



EASTGATE SQUARE 75 CENTENNIAL PARKWAY N HAMILTON, ONTARIO

HAMILION, ONTARIO

NOISE AND VIBRATION IMPACT STUDY RWDI #2300777 July 17, 2023

SUBMITTED TO

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VERSION HISTORY

Index	Date	Description	Prepared by	Reviewed by
1	July 7, 2023	Draft	Kristina Dal Bello	Gillian Redman
2	July 17, 2023	Report text updates	Kristina Dal Bello	Gillian Redman



EXECUTIVE SUMMARY

RWDI was retained to prepare a Noise and Vibration Impact Study for the proposed Eastgate Square Mall redevelopment located at 75 Centennial Parkway N in Hamilton, Ontario. The proposed development consists of redeveloping the existing site to include 13 blocks (block A to M) which includes parks (Block G, H, and I), townhouses (Blocks A and B), and high-rise buildings ranging in height from 3 to 20 storeys. A portion of the existing Eastgate Square Mall will remain on the site as retail operations.

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

- 1. Installation of central air-conditioning so that all suites' windows can remain closed.
- 2. Minimum sound isolation performance:
 - a. Suite bedroom window glazing with minimum sound isolation performance of up to STC-38.
 - b. Suite exterior balcony door with minimum sound isolation performance of up to STC-28.
- 3. The inclusion of noise warning clauses related to:
 - a. Transportation sound levels at the building façade and in the outdoor amenity areas
 - b. Proximity to commercial/industrial land-use
- 4. Construction of perimeter noise barriers along the outdoor amenity areas if feasible, with the applicable warning clause.

Rail is located farther than 500 m away from the proposed development, therefore no noise or vibration impacts from rail are expected.

The potential noise levels from stationary sources of sound were evaluated. Mechanical equipment from the remaining retail portions of the existing Eastgate Mall are the most significant source of environmental noise at the proposed development. Based on the noise modelling results and setback distances, the land use compatibility of the proposed development with respect to the nearby commercial operations is considered acceptable from the noise assessment perspective. However, due to the proximity of the proposed development to the commercial facilities, a warning clause, barrier for outdoor amenity spaces, and upgraded windows/balcony doors are recommended to inform prospective occupants of the potential for audible noise from these facilities. The recommendations for stationary sources should be revisited at the site plan approval stage and may be reduced when more detailed information is available.

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

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

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1 INTRODUCTION

RWDI was retained to prepare a Noise and Vibration Impact Study for the proposed Eastgate Square Mall redevelopment located at 75 Centennial Parkway N in Hamilton, Ontario. The proposed development consists of redeveloping the existing site to include 13 blocks (block A to M) which includes parks, townhouses, and high-rise buildings ranging in height from 3 to 20 storeys. A portion of the existing Eastgate Square Mall will remain on the site as retail operations. The context site plan is shown in **Figure 1**.

The site is exposed to noise from road traffic from Centennial Parkway N to the east, Queenston Road to the south, Delawana Drive to the north, and Kenora Avenue to the west.

Rail is located rather than 500 m away from the proposed development, therefore no noise or vibration impacts from rail are expected.

A screening level assessment of nearby stationary sources was conducted. Existing stationary sources from the remaining retail portions Eastgate Square Mall were included in the assessment. Conservative assumptions for potential noise emissions from commercial facilities within 70-meters from the development property line were included in the stationary source assessment. No Class II or III facilities were identified within 1000-meters of the proposed development.

This assessment was completed to support the Draft Plan of Subdivision Application (DPoS) submission as required by the City of Hamilton. This assessment was based on design drawings dated May 30th, 2023. A copy of the drawings are included in **Appendix A**.

2 APPLICABLE CRITERIA

Applicable criteria for transportation noise sources (road) and stationary noise sources are adopted from the Ontario Ministry of the Environment, Conservation and Parks (MECP) NPC-300 Environmental Noise Guideline (MOE, 2013), with a summary of the applicable criteria included with **Appendix B**.

The proposed development site would be characterized as a "Class 1 Area", which is defined according to NPC-300 as 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."



3 THE EFFECTS OF THE ENVIRONMENT ON THE PROPOSED DEVELOPMENT

3.1 Transportation Source Assessment

3.1.1 Road Traffic Volume Data

Centennial Parkway North, Queenston Road, Delawana Drive, and Kenora Avenue traffic volumes were obtained from the City of Hamilton. A 90%/10% daytime/nighttime local split was applied for Centennial Parkway North, Queenston Road, Delawana Drive, and Kenora Avenue.

Turning Movement Counts (TMCs) at the intersection of Centennial Parkway North and Queenston Road provided detailed traffic volumes for the two peak time periods: 08:45 to 9:45 and 17:00 to 18:00. The TMC at the intersection of Delawana Drive and Kenora Avenue provided two peak time periods: 08:30 to 09:30 and 16:15 to 17:15. The TMCs were used to determine the traffic volume and types of vehicles on each link during the AM and PM peaks and 8-hour interval which were assumed to be 9%, 10% and 60% of the Annual Average Daily Traffic (AADT), respectively.

The maximum AADTs obtained from the approximation of each of these three time periods was used for the AADT for the respective roadway. The traffic volumes for each of the respective roadways were increased at a rate of 2% per year to represent the predicted 10-year horizon volumes. A summary of the traffic data used is included in **Table 1** below with more detailed information included in **Appendix C**.

