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MEMORANDUM

DATE:	2025-07-25	RWDI Reference No.: 2408681
TO:	Michael Lazier	EMAIL: michael@northbridgecapital.com
CC:	John Pennachetti	EMAIL: John.P@cortelgroup.com
FROM:	Dan Bacon	EMAIL: Dan.Bacon@rwdi.com
	Kyle Hellewell	EMAIL: Kyle.Hellewell@rwdi.com
RE:	Noise and Vibration Impact Study 2172 Wyecroft Road Oakville, Ontario	

Dear Mr. Lazier,

RWDI was retained to complete a feasibility-level Noise and Vibration Impact Study for the proposed mixed-use development at 2172 Wyecroft Road in Oakville, Ontario. The development will consist of 4 towers, ranging from 25 to 35 storeys. This memorandum summarizes the preliminary predicted noise and vibration levels at the proposed development and compares them to the applicable criteria. This assessment is based on the 2172 Wyecroft Road drawing package dated June 30, 2025. Cardinal directions expressed in this assessment follow the "Project North" as shown in the drawing package.

APPLICABLE CRITERIA

Applicable criteria for transportation noise sources (road and rail), stationary noise sources and rail vibration are adopted from the Ontario Ministry of the Environment, Conservation and Parks (MECP) NPC-300 Environmental Noise Guideline. Criteria from the Town of Oakville Noise By-laws were also considered.

The proposed development is located within the Bronte GO Major Transit Station Area (MTSA). It is RWDI's understanding that the Bronte GO MTSA has been designated by the Town of Oakville as a "Class 4 Area" under the Provincial NPC-300 guidelines. As such, Class 4 Area criteria were considered for this assessment.

Transportation noise sources are assessed to predict indoor sound levels from surrounding transportation sources, which determines building façade elements (windows, exterior walls, doors) sound insulation design recommendations.



Michael Lazier
Northbridge Capital Inc.
RWDI #2408681
July 25, 2025

Transportation noise is also assessed in Outdoor Living Areas (OLAs), which determines OLA noise mitigation, such as noise barriers, and related warning clause recommendations.

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. Since stationary source noise is evaluated at the plane of window (rather than the indoor sound level), upgraded building façade elements are not typically considered an appropriate mitigation method for stationary sources. At-source mitigation is typically the preferred method of mitigation.

More details regarding the applicable criteria are included in **Appendix A**.

SITE VISIT

A site visit was conducted on October 18, 2024 by RWDI to take vibration measurements of train pass-bys and to obtain a better understanding of the acoustic environment of the area and the surrounding facilities. Triaxial measurements captured 14 pass-bys on the rail line.

During the site visit significant noise was observed from the adjacent New West Gypsum Recycling facility to the south, and the Mauser Packaging Solutions facility to the south. Primary sources of noise were the movement of trucking, loading/unloading, backup beepers, and dumping.

TRANSPORTATION NOISE

Road Traffic

Turning Movement Counts (TMCs) were obtained from the Town of Oakville and the Halton Region for surrounding roadways. The Annual Average Daily Traffic (AADT) volumes and vehicle breakdowns (truck percentages) were estimated based on the AM Peak hour, PM Peak hour, and 8 hour volumes as shown in the TMCs.

AADT volumes Annual Average Daily Truck Traffic (AADTT) volumes for the Queen Elizabeth Way (QEW) highway segment to the west were obtained from the publicly available Corridor website, published by the Ministry of Transportation of Ontario (MTO).

All AADT volumes were grown annually at a rate of 2% to a horizon year of 2034, except for the QEW, which was grown annually based on its historic growth.



The following surrounding roadways with the potential to have impacts on the Project were considered in this assessment:

- Third Line to the north;
- South Service Line to the north and west;
- Speers Road to the east;
- Wycroft Road to the west; and
- QEW Highway to the west.

Rail Traffic

The Oakville subdivision is located approximately 60 m east of the proposed development, and currently serves the GO rail and CN freight and passenger.

Metrolinx provided future GO rail traffic volumes and CN provided current freight and VIA rail traffic volumes. The freight and VIA rail traffic volumes were grown annually at a rate of 2.5% to a horizon year of 2034.

Results

Sound levels due to the adjacent roads were predicted using emission algorithms from the Ontario Road Noise Analysis Method for Environment and Transportation (ORNAMENT) guidelines (MOE, 1989) implemented in the Cadna/A software package.

Sound levels due to adjacent rail sources were predicted using the FTA method, 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 predicted. Predicted sound levels due to road noise, rail noise, and road and rail noise combined are presented below in **Table 1**. Cardinal directions expressed in the table follow the “Project North” as shown in the drawing package dated June 30, 2025. **Figure 1** illustrates the locations of the facades presented in **Table 1**.

Table 1: Predicted Transportation Source Sound Levels – Plane of Window

Building	Façade	Road		Rail		Road + Rail		Notes
		Day L _{EQ} , 16hr (dBA)	Night L _{EQ} , 8hr (dBA)	Day L _{EQ} , 16hr (dBA)	Night L _{EQ} , 8hr (dBA)	Day L _{EQ} , 16hr (dBA)	Night L _{EQ} , 8hr (dBA)	
Building A & B Podium	North	67	66	62	58	68	66	1
	East	61	61	62	58	64	62	1
	South	67	64	61	57	67	65	1
	West	70	68	56	52	70	68	1



