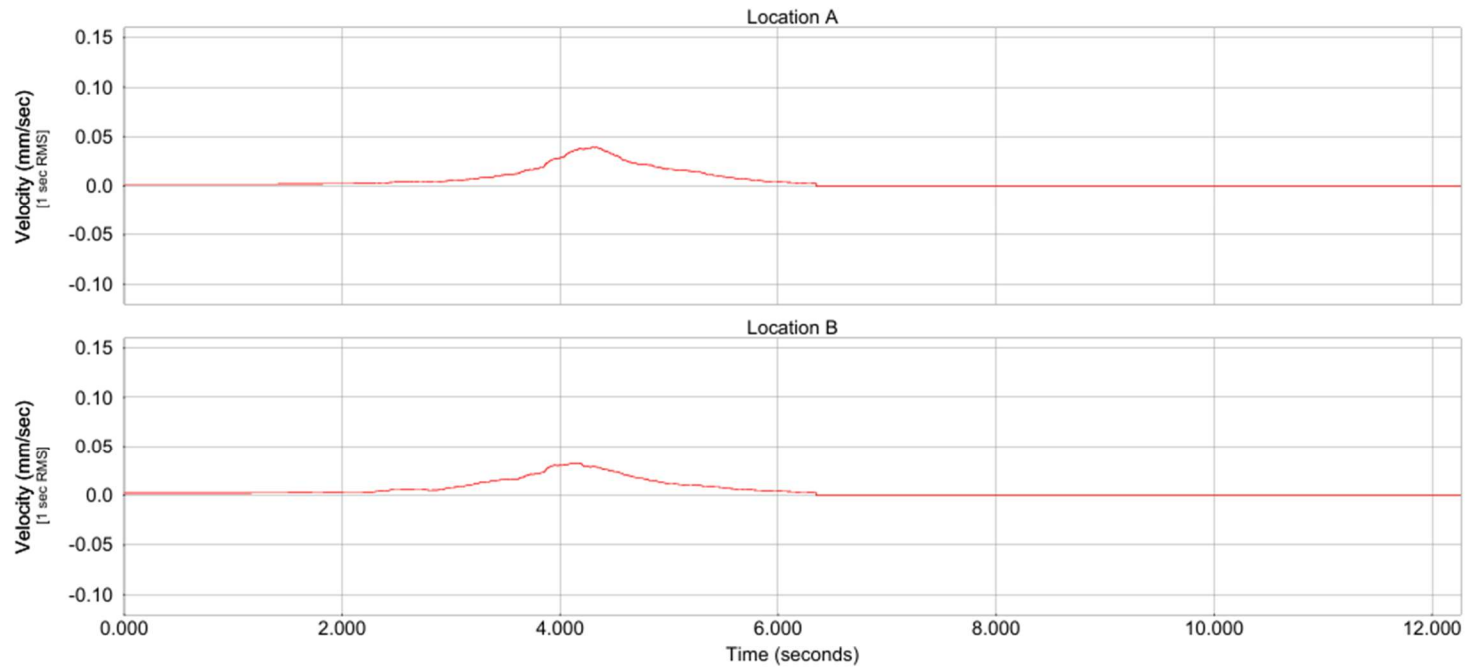


Freight Train 2 Engines

Both Left & Right
Sampling Rate: 44100
FFT size: 8192
Averaging: Infinite
Window: Flattop