Roadway	Segment	Segment 2032 Future Traffic % Day/Night (AADT)		Speed Limit (km/hr)	% Trucks
Centennial Parkway North	North of Queenston Road	26,816	90% / 10%	40	15
Queenston Road	East of Centennial Parkway	24,503	90% / 10%	50	11
Kenora Avenue	South of Delawana Drive	4,792	90% / 10%	50	3
Delawana Drive	Kenora Ave to Centennial Parkway	4,780	90% / 10%	50	4

Table 1: Road Traffic Volumes

3.1.2 Representative Receptors

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

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

- OLA_01: Block A West Level 2 Rooftop Amenity Area
- OLA_02: Block A West Level 7 Rooftop Amenity Area
- OLA_03: Block A Level 7 Rooftop Amenity Area
- OLA_04: Block D Level 2 Rooftop Amenity Area
- OLA_05: Block D Level 7 Rooftop Amenity Area
- OLA_06: Block E Level 7 Rooftop Amenity Area A
- OLA_07: Block E Level 7 Rooftop Amenity Area B
- OLA_08: Block E Level 7 Rooftop Amenity Area
- OLA_09: Block F Level 2 Rooftop Amenity Area
- OLA_10: Block F Level 7 Rooftop Amenity Area
- OLA_11: Block J Level 5 Rooftop Amenity Area
- OLA_12: Block J Level 7 Rooftop Amenity Area A
- OLA_13: Block J Level 7 Rooftop Amenity Area B
- OLA_14: Block K Level 7 Rooftop Amenity Area
- OLA_15: Block L Level 2 Rooftop Amenity Area
- OLA_16: Block L Level 7 Rooftop Amenity Area
- OLA_17: Block M Level 5 Rooftop Amenity Area A
- OLA_18: Block M Level 5 Rooftop Amenity Area B
- OLA_19: Block M Level 7 Rooftop Amenity Area A
- OLA_20: Block M Level 7 Rooftop Amenity Area B

The OLAs are indicated in Figures 2a and 2b.

3.1.3 Analysis and Results

Sound levels due to the adjacent transportation (road) sources were predicted using the RLS-90 standard (RLS,1990) as implemented in the Cadna/A software package.

To assess the effect of transportation noise on suites, the maximum sound level on each façade was determined with the results summarized in **Table 2** and **Figures 3a** and **3b** for daytime and nighttime, respectively. The maximum sound level at OLA's where sound levels exceed 55 dBA is summarized in **Table 3** and **Figure 4**.

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		Ro		
Block Building		Day L _{EQ} , 16hr (dBA)	Night L _{EQ} , 8hr (dBA)	Notes
А	Block A East: 20-Storey Building East	57	46	1
В	Block B: Townhouse 5	60	46	1
с	Block C: Townhouse 4	61	52	1
D	Block D: 20-Storey Building West	53	43	1
E	Block E: 18-Storey Building	55	54	1
F	Block F: 15-Storey Building	64	46	1
J	Block J: 20-Storey Building West	55	48	1
к	Block K: 18-Storey Building	65	57	1
	Block L: 20-Storey Building	62	52	1
L	Block L: 7-Storey Building	65	48	1
	Block M: 16-Storey Building	67	43	2
М	Block M: 20-Storey Building	63	59	1

Table 2: Predicted Ground Transportation Source Sound Levels – Plane of Window – Worst-case per Block

Note(s):

 Applicable for low and medium density developments: Provision for future installation of air-conditioning, warning clause "Type C". Applicable for high density developments: Installation of air-conditioning to allow for windows and doors to remain closed, warning clause "Type D". Refer to Appendix D for guidance regarding air-conditioning as a noise mitigation measure.

 The acoustical performance of building components must be specified to meet the indoor sound level criteria. Installation of air conditioning to allow for windows and doors to remain closed, warning clause "Type D". Refer to Appendix D for guidance regarding air-conditioning as a noise mitigation measure.

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Receptor	Description	Daytime L _{EQ} , 16hr (dBA)	Notes
OLA_09	Block F Level 2 Rooftop Amenity Area	56	1
OLA_10	Block F Level 7 Rooftop Amenity Area	60	1
OLA_14	Block K Level 7 Rooftop Amenity Area	56	1
OLA_15	Block L Level 2 Rooftop Amenity Area	65	2
OLA_16 Block L Level 7 Rooftop Amenity Area		59	1
OLA_18 Block M Level 5 Rooftop Amenity Area B		61	2
OLA_19 Block M Level 7 Rooftop Amenity Area A		58	1
OLA_20	Block M Level 7 Rooftop Amenity Area B	58	1

Table 3: Transportation Sound Levels in Outdoor Living Areas (OLAs)

Note(s):

1. For OLA sound levels >55 dBA and ≤60 dBA, noise controls may be applied to meet the 55 dBA criterion. If noise control measures are not provided, a warning clause "Type A" is recommended.

 Noise mitigation is recommended to meet the ≤55 dBA OLA sound level criterion. If noise controls are not feasible to meet the 55 dBA criterion for technical, economic or administrative reasons, an exceedance of 5 dB may be acceptable (to a maximum sound level of 60 dBA). In this case, a warning clause "Type B" is recommended.

3.2 Stationary Source Assessment

Stationary sources could be grouped into two categories: Those that have a permit with the Ontario Ministry of the Environment, Conservation and Parks (MECP) through an Environmental Compliance Approval (ECA) or Environmental Activity and Sector Registry (EASR); and those that are exempt from ECA or EASR permit requirements.

In the case where a stationary source has an Environmental Compliance Approval (ECA) or Environmental Activity and Sector Registry (EASR) permit with the MECP, and would be put in a position where it is no longer in compliance with the applicable sound level criteria due to the encroachment of the proposed new development, source specific mitigation and/or formal classification of the proposed development lands as a "Class 4 Area" (refer to C.4.4.2 "Class 4 Area" in NPC-300) would be required. In this case, coordination and agreements between the stationary source owner, proposed new development owner, the land-use planning authority and potentially the MECP would be needed.