Building	Façade	Road		Rail		Road + Rail		Notes
		Day L _{EQ} , 16hr (dBA)	Night L _{EQ} , 8hr (dBA)	Day L _{EQ} , 16hr (dBA)	Night L _{EQ} , 8hr (dBA)	Day L _{EQ} , 16hr (dBA)	Night L _{EQ} , 8hr (dBA)	
Tower A	North	68	67	60	56	69	67	1
	East	60	59	63	58	64	62	1
	South	67	66	61	56	68	67	1
	West	70	69	48	44	70	69	1
Tower B	North	66	65	62	58	67	66	1
	East	60	59	64	60	66	62	1
	South	64	63	62	58	66	64	1
	West	67	67	55	51	67	67	1
Building C & D Podium	North (Facing Rail Line)	63	62	69	64	69	65	1, 2
	East (Facing Rail Line)	57	56	70	65	70	66	1, 2
	South	63	63	66	62	68	65	1
	West	64	64	58	54	65	64	1
Tower C	North	63	62	66	61	67	64	1
	East	58	57	65	61	65	62	1
	South	64	64	62	58	66	65	1
	West	66	66	61	56	67	66	1
Tower D	North (Facing Rail Line)	62	61	68	64	69	65	1, 2
	East (Facing Rail Line)	56	54	69	64	69	65	1, 2
	South	64	64	64	60	67	65	1
	West	65	64	63	59	66	65	1

Note(s):

1. 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. NPC-300 warning clause "Type D" is required. The wording of the NPC-300 warning clauses are provided in **Appendix B**.
2. Minimum brick veneer or masonry equivalent for adjacent façades with exposure to the railway line.

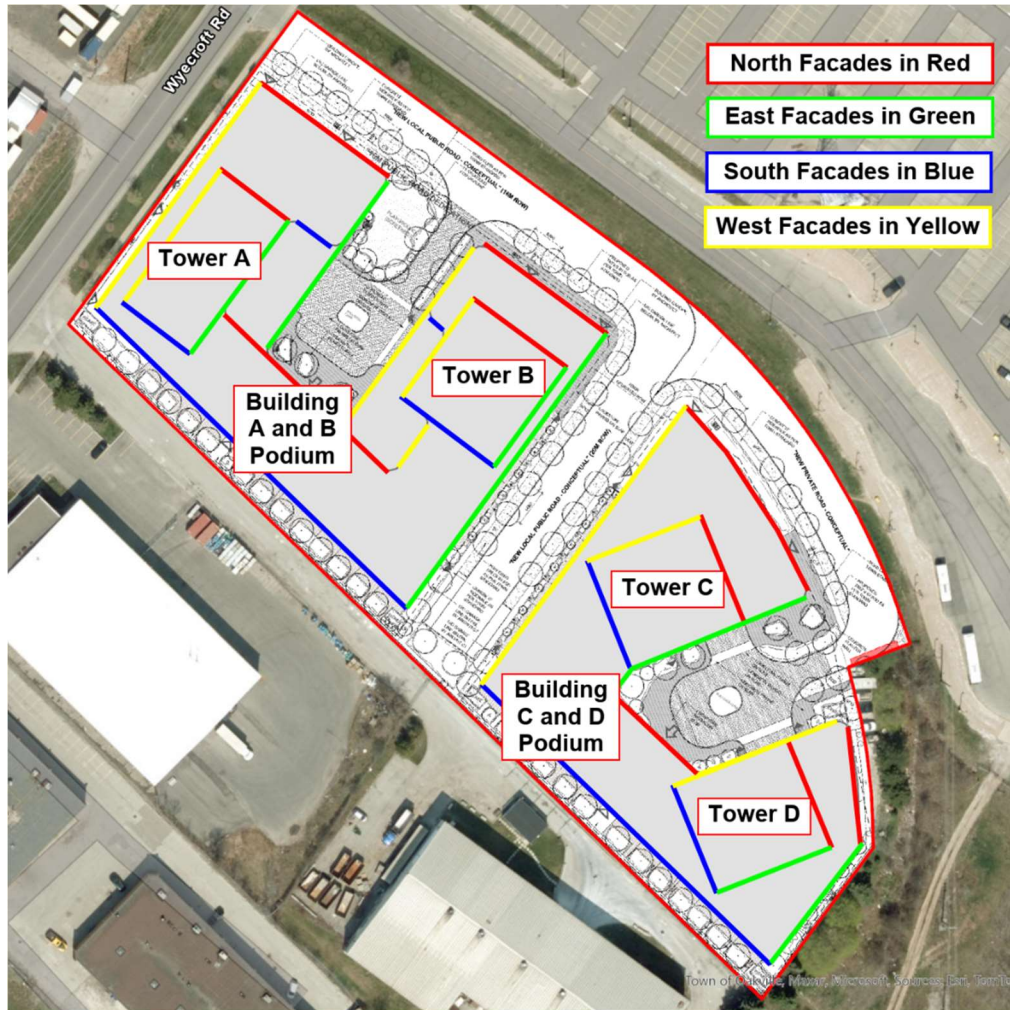


Figure 1: Façade Locations

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 meters.

Predicted sound levels due to transportation noise (road + rail) in the qualifying OLAs are presented below in **Table 2**.



Table 2: Predicted Transportation Source Sound Levels – OLAs

Receptor	Description	Daytime L_{EQ} , 16hr	Notes
OLA_01	Building A and B Level 7 Outdoor Amenity Area (West Area)	66	1
OLA_02	Building A and B Level 7 Outdoor Amenity Area (East Area)	65	1
OLA_03	Building C and D Level 7 Outdoor Amenity Area (Northwest Area)	67	1
OLA_04	Building C and D Level 7 Outdoor Amenity Area (West Area)	65	1
OLA_05	Building C and D Level 7 Outdoor Amenity Area (South Area)	67	1
OLA_06	Building C and D Level 7 Outdoor Amenity Area (East Area)	70	1

Note(s):

1. Noise mitigation is recommended to meet the ≤ 55 dBA 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.

Recommendations

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".