Train 4 Passby
WSE Consulting

Printed By: SpectraPLUS-SC Sound Card Edition

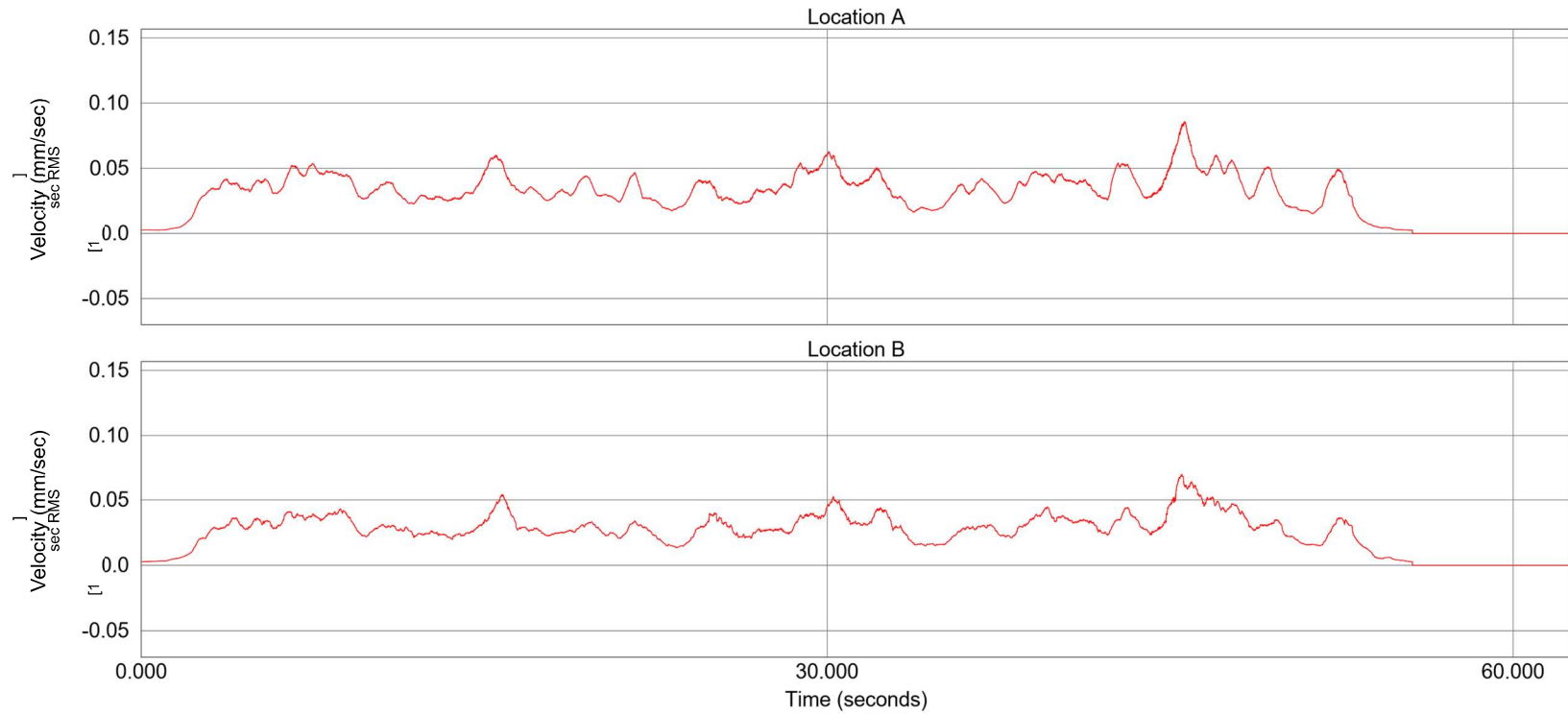


Freight Train 2 Engines

Both Left & Right
Sampling Rate: 44100
FFT size: 8192
Averaging: Infinite
Window: Flattop

Train 5 Passby
WSE Consulting

Printed By: SpectraPLUS-SC Sound Card Edition



Freight Train 2 Engines

APPENDIX B
ORNAMENT OUTPUTS

Filename: dlat22.te Time Period: 1 hours
 Description: Dlat22D

Road data, segment # 1: Dundas

 Car traffic volume : 249 veh/TimePeriod
 Medium truck volume : 20 veh/TimePeriod
 Heavy truck volume : 14 veh/TimePeriod
 Posted speed limit : 60 km/h
 Road gradient : 0 %
 Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Dundas

 Angle1 Angle2 : -90.00 deg 90.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 22.00 m
 Receiver height : 13.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

♀
 Results segment # 1: Dundas

 Source height = 1.49 m

ROAD (0.00 + 62.21 + 0.00) = 62.21 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	w.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.30	65.14	0.00	-2.16	-0.77	0.00	0.00	0.00	62.21

Segment Leq : 62.21 dBA

Total Leq All Segments: 62.21 dBA

TOTAL Leq FROM ALL SOURCES: 62.21

STAMSON 5.0 NORMAL REPORT Date: 11-11-2025 11:38:29
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: dlat22.te Time Period: 1 hours
 Description: Dlat22E

Road data, segment # 1: Dundas

```
-----
Car traffic volume : 54 veh/TimePeriod
Medium truck volume : 4 veh/TimePeriod
Heavy truck volume : 3 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)
```