In the case where a stationary source is exempt from ECA or EASR permit requirements with the MECP, the noise provisions of the applicable Municipal Code and guidance from NPC-300 would be applicable. In this case, mitigation of sound levels due to stationary sources would be from a due diligence perspective to avoid nuisance complaints from future occupants of the proposed new development. Mitigation could be in the form of mitigation at the source (with agreement from the stationary source owner) and/or mitigation at the receptor through site and building element design (building orientation, acoustical barriers, façade sound insulation design).



3.2.1 Land-Use Compatibility Review (D-6 Guideline Assessment)

The MECP Guideline D-6 (MOE, 1995) was used as a tool to classify the identified industries and asses their potential influence on the proposed development. The classifications and setback guidelines are summarized in **Appendix B**.

3.2.1.1 Class II and Class III Industries

No facilities within the 1000m radius of the proposed development were identified as Class II or Class III.

3.2.1.2 Class I Industries

There are several commercial operations within the 1000 m area surrounding the proposed development. Although these commercial facilities are not industrial, they are conservatively assessed as Class I facilities. There were four facilities within the Class I 70m potential influence area of the proposed development. Additionally, the Eastgate Square Mall is located on the same property as the proposed development. These commercial operations are summarized in **Table 5**. A scale plan **Figure E-1** is included in **Appendix E** indicating the 70 m and 300 m D-6 Guideline setback distances for the three industry classes, along with the locations of the facilities included in **Table 4**.

Name	Address	Type of Operation	Industry Class	ECA or EASR Registration #
Petro-Canada	817 Queenston Rd, Stoney Creek, ON	Car Wash	N/A	N/A
Eastgate Square Mall	75 Centennial Pkwy N, Hamilton, ON	Retail Shopping Centre	N/A	ECA #8620-7FZLL5
Shell	816 Queenston Rd, Stoney Creek, ON	Car Wash	N/A	N/A
Pioneer 711 Queenston Rd, Hamilton, ON		Car Wash	N/A	N/A
Fortinos	75 Centennial Pkwy N, Hamilton, ON	Grocery Store	N/A	N/A

Table 4: Facilities within the minimum recommended separation distance of the proposed development

Eastgate Square Shopping Centre currently operates under ECA #8620-7FZLL5. However, according to changes to Ontario Regulation 524/98 which occurred after the issuance of the ECA, the facility is now exempt from environmental permitting requirements. The owner of the Eastgate Square Shopping Centre is in the process of revoking the environmental permit as it is no longer relevant or required. This assessment assumes that Eastgate Square Shopping Centre is not operating under any environmental permits.

The remaining four industries described in **Table 5** are exempt from requiring environmental permits (ECA or EASR), and therefore proposed division of land through the Draft Plan of Subdivision is not anticipated affect any environmental approvals. Potential noise should be assessed in more detail at the Site Plan Control stage of development and mitigated as required to ensure a comfortable acoustic environment for residents and reduce the probability of any adverse effects for future occupants.

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3.2.2 Stationary Source Modelling

The results of the D-6 assessment indicate that the proposed development would be in the potential influence area of some facilities. Due to the proximity of nearby non-permitted facilities within 70m of the proposed development supplementary noise modelling has been conducted to further inform the stationary sources assessment.

3.2.2.1 Representative Receptors

Using the "building evaluation" feature of Cadna/A, each façade of the proposed residential units in the development was assessed. Additionally, outdoor points of receptions (OPORs) for this development were assessed at the residential outdoor amenity space. Outdoor points of reception associated with the commercial elements were not assessed.

3.2.2.2 Assumed Sources and Sound Power Levels

Stationary sources of noise surrounding the proposed development were identified using publicly available aerial imagery and street-level imagery.

RWDI proxy data were used for the sound power levels of the HVAC units, Makeup Air Units (MUA), Cooling Tower (CT), and Refrigerated trucks included in the model. Note, a 45 kW emergency generator at the Eastgate Square Shopping Centre is expected to be an insignificant source of noise due to its size and was not included in the modelling. The assumed sound power levels for the stationary sources are presented in **Table 5**. The locations of the sources summarized in Table 5 are illustrated in **Figure 5a** and **5b**.

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				Duty Cycle		
Facility	Source	Proxy Data / Calculation	Sound Power Level (dBA)	Daytime and Evening (07:00h – 23:00h)	Nighttime (23:00h – 07:00h)	
	HVAC_1Fan	Proxy Data	82	Continuous	Off	
Eastgate Square	HVAC_2Fan	Proxy Data	85	Continuous	Off	
Snopping Centre	HVAC_4Fan	Proxy Data	88	Continuous	Off	
	HVAC_6Fan	Proxy Data	90	Continuous	Off	
	HVAC_1Fan	Proxy Data	82	Continuous	Continuous	
	HVAC_2Fan	Proxy Data	85	Continuous	Continuous	
	HVAC_4Fan	Proxy Data	88	Continuous	Continuous	
Fortinos	HVAC_6Fan	Proxy Data	90	Continuous	Continuous	
	СТ	Proxy Data	100	Continuous	Continuous	
	MUA	Proxy Data	85	Continuous	Continuous	
	Reefer Truck	Proxy Data	102	Continuous	Reduced Capacity ¹	
Petro Canada, Shell, Pioneer	Car Wash	Proxy Data	88	Continuous	Continuous	

Table 5: Stationary Source Sound Power Level Assumptions

Note:

1.

Two of the trucks are off during the nighttime period and two refeer trucks are continuous during the nighttime period.

The assumed sound power level values and duty-cycles for the stationary sources are based on reasonable assumptions for the source type.