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 based on dimensions of a typical residential living room and bedroom.

Based on the predicted plane of window sound levels, 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 3**.



Table 3: Façade Component Minimum Sound Insulation Rating

Portion of Development	Façade	Window Glazing	Exterior Door	Façade Wall
Building A & B Podium	North	STC-32	STC-25	STC-45
	East	STC-31	STC-25	STC-45
	South	STC-31	STC-25	STC-45
	West	STC-33	STC-25	STC-45
Tower A	North	STC-33	STC-25	STC-45
	East	STC-31	STC-25	STC-45
	South	STC-32	STC-25	STC-45
	West	STC-34	STC-25	STC-45
Tower B	North	STC-32	STC-25	STC-45
	East	STC-32	STC-25	STC-45
	South	STC-31	STC-25	STC-45
	West	STC-31	STC-25	STC-45
Building C & D Podium	North	STC-36	STC-30	STC-50 ^[1]
	East	STC-37	STC-32	STC-50 ^[1]
	South	STC-34	STC-28	STC-45
	West	STC-30	STC-25	STC-45
Tower C	North	STC-34	STC-28	STC-45
	East	STC-32	STC-28	STC-45
	South	STC-32	STC-25	STC-45
	West	STC-32	STC-25	STC-45
Tower D	North	STC-35	STC-30	STC-50 ^[1]
	East	STC-36	STC-30	STC-50 ^[1]
	South	STC-33	STC-25	STC-45
	West	STC-32	STC-25	STC-45
Corner Units^[2]	N/A	STC-39	STC-32	STC-50 ^[1]

Note(s):

1. Minimum brick veneer or masonry equivalent for adjacent façades with exposure to the railway line (typically approximately STC-50).
2. Applicable for corner units exposed to noise through windows/exterior doors facing 2 directions.

Based on the current assumptions, the maximum requirements were determined to be up to STC-39 for window glazing and up to STC-32 for exterior doors. Exterior walls must meet STC-45, except for the façades facing the rail line, which require minimum brick veneer construction (typically approximately STC-50).

Outdoor Living Areas

Perimeter barriers are predicted to be required for all OLAs, ranging from 2.2 m to 3.2 m in height to achieve the maximum allowable sound level of 60 dBA in the OLAs. Mitigating sound levels down to 55 dBA would require OLA barriers greater than 3 m in height and is not considered feasible. The OLAs included in this assessment are illustrated in **Figure 2**. Barriers are shown in blue with their respective height requirements.

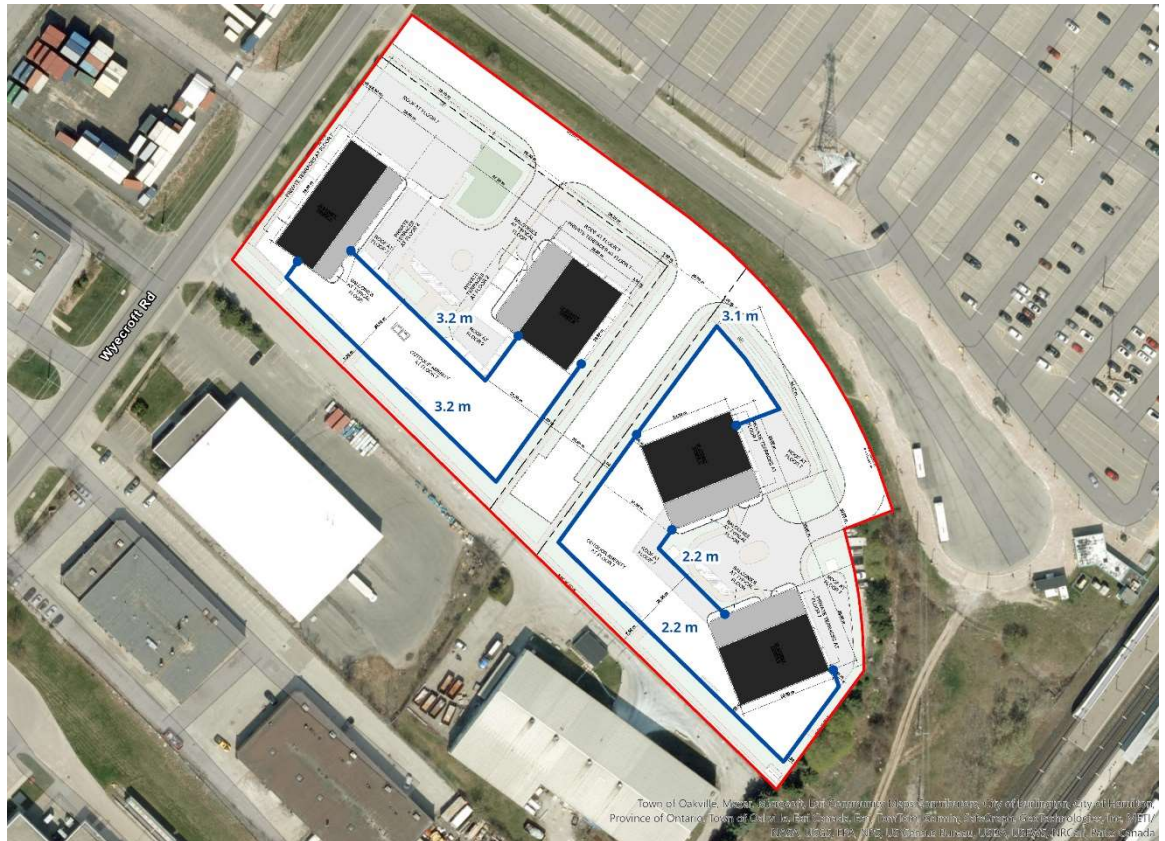


Figure 2: Outdoor Living Areas and Barriers Required to Achieve 60 dBA

NPC-300 warning clause “Type B” is required for all OLAs and warning clause “Type D” is required for all suites. Wording for the NPC-300 warning clauses are provided in **Appendix B**.