Data for Segment # 1: Dundas

```
-----
Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 22.00 m
Receiver height : 13.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00
```

♀

Results segment # 1: Dundas

 Source height = 1.49 m

ROAD (0.00 + 55.46 + 0.00) = 55.46 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.30	58.39	0.00	-2.16	-0.77	0.00	0.00	0.00	55.46

Segment Leq : 55.46 dBA

Total Leq All Segments: 55.46 dBA

TOTAL Leq FROM ALL SOURCES: 55.46

STAMSON 5.0 NORMAL REPORT Date: 11-11-2025 11:39:40
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: d1at22f.te Time Period: Day/Night 16/8 hours Description: D1at22F

Road data, segment # 1: Dundas (day/night)

```
-----
Car traffic volume   : 13622/1514 veh/TimePeriod *
Medium truck volume : 1084/120   veh/TimePeriod *
Heavy truck volume  : 774/86    veh/TimePeriod *
Posted speed limit  : 60 km/h
Road gradient       : 0 %
Road pavement      : 1 (Typical asphalt or concrete)
```

* Refers to calculated road volumes based on the following input:

```
24 hr Traffic Volume (AADT or SADT): 13296
Percentage of Annual Growth         : 2.00
Number of Years of Growth           : 13.00
Medium Truck % of Total Volume      : 7.00
Heavy Truck % of Total Volume       : 5.00
Day (16 hrs) % of Total Volume     : 90.00
```

Data for Segment # 1: Dundas (day/night)

```
-----
Angle1 Angle2      : -90.00 deg  90.00 deg
Wood depth          : 0          (No woods.)
No of house rows   : 0 / 0
Surface            : 1          (Absorptive ground surface)
Receiver source distance : 22.00 / 22.00 m
Receiver height    : 13.50 / 13.50 m
Topography         : 1          (Flat/gentle slope; no barrier)
Reference angle    : 0.00
```

♀
 Results segment # 1: Dundas (day)

Source height = 1.50 m

```
ROAD (0.00 + 67.56 + 0.00) = 67.56 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
-----
-90     90    0.30  70.50  0.00 -2.16 -0.77  0.00  0.00  0.00  67.56
-----
```

Segment Leq : 67.56 dBA

Total Leq All Segments: 67.56 dBA

♀
 Results segment # 1: Dundas (night)

Source height = 1.50 m

```
ROAD (0.00 + 61.03 + 0.00) = 61.03 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
-----
-90     90    0.30  63.96  0.00 -2.16 -0.77  0.00  0.00  0.00  61.03 -----
```

Segment Leq : 61.03 dBA

Total Leq All Segments: 61.03 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 67.56
 (NIGHT): 61.03

STAMSON 5.0 NORMAL REPORT Date: 11-11-2025 11:41:10
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: d3at65.te Time Period: 1 hours
 Description: D3at65D

Road data, segment # 1: Dundas

 Car traffic volume : 249 veh/TimePeriod
 Medium truck volume : 20 veh/TimePeriod
 Heavy truck volume : 14 veh/TimePeriod
 Posted speed limit : 60 km/h
 Road gradient : 0 %
 Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Dundas

 Angle1 Angle2 : 0.00 deg 90.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 65.00 m
 Receiver height : 13.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

♀

Results segment # 1: Dundas

 Source height = 1.49 m

ROAD (0.00 + 53.08 + 0.00) = 53.08 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	w.Adj	H.Adj	B.Adj	SubLeq
0	90	0.30	65.14	0.00	-8.28	-3.78	0.00	0.00	0.00	53.08

 Segment Leq : 53.08 dBA

Total Leq All Segments: 53.08 dBA

TOTAL Leq FROM ALL SOURCES: 53.08

STAMSON 5.0 NORMAL REPORT Date: 11-11-2025 11:40:39
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: d3at65.te Time Period: 1 hours
 Description: D3at65E

Road data, segment # 1: Dundas

```
-----
Car traffic volume : 54 veh/TimePeriod
Medium truck volume : 4 veh/TimePeriod
Heavy truck volume : 3 veh/TimePeriod
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)
```

Data for Segment # 1: Dundas

```
-----
Angle1 Angle2 : 0.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 65.00 m
Receiver height : 13.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00
```