3.2.2.3 Analysis and Results

Stationary source noise modelling was carried out using the Cadna/A software package, a commercially available implementation of the ISO 9613 (ISO, 1994 and ISO, 1996) algorithms. The predicted sound levels are assessed against both the Class 1 targets (refer to **Appendix A**).

The predicted sound levels during the worst-case 1-hour from existing stationary sources are presented in **Table 6** and **Figures 6a** and **6b** for daytime and nighttime, respectively. The sound levels from stationary sources at each OLA is illustrated in **Figure 7**.

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Building	Stationary Source Sound Levels, L _{EQ,1hr}	Class 1 Sound Level Targets, L _{EQ-1hr}	Meets
	Daytime/Nighttime ¹	Daytime/Nighttime ¹	Target?
Block A East: 7-Storey Building West	60 dBA / 44 dBA	50 / 45 dBA	No
Block A West: 20-Storey Building West	72 dBA / 72 dBA	50 / 45 dBA	No
Block B: Townhouse 3	71 dBA / 68 dBA	50 / 45 dBA	No
Block C: Townhouse 3	54 dBA / 54 dBA	50 / 45 dBA	No
Block D: 20-Storey Building West	61 dBA / 59 dBA	50 / 45 dBA	No
Block E: 7-Storey Building North	56 dBA / 54 dBA	50 / 45 dBA	No
Block F: 15-Storey Building	52 dBA / 48 dBA	50 / 45 dBA	No
Block F: Podium	49 dBA / 49 dBA	50 / 45 dBA	No
Block J: 20-Storey Building East	50 dBA / 32 dBA	50 / 45 dBA	No
Block K: 20-Storey Building	45 dBA / 27 dBA	50 / 45 dBA	Yes
Block L: 20-Storey Building	54 dBA / 42 dBA	50 / 45 dBA	No
Block M: 7-Storey Building South	45 dBA / 26 dBA	50 / 45 dBA	Yes
OLA_02	62 dBA /	50 dBA /	No
OLA_03	57 dBA /	50 dBA /	No

Table 6: Predicted Sound Levels- Continuous Stationary Sources - Worst-case per block

Note(s):

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

As shown in **Table 6**, the daytime-evening and nighttime continuous sound levels at the façade due to existing stationary sources are predicted to exceed the Class 1 sound level targets based on screening level noise modelling analysis. The exceedance of targets is limited to sound from the Eastgate Square Shopping Centre and the Fortinos grocery store. Sound from other facilities is not expected to be of concern. Recommendations based on the modelling are provided in **Section 3.3.2**.

3.3 Recommendations

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

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3.3.1 Transportation Sources

The following recommendations are provided to address transportation sources.

3.3.1.1 Building Façade Components

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

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

- Typical residential living room:
 - Glazing 60% of façade, Door: 20% of façade
 - 55% Façade to floor area Ratio
- Typical residential bedroom:
 - Glazing 80% of façade, Door: N/A
 - o 81% Façade to floor area Ratio
- Acoustical character of rooms: High absorption finishes/furniture for bedrooms and intermediate absorption finishes/furniture for living rooms.

Based on the predicted plane of window sound levels and the assumptions listed above, recommendations for the minimum sound insulation ratings for the building components were determined using the National Research Council of Canada "BPN-56 method" (NRCC, 1985). The reported results are in terms of Sound Transmission Class (STC) ratings as summarized in **Table 7** and is illustrated in **Figure 8**.

Portion of Development	Façade	Window Glazing	Exterior Door	Façade Wall
Block M: 16-Storey Building	East	STC-26	STC-45	STC-28
Block M: 18-Storey Building	East	STC-25	STC-45	STC-28
Block M: 7-Storey Building North	East	STC-25	STC-45	STC-28
Block M: 7-Storey Building South	East	STC-25	STC-45	STC-28

Table 7: Recommended Facade Component Minimum Sound Insulation Rating

The maximum requirement for the window glazing was determined to be STC-35, and STC-30 for the exterior door, which is considered feasible as this can be achieved by various double-glazed configurations of insulated glazing units.

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

We recommend that the façade construction is reviewed during detailed design to ensure that the indoor sound level limits will be met, and that the window/door supplier is requested to provide STC laboratory test reports as

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part of shop drawing submittal to confirm that the glazing/door components will meet the minimum STC requirements.

3.3.1.2 Ventilation Recommendations

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

3.3.1.3 Outdoor Living Areas

Due to exposure to transportation sources along Centennial Parkway North and Queenston Road sound levels in OLAs are predicted to be elevated. The road daytime average sound levels for the OLAs included in the assessment are in the range of 31-65 dBA. To reduce the transportation sound levels in OLAs to meet the applicable criteria, noise barriers are recommended.

The recommended geometry of the noise barriers are included with **Figure 9a** (to meet 55 dBA) and **Figure 9b** (to meet 60 dBA). The barrier heights are summarized in Table 7. General guidance with respect to noise barrier design is included with **Appendix D**.

		Predicted OLA Sound Level	Barrier Height (m) to Meet Sound Level Criterion		
Receptor Description		Daytime L _{EQ} , 16hr (dBA)	≤ 55 dBA¹	≤ 60 dBA²	
OLA_09	Block F Level 2 Rooftop Amenity Area	56	1.0 m ³		
OLA_10	Block F Level 7 Rooftop Amenity Area	60	1.0 m ³		
OLA_14	Block K Level 7 Rooftop Amenity Area	56	1.0 m ³		
OLA_15	Block L Level 2 Rooftop Amenity Area	65	2.0 m ³	1.0 m	
OLA_16	Block L Level 7 Rooftop Amenity Area	59	1.4 m ³		
OLA_18	Block M Level 5 Rooftop Amenity Area B	61	1.0 m ³	1.0 m	
OLA_19	Block M Level 7 Rooftop Amenity Area A	58	1.0 m ³		
OLA_20	Block M Level 7 Rooftop Amenity Area B	58	1.0 m ³		

Table 8: Barrier Height Recommendations for OLAs

Note(s):

1. Refer to Figure 3a for barrier geometry to meet 55 dBA.

2. Refer to Figure 3b for barrier geometry to meet 60 dBA. A warning clause "Type B" is recommended in cases where the OLA sound level is >55 dBA (to a maximum of 60 dBA).