STATIONARY SOURCE NOISE

The project lands are surrounded by industrial and commercial facilities. The MECP Guideline D-6 (MOE, 1995) was used as a tool to classify the identified industries and assess their potential influence on the proposed development. Stationary sources of noise surrounding the proposed development were identified using a combination of source identification during the site visit conducted on October 18, 2024, publicly available aerial and street-level imagery, business listing, and The Ministry of the Environments Access Environment database.

Various facilities were identified within a 300 meter radius with potential to influence sound levels at the proposed development. Many of the identified facilities possess existing environmental permits with the Ontario Ministry of the Environment, Conservation and Parks (MECP) through an Environmental Compliance Approval (ECA) or Environmental Activity and Sector Registry (EASR).

RWDI proxy data were used for all stationary sources, except for the Mauser Packaging Solutions facility to the south, which was modelled as a single point source based on a sound level measurement taken during the site visit.

Per Town of Oakville Noise Bylaw 2008-098, back-up/reverse alarms were considered as stationary sources. Back-up alarms were observed during the site visit at adjacent sites and modelled accordingly.

All mechanical equipment on adjacent buildings was assumed to operate simultaneously and continuously during daytime-evening hours (7:00 – 23:00). HVAC equipment on neighbouring buildings was assumed to operate for 30 minutes/hour during nighttime hours. Paint booth exhaust fans associated with some surrounding commercial businesses were assumed to not operate during nighttime hours. All other equipment was assumed to operate simultaneously and continuously during nighttime hours.

Point sources and line sources included in this preliminary stationary source assessment are illustrated in **Figure 3**. Stationary sources are shown in green. Surrounding industries within a 300 m radius of the proposed development identified to have an existing environmental permit with the MECP are labelled.

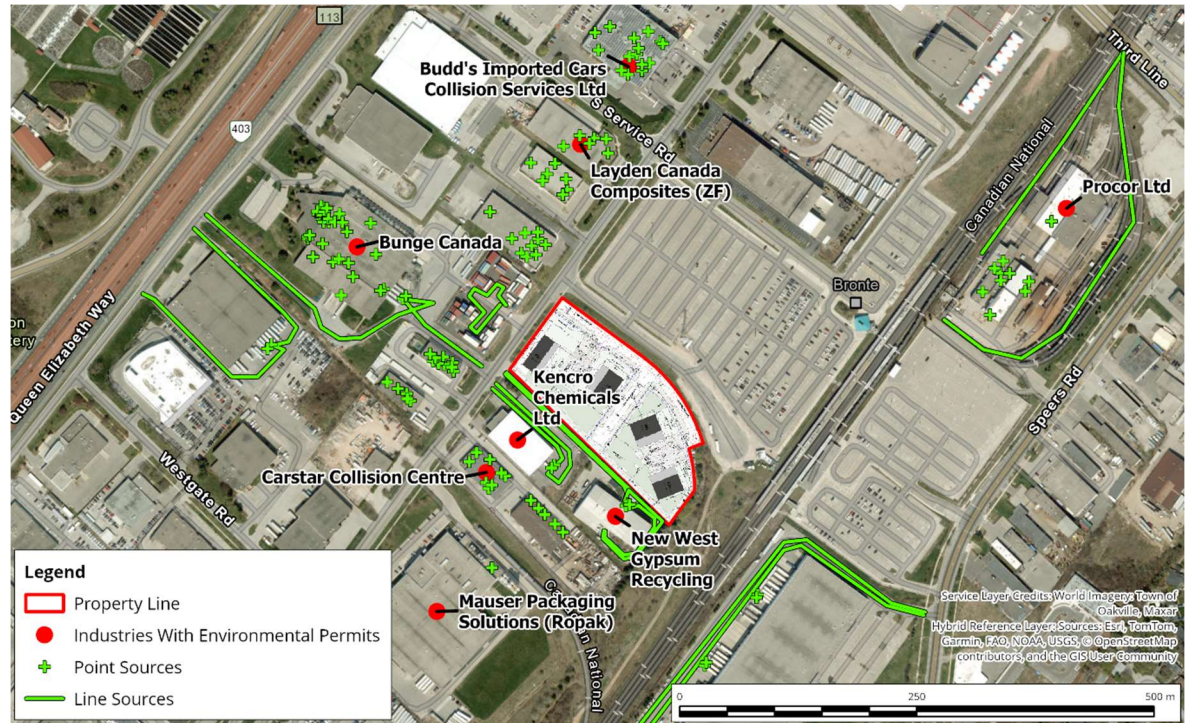


Figure 3: Stationary Sources and Surrounding Permitted Industries

Results

To assess the effect of stationary source noise on suites, the maximum sound level on each façade was predicted. Predicted sound levels due to stationary sources are presented below in **Table 4**. It is RWDI's understanding that the Bronte GO MTSA has been designated by the Town of Oakville as a "Class 4 Area" under the Provincial NPC-300 guidelines. As such, Class 4 Area criteria were considered for this assessment. Cardinal directions expressed in the table follow the "Project North" as shown in the drawing package dated June 30, 2025.