♀
 Results segment # 1: Dundas

Source height = 1.49 m

ROAD (0.00 + 46.33 + 0.00) = 46.33 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	w.Adj	H.Adj	B.Adj	SubLeq
0	90	0.30	58.39	0.00	-8.28	-3.78	0.00	0.00	0.00	46.33

Segment Leq : 46.33 dBA

Total Leq All Segments: 46.33 dBA

TOTAL Leq FROM ALL SOURCES: 46.33

STAMSON 5.0 NORMAL REPORT Date: 11-11-2025 11:42:12
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: d3at65f.te Time Period: Day/Night 16/8 hours Description: D3at65F

Road data, segment # 1: Dundas (day/night)

 Car traffic volume : 13622/1514 veh/TimePeriod *
 Medium truck volume : 1084/120 veh/TimePeriod *
 Heavy truck volume : 774/86 veh/TimePeriod *
 Posted speed limit : 60 km/h
 Road gradient : 0 %
 Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 13296
 Percentage of Annual Growth : 2.00
 Number of Years of Growth : 13.00
 Medium Truck % of Total Volume : 7.00
 Heavy Truck % of Total Volume : 5.00
 Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Dundas (day/night)

 Angle1 Angle2 : 0.00 deg 90.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 65.00 / 65.00 m
 Receiver height : 13.50 / 13.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

Results segment # 1: Dundas (day)

 Source height = 1.50 m

ROAD (0.00 + 58.44 + 0.00) = 58.44 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	w.Adj	H.Adj	B.Adj	SubLeq
0	90	0.30	70.50	0.00	-8.28	-3.78	0.00	0.00	0.00	58.44

Segment Leq : 58.44 dBA

Total Leq All Segments: 58.44 dBA

Results segment # 1: Dundas (night)

Source height = 1.50 m

ROAD (0.00 + 51.90 + 0.00) = 51.90 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq	
0	90	0.30	63.96	0.00	-8.28	-3.78	0.00	0.00	0.00	51.90	-----

Segment Leq : 51.90 dBA

Total Leq All Segments: 51.90 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 58.44
(NIGHT): 51.90

STAMSON 5.0 NORMAL REPORT Date: 12-11-2025 11:02:35
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: d1at22f.te Time Period: Day/Night 16/8 hours Description: D5aat29F

Road data, segment # 1: Dundas (day/night)

```
-----
Car traffic volume : 13622/1514 veh/TimePeriod *
Medium truck volume : 1084/120 veh/TimePeriod *
Heavy truck volume : 774/86 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)
```

* Refers to calculated road volumes based on the following input:

```
24 hr Traffic Volume (AADT or SADT): 13296
Percentage of Annual Growth : 2.00
Number of Years of Growth : 13.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 90.00
```

Data for Segment # 1: Dundas (day/night)

```
-----
Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 29.00 / 29.00 m
Receiver height : 16.50 / 16.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : 90.00 deg
Barrier height : 17.00 m
Barrier receiver distance : 5.00 / 5.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00
```

Results segment # 1: Dundas (day)

Source height = 1.50 m

Barrier height for grazing incidence

```
-----
Source ! Receiver ! Barrier ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
-----+-----+-----+-----
! 13.91 ! 13.91 ! 1.50 ! 16.50
```

ROAD (0.00 + 54.23 + 0.00) = 54.23 dBA

Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

```
-----
-90 90 0.00 70.50 0.00 -2.86 0.00 0.00 0.00 -13.40 54.23 -----
```

Segment Leq : 54.23 dBA

Total Leq All Segments: 54.23 Dba

Results segment # 1: Dundas (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)		
13.91	13.91			1.50	16.50

ROAD (0.00 + 47.69 + 0.00) = 47.69 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	63.96	0.00	-2.86	0.00	0.00	0.00	-13.40	47.69

Segment Leq : 47.69 dBA

Total Leq All Segments: 47.69 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 54.23
(NIGHT): 47.69

TR2AT85 - 62-61

STAMSON 5.0 NORMAL REPORT Date: 12-11-2025 13:22:33
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: tr2at85.te Time Period: Day/Night 16/8 hours Description: TR2at85

Rail data, segment # 1: CP Rail (day/night)

Train Type	! Trains ! (Left)	! Trains ! (Right)	! Speed ! (km/h)	!# loc !/Train!	!# Cars! /Train!	! Eng ! type	!Cont !weld
1. CP Rail	! 4.6/2.0	! 4.6/2.0	! 60.0	! 4.0	!211.0	!Diesel!	! Yes