3. If noise control measures are not provided, a warning clause "Type A" is recommended.

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3.3.2 Stationary Sources

The facilities in the area surrounding the proposed development are exempt from requiring environmental permits (ECA or EASR), and therefore the proposed division of land through the Draft Plan of Subdivision is not anticipated to affect any environmental approvals. Potential noise is assessed and mitigated as required to ensure a comfortable acoustic environment for residents to reduce the probability of any adverse effects for future occupants.

This analysis is based on the proxy data and worst-case assumptions regarding operations as a conservative approach. Achieving a comfortable acoustic environment for future residents will rely on a combination of:

- Obtaining a better understanding of Fortinos' operating times and mechanical equipment sound power levels in order to refine modelling;
- Investigation of mitigation for the cooling towers at Fortinos;
- Relocation of outdoor living areas or shielding them from stationary sources using noise barriers;
- Modification of the building design to shield sensitive areas, such as the location of windows and balconies, or the inclusion of vertical wall elements that provide barrier screening;
- Specialized noise insulation design of the façade, glazing and balcony door assemblies to ensure adequate indoor sound levels.

The following recommendations supporting the conclusion that the proposed development is feasible to develop adjacent to existing uses assumes a worst-case scenario. It is expected that as the development progresses, these recommendations may lessen.

3.3.2.1 Building Façade Components

Due to the elevated stationary sound levels in the area, acoustical design of the façade components including spandrel, window glazing, and exterior doors, are recommended to be specified for the proposed development. STC ratings are provided for the worst-case location to demonstrate the feasibility of the project. STC ratings for other locations are expected to be less.

To assess the development's feasibility, preliminary window glazing, and exterior balcony door sound isolation requirements were determined. The same assumptions for the transportation sources in Section 3.1.1.1 were applied for the stationary sources.

Based on the predicted plane of window sound levels and the assumptions, recommendations for the minimum sound insulation ratings for the building components were determined using the National Research Council of Canada "BPN-56 method" (NRCC, 1985). The reported results are in terms of Sound Transmission Class (STC) ratings as summarized in **Table 9** and is illustrated in **Figure 10**.

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Portion of Development	Facade	Window Glazing	Facade Wall	Exterior Door
Block A West: 20-Storey Building East	North	STC-31	STC-45	STC-28
Block A West: 20-Storey Building West	North	STC-38	STC-45	STC-28
Block A West: 7-Storey Building	North	STC-37	STC-45	STC-28
Block A West: Podium	North	STC-29	STC-45	STC-28
Block B: Townhouse 1	North	STC-29	STC-45	STC-28
Block B: Townhouse 2	East	STC-24	STC-45	STC-28
Block B: Townhouse 3	North	STC-36	STC-45	STC-28
Block B: Townhouse 4	East	STC-30	STC-45	STC-28

Table 9: Recommended Façade Component Minimum Sound Insulation Rating - Worst-Case Location

3.3.2.2 Ventilation Recommendations

Due to the transportation sound levels at the plane of the façade, central air conditioning is recommended for the proposed development to allow for windows and doors to remain closed as a noise mitigation measure. These requirements align with the ventilation requirements for transportation noise.

3.3.2.3 Outdoor Points of Reception

NPC-300 suggests that outdoor sound levels in the range of 50 to 55 dBA would provide a comfortable sound level, based on stationary and transportation sound level limits. Due to exposure of stationary sources from Fortinos and Eastgate Square Shopping Centre sound levels at the outdoor points of reception (OPORs) are predicted to be elevated. The stationary daytime average sound levels for the OPORs included in the assessment are in the range of 31-65 dBA. To reduce the stationary sound levels in OPORs to meet the applicable criteria, noise barriers are recommended.

The recommended geometry of the noise barriers are included with **Figure 11.** The barrier heights are summarized in Table 9. General guidance with respect to noise barrier design is included with **Appendix D**.

Receptor	Description	Predicted OLA Sound Level Daytime L _{EQ} , 16hr (dBA)	Barrier Height (m) to Meet Sound Level Target
OLA_02	Block A West Level 7 Rooftop Amenity Area	62	2.0 m
OLA_03	Block A Level 7 Rooftop Amenity Area	57	1.0 m

Table 10: Barrier Height Recommendations for OLA - Stationary Sources

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3.3.3 Warning Clauses

The following warning clauses are recommended for the proposed development:

- 1. NPC-300 Type A or B to address transportation sound levels in Outdoor Living Areas (OLAs)
- 2. NPC-300 Type C or D to address transportation sound levels at the plane of window
- 3. NPC-300 Type E to address proximity to commercial/industrial facilities

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

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

On-site stationary sources for the development are expected to consist of HVAC related equipment in the roof-top mechanical penthouse as well as various exhaust fans. Further, consideration should be given to control airborne and structure-borne noise generated within the proposed development.

Within the development itself the main sources of noise that are likely to affect the uses of the building are the mechanical systems. The potential noise effect of the commercial component of the development is recommended to be reviewed during detailed design, to ensure the applicable criteria will be met.