Table 4: Predicted Stationary Source Sound Levels – Plane of Window

Building	Façade	Predicted Sound Level		Criteria	Meets Class 4 Default Sound Level Limits? (Daytime / Nighttime)
		Daytime- Evening (7:00-23:00) L _{EQ} , 1hr (dBA)	Night (23:00- 7:00) L _{EQ} , 1hr (dBA)	Class 4 Daytime / Nighttime L _{EQ} , 1hr (dBA)	
Building A & B Podium	North	50	47	60 / 55	Yes / Yes
	East	61	60	60 / 55	No / No
	South	64	64	60 / 55	No / No
	West	57	56	60 / 55	Yes / No
Tower A	North	50	47	60 / 55	Yes / Yes
	East	57	57	60 / 55	Yes / No
	South	59	58	60 / 55	Yes / No
	West	56	55	60 / 55	Yes / Yes
Tower B	North	48	45	60 / 55	Yes / Yes
	East	57	57	60 / 55	Yes / No
	South	59	59	60 / 55	Yes / No
	West	53	52	60 / 55	Yes / Yes
Building C & D Podium	North (Facing Rail Line)	56	56	60 / 55	Yes / No
	East (Facing Rail Line)	57	56	60 / 55	Yes / No
	South	70	70	60 / 55	No / No
	West	62	62	60 / 55	No / No
Tower C	North	52	51	60 / 55	Yes / Yes
	East	60	60	60 / 55	Yes / No
	South	61	61	60 / 55	No / No
	West	51	50	60 / 55	Yes / Yes



Building	Façade	Predicted Sound Level		Criteria	Meets Class 4 Default Sound Level Limits? (Daytime / Nighttime)
		Daytime-Evening (7:00-23:00) L _{EQ} , 1hr (dBA)	Night (23:00-7:00) L _{EQ} , 1hr (dBA)	Class 4 Daytime / Nighttime L _{EQ} , 1hr (dBA)	
Tower D	North (Facing Rail Line)	54	53	60 / 55	Yes / Yes
	East (Facing Rail Line)	58	58	60 / 55	Yes / No
	South	66	66	60 / 55	No / No
	West	57	56	60 / 55	Yes / No

The results presented above in **Table 4**, are also illustrated below in **Figure 4** for the daytime operating scenario, assuming all equipment operates continuously during nighttime hours. Predicted exceedances above the Class 4 nighttime sound level limits (55 dBA between hours of 23:00 – 7:00) are shown in orange, and predicted exceedances above the Class 4 daytime sound level limits (60 dBA between hours of 7:00 – 23:00) are shown in red.

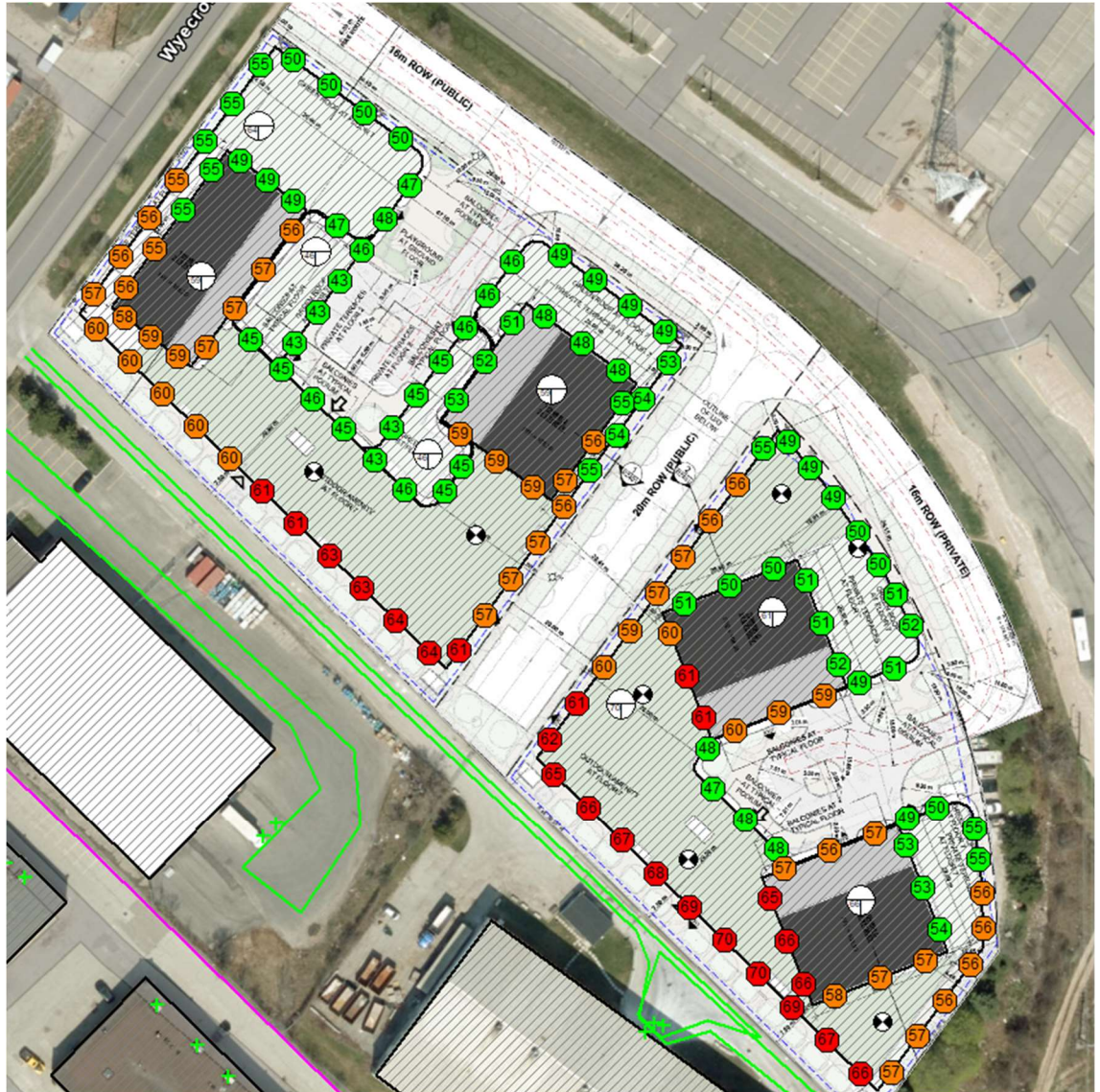


Figure 4: Predicted Stationary Source Sound Levels – Plane of Window

These results are based on reasonable assumptions regarding sound power levels based on source types. However, more information is required for each of the permitted facilities labelled in **Figure 3** to refine the model.