Data for Segment # 1: CP Rail (day/night)

Angle1 Angle2 : 0.00 deg 90.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 85.00 / 85.00 m
 Receiver height : 16.50 / 16.50 m
 Topography : 2 (Flat/gentle slope; with barrier)
 Whistle Angle : 85 deg Track 1
 Barrier angle1 : 0.00 deg Angle2 : 20.00 deg
 Barrier height : 5.50 m
 Barrier receiver distance : 70.00 / 70.00 m
 Source elevation : 0.00 m
 Receiver elevation : 0.00 m
 Barrier elevation : 0.00 m
 Reference angle : 0.00

Results segment # 1: CP Rail (day)

Barrier height for grazing incidence

Source Height (m)	! Receiver Height (m)	! Barrier Height (m)	! Elevation of Barrier Top (m)
4.00	! 16.50	! 6.21	! 6.21
0.50	! 16.50	! 3.32	! 3.32

LOCOMOTIVE (0.00 + 55.43 + 60.40) = 61.60 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	20	0.00	73.54	-7.53	-9.54	0.00	0.00	-3.89	52.57*
0	20	0.14	73.54	-8.55	-9.55	0.00	0.00	0.00	55.43
20	90	0.14	73.54	-8.55	-4.59	0.00	0.00	0.00	60.40

* Bright Zone !

WHEEL (0.00 + 38.14 + 51.47) = 51.67 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	20	0.00	65.74	-7.53	-9.54	0.00	0.00	-10.52	38.14
20	90	0.24	65.74	-9.34	-4.93	0.00	0.00	0.00	51.47

LEFT WHISTLE (0.00 + 43.53 + 0.00) = 43.53 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
82	85	0.14	70.51	-8.55	-18.43	0.00	0.00	0.00	43.53

RIGHT WHISTLE (0.00 + 39.50 + 0.00) = 39.50 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
85	86	0.14	70.51	-8.55	-22.45	0.00	0.00	0.00	39.50

Segment Leq : 62.11 dBA

Total Leq All Segments: 62.11 dBA

TR2AT85 - 62-61

Results segment # 1: CP Rail (night)

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
4.00	16.50	6.21	6.21
0.50	16.50	3.32	3.32

LOCOMOTIVE (0.00 + 54.72 + 59.68) = 60.88 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	20	0.00	72.82	-7.53	-9.54	0.00	0.00	-3.89	51.86*
0	20	0.14	72.82	-8.55	-9.55	0.00	0.00	0.00	54.72
20	90	0.14	72.82	-8.55	-4.59	0.00	0.00	0.00	59.68

* Bright Zone !

WHEEL (0.00 + 37.42 + 50.75) = 50.95 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	20	0.00	65.02	-7.53	-9.54	0.00	0.00	-10.52	37.42
20	90	0.24	65.02	-9.34	-4.93	0.00	0.00	0.00	50.75

LEFT WHISTLE (0.00 + 42.81 + 0.00) = 42.81 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
82	85	0.14	69.79	-8.55	-18.43	0.00	0.00	0.00	42.81

RIGHT WHISTLE (0.00 + 38.79 + 0.00) = 38.79 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
85	86	0.14	69.79	-8.55	-22.45	0.00	0.00	0.00	38.79

Segment Leq : 61.39 dBA

Total Leq All Segments: 61.39 dBA

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TOTAL Leq FROM ALL SOURCES (DAY): 62.11
(NIGHT): 61.39

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♀

TR4AT45 - 68-66

STAMSON 5.0 NORMAL REPORT Date: 12-11-2025 13:23:04
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: tr4at45.te Time Period: Day/Night 16/8 hours Description: TR4at45

Rail data, segment # 1: CP Rail (day/night)

Train Type	! Trains ! (Left)	! Trains ! (Right)	! Speed ! (km/h)	!# loc !/Train!	!# Cars !/Train!	! Eng ! type	!Cont !weld
1. CP Rail	4.6/2.0	4.6/2.0	60.0	4.0	211.0	Diesel	Yes