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

We recommend that the potential noise effect of the proposed development is reviewed during detailed design to ensure the applicable sound level criteria will be achieved.

5 CONCLUSIONS

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

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

- 1. Installation of central air-conditioning so that all suites' windows can remain closed.
- 2. Minimum sound isolation performance:
 - a. Suite bedroom window glazing with minimum sound isolation performance of STC-38.
 - b. Suite exterior balcony door with minimum sound isolation performance of STC-28.

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- 3. The inclusion of noise warning clauses related to:
 - a. Transportation sound levels at the building façade and in the outdoor amenity areas
 - b. Proximity to commercial/industrial land-use
- 4. Construction of perimeter noise barriers along the outdoor amenity areas if feasible, with the applicable warning clause.

Rail is located farther than 500 m away from the proposed development, therefore no noise or vibration impacts from rail are expected.

The potential noise levels from stationary sources of sound were evaluated. Mechanical equipment from the remaining retail portions of the existing Eastgate Mall are the most significant source of environmental noise at the proposed development. Based on the noise modelling results and setback distances, the land use compatibility of the proposed development with respect to the nearby commercial operations is considered acceptable from the noise assessment perspective. However, due to the proximity of the proposed development to the commercial facilities, a warning clause, barrier for outdoor amenity spaces, and upgraded windows/balcony doors are recommended to inform prospective occupants of the potential for audible noise from these facilities. The recommendations for stationary sources should be revisited at the site plan approval stage and may be reduced when more detailed information is available.

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

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

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6 STATEMENT OF LIMITATIONS

This report entitled Eastgate Square 75 Centennial Parkway N was prepared by Rowan Williams Davies & Irwin Inc. ("RWDI") for Hammer LP ("Client"). The findings and conclusions presented in this report have been prepared for the Client and are specific to the project described herein ("Project"). The conclusions and recommendations contained in this report are based on the information available to RWDI when this report was prepared. Because the contents of this report may not reflect the final design of the Project or subsequent changes made after the date of this report, RWDI recommends that it be retained by Client during the final stages of the project to verify that the results and recommendations provided in this report have been correctly interpreted in the final design of the Project.

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

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

7 REFERENCES

- 1. Ontario Ministry of the Environment (MOE), August 2013, Publication NPC-300, Environmental Noise Guideline Stationary and Transportation Sources Approval and Planning (MOE, 2013).
- 2. Richtlinien für den Lärmschutz an Strassen (RLS). BM für Verkehr, Bonn, 1990 (RLS, 1990).
- 3. Ontario Ministry of the Environment (MOE) Publication Guideline D-6, "Compatibility Between Industrial Facilities and Sensitive Land Uses", July 1995 (MOE, 1995).
- 4. Controlling Sound Transmission into Buildings (BPN-56), National Research Council Canada (NRCC, 1985).
- International Organization for Standardization (ISO), 1994b, International Standard ISO 9613-1:1994, Acoustics Attenuation of Sound during propagation outdoors. Part 1: Calculation of the absorption of sound by the atmosphere. (ISO, 1994)
- 6. International Organization for Standardization (ISO), 1996, International Standard ISO 9613-2:1996, Acoustics Attenuation of sound during propagation outdoors Part 2: General method of calculation (ISO, 1996)
- 7. City of Hamilton, Noise Control By-Law 11-285, (Link, accessed 2023-07-05).







Project #:	2300777
Date:	2023-07-05







Drawn by: GER	Figure:	За	24
Project #:	230	0777	
Date:	2023-	07-05	

50 to 55 dBA 55 to 60 dBA 60 to 65 dBA 65 to 70 dBA 70 to 75 dBA 75 to 80 dBA > 85 dBA

Results of Road Traffic	Modelling -	Nighttime
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Drawn by: GER	Figure:	3b	27	
Project #:	23	00777		
Date:	2023	8-07-05		



 + - HVAC 1-Fan + - HVAC 2-Fan + - HVAC 4-Fan + - HVAC 6-Fan + - Make-up Air Unit (MUA) + - Cooling Tower (CT) + - Reefer Truck 	Propert	belawan, ty Boundary	Centennial Pkwy N
Stationary Source Locations - Mall	Drawn by: CWM	Figure: 5a	
	Project #:	2300777	
Eastgate Square – Hamilton, Ontario	Date:	2023-07-05	

+ - Carwash



Stationary Source Locations - Carwashes	Drawn by: CWM	Figure: 5b	27	٧,	
	Project #:	2300777		Υ	
Eastgate Square – Hamilton, Ontario	Date:	2023-07-05			



Results of Stationary Source Modelling - Daytime

Drawn by: GER	Figure:	6a	$\mathbf{P}_{\mathbf{A}}$	
Project #:	2300777			
Date:	2023	8-07-05		



Results of Stationary Source Modelling - Nighttime

Drawn by: GER	Figure:	6b	27	V,
Project #:	2300777			4
Date:	2023	8-07-05		



S5 to 65 dBA (AC Required)				
> 65 dBA (AC + Facade Design Required)		50	-	- BD
Results of Road Traffic Modelling – Requirements	Drawn by: GER	Figure:	8	

Daytime (Worst-case Scenario)

Drawn by: GER	Figure:	8	
Project #:	230	0777	
Date:	2023	-07-05	







		dBA (AC Require A (AC + Facade E	ed) Design Required)
Results of Stationary Source Requirements	Drawn by: GER	Figure: 10	
Nighttime (Worst-case Scenario)	Project #:	2300777	
Eastgate Square – Hamilton, Ontario	Date:	2023-07-05	





APPENDIX A

lesk Docs://Eastgate Mall Redevelopment/BDPQ_AR_21043_Eastgate Square_Master Plan_R2022.rvt