Based on the current modelling assumptions, exceedances above the NPC-300 Class 4 default sound criteria are predicted at some façades of the proposed development.

Outdoor Points of Reception (OPORs) for stationary source noise are assessed at the worst-case location within each Outdoor Amenity Space. Based on current modelling assumptions, sound levels are predicted up to a maximum a maximum of 68 dBA in the outdoor amenity spaces compared to the NPC-300 Class 4 default sound criterion of 55 dBA during daytime hours.



The current modelling does not include calculations for elevated background sound levels due to transportation noise. NPC-300 considers the applicable sound level limits for stationary sources the higher of the default exclusion limits and the predicted sound level due to transportation sources during a quietest hour. A next step in refining the model will be to add elevated background sound level calculations to provide elevated sound level limits for the proposed development. However, the elevated limits are not predicted to be enough to show compliance. Modelling refinements should be completed at Detailed Design. Mitigation options are discussed below.

Mitigation and Recommendations

Despite the Class 4 designation by the Town of Oakville, exceedances are still predicted above the default sound level limits due to stationary source noise based on the current modelling assumptions. The model should be refined at Detailed Design to include elevated background sound levels from transportation sources during a quietest hour, to include more detailed information regarding surrounding industry operations, and to define mitigation requirements for stationary source compliance.

Based on the current modelling, without mitigation, the proposed development is likely to cause noncompliance with some existing surrounding industries' environmental permits.

Noise sources at the New West Gypsum facility are likely to require a carefully evolved mitigation strategy. The New West Gypsum Recycling facility is located directly to the south of the proposed development and has a large bay door facing the proposed development with frequent truck and loader activities, backup beepers, as well as dumping of recycled materials adjacent to the proposed development. More detailed information is required to refine the modelling of this facility during Detailed Design to refine the mitigation requirements.

Consideration must be given to potential mitigation measures. These may include localized barrier walls, at-source mitigation such as silencers, and at-receptor mitigation such as enclosed noise buffers, blank façades (with no windows to noise-sensitive spaces), and noise barriers for outdoor amenity areas. With the implementation of mitigation measures, the proposed development can achieve compliance with the Class 4 Area noise criteria. Mitigation measures will likely be costly. Mitigation measures should be clearly defined before SPA once more information has been obtained regarding surrounding facility operations.

The surrounding industries should be contacted before Site Plan Approval (SPA) to request information regarding their typical facility operations to refine the noise modelling. Noise monitoring may be required to quantify sound level emissions from the surrounding industries.

Generally, source-based mitigation is the preferred mitigation method. This would need to be coordinated with the surrounding industries. If mitigating at the source is not possible, enclosed noise buffers and large noise barriers for the outdoor amenity areas would be required. The current modelling assumes all industries operate 24 hours/day. In reality, noise emissions from some of the surrounding industries are likely to be reduced during nighttime hours. Hours of operation should be confirmed with the surrounding industries at Detailed Design.

Based on the current modelling assumptions, without any source mitigation, and without any other modifications to the building design, enclosed noise buffers would be the only feasible method of mitigation. Enclosed noise buffers would be required for the following façades, shown in **Figure 5**, assuming a worst-case scenario where no at-source mitigation can be implemented.

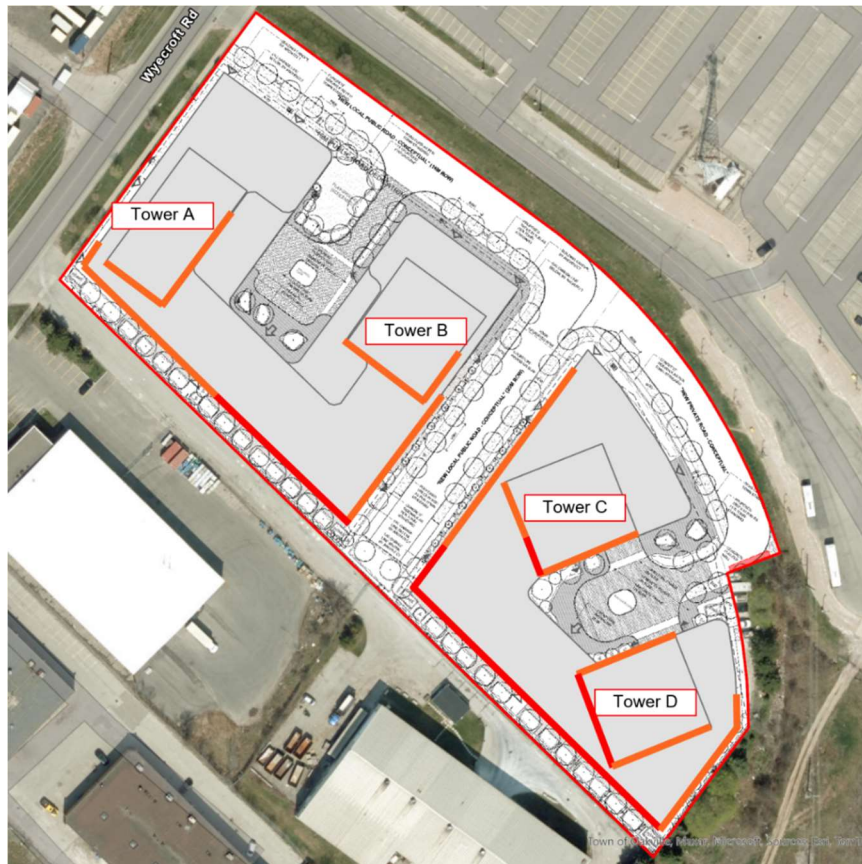


Figure 5: Façades Requiring Enclosed Noise Buffers based on Preliminary Noise Modelling