Data for Segment # 1: CP Rail (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 45.00 / 45.00 m
 Receiver height : 16.50 / 10.50 m
 Topography : 2 (Flat/gentle slope; with barrier)
 Whistle Angle : 85 deg Track 1
 Barrier angle1 : -20.00 deg Angle2 : 20.00 deg
 Barrier height : 5.50 m
 Barrier receiver distance : 30.00 / 30.00 m
 Source elevation : 0.00 m
 Receiver elevation : 0.00 m
 Barrier elevation : 0.00 m
 Reference angle : 0.00

Results segment # 1: CP Rail (day)

Barrier height for grazing incidence

Source Height (m)	! Receiver Height (m)	! Barrier Height (m)	! Elevation of Barrier Top (m)
4.00	16.50	8.17	8.17
0.50	16.50	5.83	5.83

LOCOMOTIVE (63.53 + 61.58 + 63.53) = 67.75 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-20	0.14	73.54	-5.42	-4.59	0.00	0.00	0.00	63.53
-20	20	0.00	73.54	-4.77	-6.53	0.00	0.00	0.00	62.23*
-20	20	0.14	73.54	-5.42	-6.54	0.00	0.00	0.00	61.58
20	90	0.14	73.54	-5.42	-4.59	0.00	0.00	0.00	63.53

* Bright Zone !

WHEEL (54.90 + 53.27 + 54.90) = 59.19 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-20	0.24	65.74	-5.92	-4.93	0.00	0.00	0.00	54.90
-20	20	0.00	65.74	-4.77	-6.53	0.00	0.00	-4.75	49.68*
-20	20	0.24	65.74	-5.92	-6.55	0.00	0.00	0.00	53.27
20	90	0.24	65.74	-5.92	-4.93	0.00	0.00	0.00	54.90

* Bright Zone !

LEFT WHISTLE (0.00 + 53.81 + 0.00) = 53.81 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
69	85	0.14	70.51	-5.42	-11.29	0.00	0.00	0.00	53.81

RIGHT WHISTLE (0.00 + 44.35 + 0.00) = 44.35 dBA
 Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

 85 87 0.14 70.51 -5.42 -20.74 0.00 0.00 0.00 44.35

 TR4AT45 - 68-66

Segment Leq : 68.48 dBA

Total Leq All Segments: 68.48 dBA

♀

Results segment # 1: CP Rail (night)

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
4.00 !	10.50 !	6.17 !	6.17
0.50 !	10.50 !	3.83 !	3.83

LOCOMOTIVE (61.39 + 59.99 + 61.39) = 65.74 dBA
 Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

 -90 -20 0.31 72.82 -6.27 -5.15 0.00 0.00 0.00 61.39

 -20 20 0.00 72.82 -4.77 -6.53 0.00 0.00 -3.76 57.75*
 -20 20 0.31 72.82 -6.27 -6.56 0.00 0.00 0.00 59.99

 20 90 0.31 72.82 -6.27 -5.15 0.00 0.00 0.00 61.39

* Bright Zone !

WHEEL (52.80 + 43.84 + 52.80) = 56.08 dBA
 Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

 -90 -20 0.42 65.02 -6.78 -5.45 0.00 0.00 0.00 52.80

 -20 20 0.09 65.02 -5.20 -6.54 0.00 0.00 -9.44 43.84

 20 90 0.42 65.02 -6.78 -5.45 0.00 0.00 0.00 52.80

LEFT WHISTLE (0.00 + 51.05 + 0.00) = 51.05 dBA
 Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

 69 85 0.31 69.79 -6.27 -12.47 0.00 0.00 0.00 51.05

RIGHT WHISTLE (0.00 + 40.67 + 0.00) = 40.67 dBA
 Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

 85 87 0.31 69.79 -6.27 -22.85 0.00 0.00 0.00 40.67

Segment Leq : 66.33 dBA

Total Leq All Segments: 66.33 dBA

♀

TOTAL Leq FROM ALL SOURCES (DAY): 68.48
 (NIGHT): 66.33

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 ♀

TR5bat50 - 58-57

STAMSON 5.0 NORMAL REPORT Date: 12-11-2025 11:12:19
 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: tr5bat50.te Time Period: Day/Night 16/8 hours Description: TR5bat50

Rail data, segment # 1: CP Rail (day/night)

Train Type	! Trains ! (Left)	! Trains ! (Right)	! Speed ! (km/h)	!# loc !/Train!	!# Cars! /Train!	! Eng ! type	!Cont !weld
1. CP Rail	! 4.6/2.0	! 4.6/2.0	! 60.0	! 4.0	!211.0	!Diesel!	! Yes