APPENDIX B

CRITERIA

Transportation Sources

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

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

Road and Rail

Indoor Sound Level Criteria

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

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

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

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



Type of Space		Sound Level Criteria (Indoors)		
		Daytime L _{eq,16-hr} 07:00h – 23:00h	Nighttime L _{eq,8-hr} 23:00h - 07:00h	
		50 dBA	-	
General Offices, reception areas, retail stores, etc.	Rail	45 dBA	-	
Theatres, places of worship, libraries, individual or semi- private offices, conference rooms, reading rooms, etc.	Road	45 dBA	-	
	Rail	40 dBA	-	
Sleeping quarters of residences, hospitals,		-	40 dBA	
nursing/retirement homes, etc.	Rail	-	35 dBA	
Cleaning quarters of botals (motals	Road	-	45 dBA	
		-	40 dBA	

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

Outdoor Living Areas (OLAs)

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

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

Table 3: Sound Level Criteria - Outdoor Living Area

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

Outdoor and Plane of Window Sound Levels

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

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

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

Note(s):

1. Whistle noise is included (if applicable) in the determination of the sound level at the plane of window.

2. Some railway companies (e.g. CN, CP) may require that the exterior walls include a brick veneer or masonry equivalent for the façade facing the railway line, regardless of the sound level.

3. Whistle noise is not included in the determination of the sound level at the OLA.

Rail Layover Sites

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

Rail Vibration Criteria

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

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

This vibration criterion is based on a one-second exponential time-averaged maximum hold root-mean-square (RMS) vibration velocity level and is consistent with the Railway Associations of Canada (RAC, 2013) guideline, the U.S. Federal Transit Authority (FTA, 2018) criterion for residential land-uses, the Toronto Transit Commission (TTC) guidelines for the assessment of potential vibration impact of future expansion (MOEE/TTC, 1993).

Aircraft

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

Table 5: Indoor Sound Level Criteria for Aircraft Sources

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

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

Table 6: Supplementary Indoor Sound Level Criteria for Aircraft Sources

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

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

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

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

Assessment	Aircraft Sound Level	NPC-300 Requirements
Location	NEF (L _{EQ,24-hr})	
≥NEF 3	≥NEF 30	Air conditioning to allow windows to remained closed. The sound insulation performance of building components must be specified and designed to meet the indoor sound level criteria. Warning clauses "Type D" and "Type B" are recommended.
Outdoors	< NEF 30 ≥ NEF 25	The sound insulation performance of building components must be specified and designed to meet the indoor sound level criteria. Applicable for low and medium density development: Forced-air ventilation system to allow for the future installation of air-conditioning. Warning clause "Type C" is recommended. Applicable for high density development: Air conditioning to allow windows to remained closed. Warning clause "Type D" is recommended.
	< NEF 25	Further assessment not required

Stationary Sources

NPC-300 Sound Level Criteria – Stationary Sources

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

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

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

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

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

Note(s):

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

2. Class 1, 2 and 3 sound level criteria apply to a window that is assumed to be open.

3. Class 4 area criteria apply to a window that is assumed closed. Class 4 area requires formal designation by the land-use planning authority.

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

For impulsive sound, other than quasi-steady impulsive sound, from a stationary source, the sound level criteria

at a POR is expressed in terms of the Logarithmic Mean Impulse Sound Level (L_{LM}), and is summarized in **Table 10**.



	Number of	Class 1 and	d 2 Areas	Class 3	Areas	Class 4 Areas			
Time Period	Impulses in Period of One-Hour	Outdoor Plane o Windov		Outdoor	Plane of Window	Outdoor	Plane of Window		
Daytime (0700-2300h)	9 or more	50 dBAI	50 dBAI	45 dBAI	45 dBAI	55 dBAI	60 dBAI		
Nighttime (2300–0700h)		-	45 dBAI	-	40 dBAI	-	55 dBAI		
Daytime (0700-2300h)	7 4 5 0	55 dBAI	55 dBAI	50 dBAI	50 dBAI	60dBAI	65 dBAI		
Nighttime (2300–0700h)	- / to 8	-	50 dBAI	-	45 dBAI	-	60 dBAI		
Daytime (0700-2300h)	5 to 6	60 dBAI	60 dBAI	55 dBAI	55 dBAI	65 dBAI	70 dBAI		
Nighttime (2300–0700h)		-	55 dBAI	-	50 dBAI	-	65 dBAI		
Daytime (0700-2300h)		65 dBAI	65 dBAI	60 dBAI	60 dBAI	70 dBAI	75 dBAI		
Nighttime (2300–0700h)	4	-	60 dBAI	-	55 dBAI	-	70 dBAI		
Daytime (0700-2300h)	2	70 dBAI	70 dBAI	65 dBAI	65 dBAI	75 dBAI	80 dBAI		
Nighttime (2300–0700h)	3	-	65 dBAI	-	60 dBAI	-	75 dBAI		
Daytime (0700-2300h)	2	75 dBAI	75 dBAI	70 dBAI	70 dBAI	80 dBAI	85 dBAI		
Nighttime (2300–0700h)		-	70 dBAI	-	65 dBAI	-	80 dBAI		
Daytime (0700-2300h)	1	80 dBAI	80 dBAI	75 dBAI	75 dBAI	85 dBAI	90 dBAI		
Nighttime (2300–0700h)		-	75 dBAI	-	70 dBAI	-	85 dBAI		

Table 10: NPC-300 Exclusion Limits – Impulsive Stationary Sources (LLM)

Note(s): 1.