Façades shown in red would require enclosed noise buffers if all industries were to operate during daytime-evening hours only (7:00 – 23:00). Façades shown in orange would require enclosed noise buffers if all industries were to operate fully for 24 hours/day. The orange façades apply to all storeys of those façade faces. The red façades would apply to all storeys associated with the podiums, and approximately half the storeys associated with the towers.



Based on the current modelling assumptions, a maximum of 15 dB reduction would be required from the enclosed noise buffers, which is considered feasible and can be achieved by various glazing options. These recommendations should be refined once more information is available regarding surrounding industry operations.

Based on the current modelling, noise barriers up to 2m in height would be required around the outdoor amenity areas to mitigate stationary source noise. The barriers required for transportation noise, presented in **Figure 2**, are higher than those required for stationary sources and would sufficiently mitigate noise from stationary sources.

NPC-300 Warning Clause "Type F" is recommended to notify purchasers/tenants of the Class 4 Area designation. Furthermore, per the Town of Oakville By-law Number 2021-128 Official Plan Amendment No. 41, warning clauses in offers of purchase and sale, lease or rental agreements and condominium declarations, or other development agreements as applicable, shall be determined and secured through the planning application process, and may include, but not be limited to advising purchasers and future occupants of:

- the proximity of major facilities including associated heavy truck traffic;
- the proximity of the railway and associated rail traffic and operations; and,
- the property being located within a Class 4 area as per the Provincial NPC-300 guidelines.

VIBRATION

Vibration levels due to train pass-bys were measured during the site visit on October 18, 2024, and recorded continuously for 3 hours, capturing 14 rail pass-bys. The measurements were taken at a setback distance of approximately 65 m from the nearest rail line. The measurement location is approximately in line with the nearest façade of the proposed development facing the railway. All measured vibration levels from train pass-bys were determined to be below the Railway Association of Canada criterion of 0.14 mm/s RMS.

Significant sources of vibration, such as stamping presses, were not identified at surrounding industries. Ground-borne vibration was not perceptible on the project lands during the site visit.

Therefore, the proposed development is predicted feasible with respect to vibration, and its current location.



CONCLUSIONS

In conclusion, the proposed development poses many compatibility challenges with respect to the surrounding transportation (roadway and railway) sources and stationary sources associated with surrounding industrial facilities. However, through further modelling refinements and mitigation investigation at Detailed Design, the proposed development is considered feasible with respect to noise and vibration.

Based on current modelling assumptions, the following requirements are applicable due to the surrounding transportation noise sources:

- Installation of central air-conditioning so that all suites' windows can remain closed.
- The inclusion of noise warning clauses related to:
 - Transportation sound levels at the building façade and in the outdoor amenity areas
 - Proximity to railway line
- Upgraded façade construction:
 - On worst-case façades, suite window glazing with a minimum sound isolation performance of STC-39
 - On worst-case façades, exterior balcony door with a minimum sound isolation performance of STC-32
 - Minimum brick veneer or masonry equivalent for adjacent façades with exposure to the railway line
- Construction of perimeter noise barriers along the outdoor amenity areas up to a height of 3.2 meters

Predictable worst-case assumptions were incorporated into the stationary source modelling in the absence of detailed information.

The stationary source modelling should be refined to include the following before SPA:

- Elevated background sound level limits due to transportation noise
- More detailed information regarding operations at surrounding industries

To achieve compliance with the Class 4 noise criteria for surrounding stationary sources, based on the current modelling assumptions, the following mitigation methods may be required:

- At-source mitigation, including localized barrier walls or silencers, to be determined at Detailed Design
- Perimeter barrier walls for outdoor amenity spaces with a height of 2 meters. This requirement would be superseded by the requirement for barrier walls due to transportation noise, which requires taller barrier walls
- On-building mitigation, such as an enclosed noise buffers or blank facades for the façades illustrated in **Figure 5**

Vibration levels from train pass-bys were measured by RWDI on October 18, 2024, and were determined to be below the applicable Rail Association of Canada criterion of 0.14 mm/s RMS.



Michael Lazier
Northbridge Capital Inc.
RWDI #2408681
July 25, 2025

Based on the current modelling assumptions, the proposed development is considered feasible with respect to transportation noise and vibration, although some mitigation measures may be challenging and costly.

With the implementation of mitigation, compliance with Class 4 limits is feasible for the proposed development. Mitigation measures should be clearly defined before SPA once more information has been obtained regarding surrounding facility operations.