Data for Segment # 1: CP Rail (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 1 (Absorptive ground surface)
 Receiver source distance : 50.00 / 50.00 m
 Receiver height : 19.50 / 19.50 m
 Topography : 2 (Flat/gentle slope; with barrier)
 Whistle Angle : 85 deg Track 1
 Barrier angle1 : -90.00 deg Angle2 : 90.00 deg
 Barrier height : 20.00 m
 Barrier receiver distance : 5.00 / 5.00 m
 Source elevation : 0.00 m
 Receiver elevation : 0.00 m
 Barrier elevation : 0.00 m
 Reference angle : 0.00

Results segment # 1: CP Rail (day)

Barrier height for grazing incidence

Source Height (m)	! Receiver Height (m)	! Barrier Height (m)	! Elevation of Barrier Top (m)
4.00	! 19.50	! 17.95	! 17.95
0.50	! 19.50	! 17.60	! 17.60

LOCOMOTIVE (0.00 + 57.32 + 0.00) = 57.32 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	73.54	-5.23	0.00	0.00	0.00	-10.99	57.32

WHEEL (0.00 + 48.67 + 0.00) = 48.67 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	65.74	-5.23	0.00	0.00	0.00	-11.84	48.67

LEFT WHISTLE (0.00 + 45.13 + 0.00) = 45.13 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
74	85	0.00	70.51	-5.23	-12.04	0.00	0.00	-8.11	45.13

RIGHT WHISTLE (0.00 + 39.43 + 0.00) = 39.43 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
85	87	0.00	70.51	-5.23	-19.43	0.00	0.00	-6.42	39.43

Segment Leq : 58.16 dBA

Total Leq All Segments: 58.16 dBA

Results segment # 1: CP Rail (night)

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
4.00	19.50	17.95	17.95
0.50	19.50	17.60	17.60

4.00	19.50	17.95	17.95
0.50	19.50	17.60	17.60

LOCOMOTIVE (0.00 + 56.71 + 0.00) = 56.71 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	72.93	-5.23	0.00	0.00	0.00	-10.99	56.71

WHEEL (0.00 + 48.07 + 0.00) = 48.07 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	65.13	-5.23	0.00	0.00	0.00	-11.84	48.07

LEFT WHISTLE (0.00 + 44.53 + 0.00) = 44.53 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
74	85	0.00	69.90	-5.23	-12.04	0.00	0.00	-8.11	44.53

RIGHT WHISTLE (0.00 + 38.82 + 0.00) = 38.82 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
85	87	0.00	69.90	-5.23	-19.43	0.00	0.00	-6.42	38.82

Segment Leq : 57.55 dBA

Total Leq All Segments: 57.55 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 58.16
(NIGHT): 57.55

APPENDIX C
Warning Clauses

NPC 300 Type A:

"Purchasers/tenants are advised that sound levels due to increasing road and rail 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."

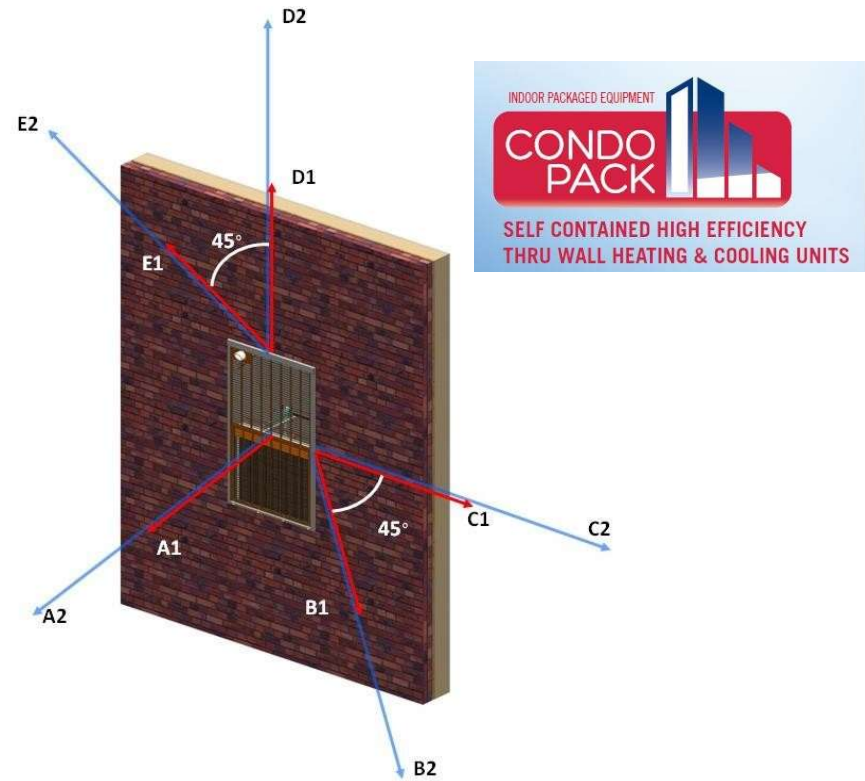
NPC 300 Type D:

"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."

APPENDIX D
Supporting Information

Condo Pack: Sound Data

The sound measurements were taken at different vectors from the front (outside face) of the unit. This is to aid the overall design of the building in regards to the property line and other vantage points.



Condo Pack Model		P-CxxA-A12A-A/ PSC0xxB012A P-SxxA-A12A-A/ PSS0xxB012A P-ExxA-A12A-A/ PSE0xxB012A		P-CxxA-A18A-A/ PSC0xxB018A P-SxxA-A18A-A/ PSS0xxB018A P-ExxA-A18A-A/ PSE0xxB018A		P-CxxA-A24A-A/ PSC0xxB024A P-SxxA-A24A-A/ PSS0xxB024A P-ExxA-A24A-A/ PSE0xxB024A	
Sound Levels		1.0 T AC module		1.5 T AC module		2.0 T AC module	
Distance from unit		1 m	2m	1 m	2m	1 m	2m
Location of Measurement		Sound Pressure Level [db]		Sound Pressure Level [db]		Sound Pressure Level [db]	
A	Directly in front of unit	71.2	66.4	71.2	66.4	71.2	66.4
B	45° angle in Horizontal plane	68.8	64.9	68.8	64.9	68.8	64.9
C	Along the wall - Horizontally	67.5	63.9	67.5	63.9	67.5	63.9
D	Along the wall - Vertically	65.3	63.2	65.3	63.2	65.3	63.2
E	45° angle in Vertical plane	67.1	64.7	67.1	64.7	67.1	64.7
Note : CxxA/CxxB represents 15K, 30K, 40K, 50K BTU/h heating; SxxA/S0xxB represents 26K, 38K, 51K, 64K BTU/h heating; ExxA/E0xxB represents 5kW,7.5kW,10kW & 15kW heating							

Raw Measured Data

Source ID	1/3rd Octave Centre Frequency (Hz), Sound Pressure Level (dB)																							
	50	63	80	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000
AH	67.15	72.11	67.93	65.86	73.37	66.21	66.25	63.71	61.59	61.05	61.84	61.81	61.78	60.37	58.14	58.90	55.49	52.71	52.37	48.62	44.83	44.87	41.49	36.61

$$^1L_w = L_p + 20 + \log(r) + 11 - 10 \cdot \log(Q)$$

$$L_p(\text{total}) = 10 \cdot \log(10(L_p(31\text{Hz})/10) + 10(L_p(63\text{Hz})/10) + 10(L_p(8\text{kHz})/10))$$

R is distance measurement was taken, Q is directivity index, t is operating time

Source ID	Source Description	Source Directionality	Operating Condition	Total Receptor Distance (m)	Directivity Factor (Q)	Tonal (Yes/No)	Octave Band (Hz)								Total	
							63	125	250	500	1000	2000	4000	8000		
AHU01	Condo Pack - Straight Out	None	Steady State	3.707	4	No	Source PWL (dBA)	50.10	60.42	61.72	65.03	66.80	63.88	57.09	47.62	71.36
							Calculated SPL (dBA)	33.74	44.06	45.36	48.67	50.44	47.52	40.73	31.26	55.00
AHU01	Condo Pack - Along Wall Horizontally	None	Steady State	1.570	4	No	Source PWL (dBA)	59.59	59.91	54.21	51.52	50.29	46.37	39.58	32.11	63.90
							Calculated SPL (dBA)	50.69	51.01	45.31	42.63	41.39	37.47	30.68	23.21	55.00