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

D-Series Guidelines

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

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

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

Table 11: Summary of Guideline D-6

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

<u>K</u>

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

Table 12: Guideline D-6 Industrial Categorization Criteria



APPENDIX C

City of Hamilton		TURNING	ΜΟΥΕΜΕΝΤ	COUNT	Loc. Code: 15271		
Intersection:	Delawana Dr	at	Kenora Ave	Total Vehicles: 2,054	Date: Tuesday		

Sep 13, 2022 Period: 7 hours

18

Intersection: Delawana Dr at Kenora Ave (North/South) (East/West) M.V.E./Year: 1.432 Direction: Road Condition: Wet Weather: Rain AWDT Factor: 2.05 Comments:

	1110.					тот	AL VEHI	CLES							
15 mins.	N	orth Bd. o	on		East Bd. on	1	South B	d. on	West B	3d. on			Pede	strians	
Ending		N/S			E/W		N/S		E/W		Total	N	E	S	w
(Pk.Hr.*)	L	S	R	L	S F		. S	R		<u>8 R</u>	Veh's	side	side	side	side
7:15	0	0	8 15		0 0		0		12	0 0	28	0	3	0	1
7:45	0	0	13	0	0 0	2	3	0	15	0 2	35	0	6	0	1
8:00	0	4	25 14	0	0 0	2	2 0 1		20	0 1	52	0	11	03	1
8:30 *	0	1	36	0	0 0	2	4	. 0	37	0 0	80	1	5	1	1
8:45 *	0	1	28	0	0 0	0 1	2	0	23	0 0	55	2	10	1	1
9:00 *	0	2	40		0 0	2	: 3 . 1		25	05	77 49	1	3	1	1
9:30	0	3	27	Ö	0 0		1	0	21	0 0	52	Ő	3	0	1
9:45	0	0	35	0	0 0	2 4	2	0	20	0 3	64	0	4	0	1
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TURNING MOVEMENT COUNT

City of Hamilton

Intersection:	Queenston Rd	
Direction:	(East/West)	
Road Condition: V	Weath	
Comments:		

at Weather: Rain Centennial Pkwy (North/South) Total Vehicles: 22,052 M.V.E./Year: 15.370 AWDT Factor: 2.05 Date: Tuesday Sep 13, 2022 Period: 7 hours

TOTAL VEHICLES										r			r	1			
15 mins.	N	lorth Bd.	on		East Bd	. on		South B	d. on	1	West B	d. on	Total	N	Pede	strians	
Enaing (Pk Hr *)		N/5	R	1	E/W	R		N/5	R	1	E/W	R	I otal Veh's	N sida	E	S side	W
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8:00	15	172	37	30	119	13	13	88	27	21	146	25	706	4	1	2	
8:15	16	141	25	27	77	12	14	80	31	34	155	29	641	10	4	2	
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9:45	24	151	19	35	98	16	28	96	27	24	115	29	662	6	0	2	
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14:00	22	124	35	53	140	30	57	155	47	35	100	36	834	9	2	8	8
14:15	33	125	46	43	151	20	37	120	47	40	120	37	819	9	5	7	
14:45 *	28	122	34	43	146	24	45	145	57	41	114	42	840	12	5	7	1
15:00 *	28	120	56	53	160	24	48	149	44	45	145	33	905	10	3	5	8
15:30 *	18	126	58	41	195	23 39	37	187	51	46	150	40	955	18	6	8	12
16:15	28	105	34	40	177	26	49	218	50	38	107	35	907	17	9	8	11
16:30	23	118	21	49	157 149	29 35	43	203	45 44	49 50	145 155	32 44	914	18 25	4	3	10
17:00 *	24	116	39	41	168	26	43	203	49	52	161	30	952	22	8	17	1
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17:45 *	26	128	34	46	181	24	49	216	52	49	136	26	967	13	1	10	(
18:00	30	118	25	50	180	27	29	215	36	37	129	29	905	13	5	4	1
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15 mins.	N	lorth Bd.	on			East Bo	l. on			South Bo	l. on			West Bo	l. on		
Ending		N/S				E/W				N/S				E/W			
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APPENDIX D



NOISE MITIGATION GUIDANCE

Acoustic/Noise Barrier

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

- A wall, berm, wall/berm combination or similar structure, used as a noise control measure, and high enough to break the line-of-sight between the source and the receptor.
- The minimum surface density (face weight) is 20 kg/m²
 - Many materials could satisfy the surface density requirement, e.g. wood, glass, concrete, Plexiglas, Acrylite.
 - The required thickness can be determined by dividing the 20 kg/m² face weight by the material density (kg/m³). Typically, this would imply:
 - 50 mm (2") thickness of wood
 - 13 mm (0.5") thickness of lighter plastic (like Plexiglas or PVC)
 - 6 mm (0.25") thickness of heavier material (like aluminum, glass, concrete)
- The barrier should be structurally sound, appropriately designed to withstand wind and snow load, and constructed without cracks or surface gaps. Joints between panels may need to be overlapped to ensure surfaces are free of gaps, particularly for wood construction.
- Any gaps under the barrier that are necessary for drainage purposes should be minimized and localized, so that the acoustical performance of the barrier is maintained.
- If a sound absorptive face is to be included in the barrier design, the minimum noise reduction coefficient is recommended to be NRC 0.7.

Building Ventilation and Air Conditioning

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

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

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

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

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APPENDIX E





APPENDIX F

WARNING CLAUSES

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

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

Transportation Sources

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

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

NPC-300 Type B: Recommended to address surface transportation sound levels in OLAs if the sound level is in the range of >55 dBA but \leq 60 dBA, and noise controls have been provided. Recommended to address outdoor aircraft sound levels \geq NEF 30.

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

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

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

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

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

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

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

Stationary Sources

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

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

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

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