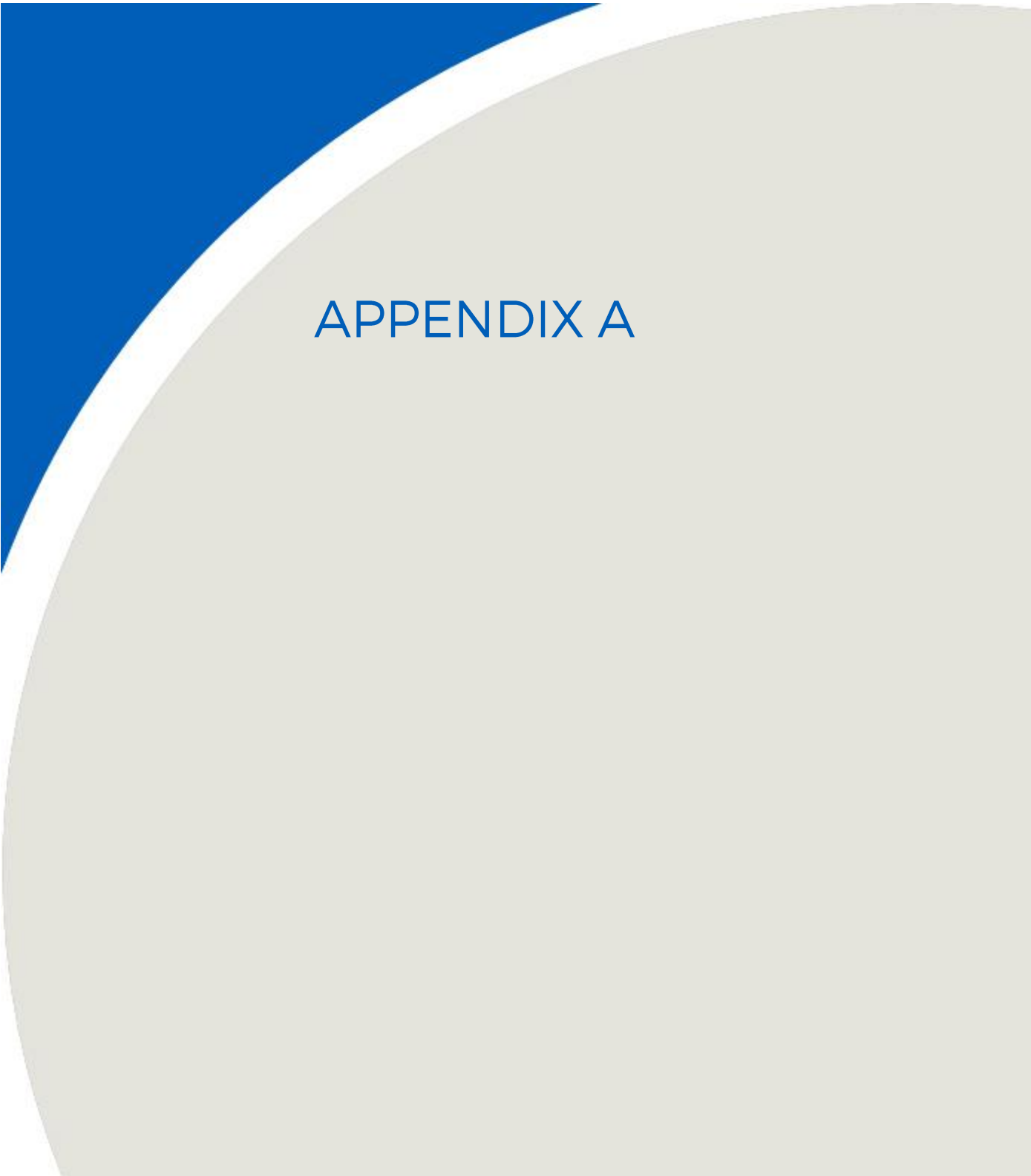
We trust that this information meets your needs at this time. Please do not hesitate to contact us with any further questions.

Statement of Limitations

This document entitled “Noise and Vibration Impact Study – Preliminary Results, 2172 Wyecroft Road Oakville, Ontario” was prepared by Rowan Williams Davies & Irwin Inc. (“RWDI”) for Northbridge Capital Inc. (“Client”). The findings and conclusions presented in this document have been prepared for the Client and are specific to the project described herein (“Project”). The conclusions and recommendations contained in this document are based on the information available to RWDI when it was prepared. Since the contents of this document may not reflect changes made to the facility and/or the operations therein after the date of this report, it is recommended that RWDI be retained by the Client in the event such changes are contemplated/implemented to verify that the results and recommendations provided herein are still applicable to the Project.

The conclusions and recommendations contained in this document have also been made for the specific purpose(s) set out herein. Should the Client or any other third party utilize the document 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 document carefully review the stated assumptions contained herein to understand the different factors which may impact the conclusions and recommendations provided.

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APPENDIX A

CRITERIA

Transportation Sources

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

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

Road and Rail

Indoor Sound Level Criteria

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

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

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

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

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

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

Outdoor Living Areas (OLAs)

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

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

Table 3: Sound Level Criteria – Outdoor Living Area

Assessment Location	Sound Level Criteria (Outdoors)	
	Daytime $L_{eq,16-hr}$ 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.

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

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

Note(s):

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

Rail Layover Sites

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

Rail Vibration Criteria

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

GO, Freight, VIA Train

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

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

TTC Streetcar/Subway

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

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

Aircraft

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

Table 5: Indoor Sound Level Criteria for Aircraft Sources

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

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

Table 6: Supplementary Indoor Sound Level Criteria for Aircraft Sources

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

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

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

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

Assessment Location	Aircraft Sound Level	NPC-300 Requirements
	NEF ($L_{EQ,24-hr}$)	
Outdoors	$\geq$ 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.
	$<$ NEF 30 $\geq$ 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.

Continuous Sources – Regular Operations

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

Table 9: NPC-300 Exclusion Limits – Continuous and Quasi-Steady Impulsive Stationary Sources ($L_{Aeq-1hr}$)

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

Note(s):

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

Continuous Sources - Emergency Equipment Testing

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

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

Impulsive Sources

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

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

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

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

Note(s):

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

D-Series Guidelines

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

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

Table 11: Summary of Guideline D-6

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

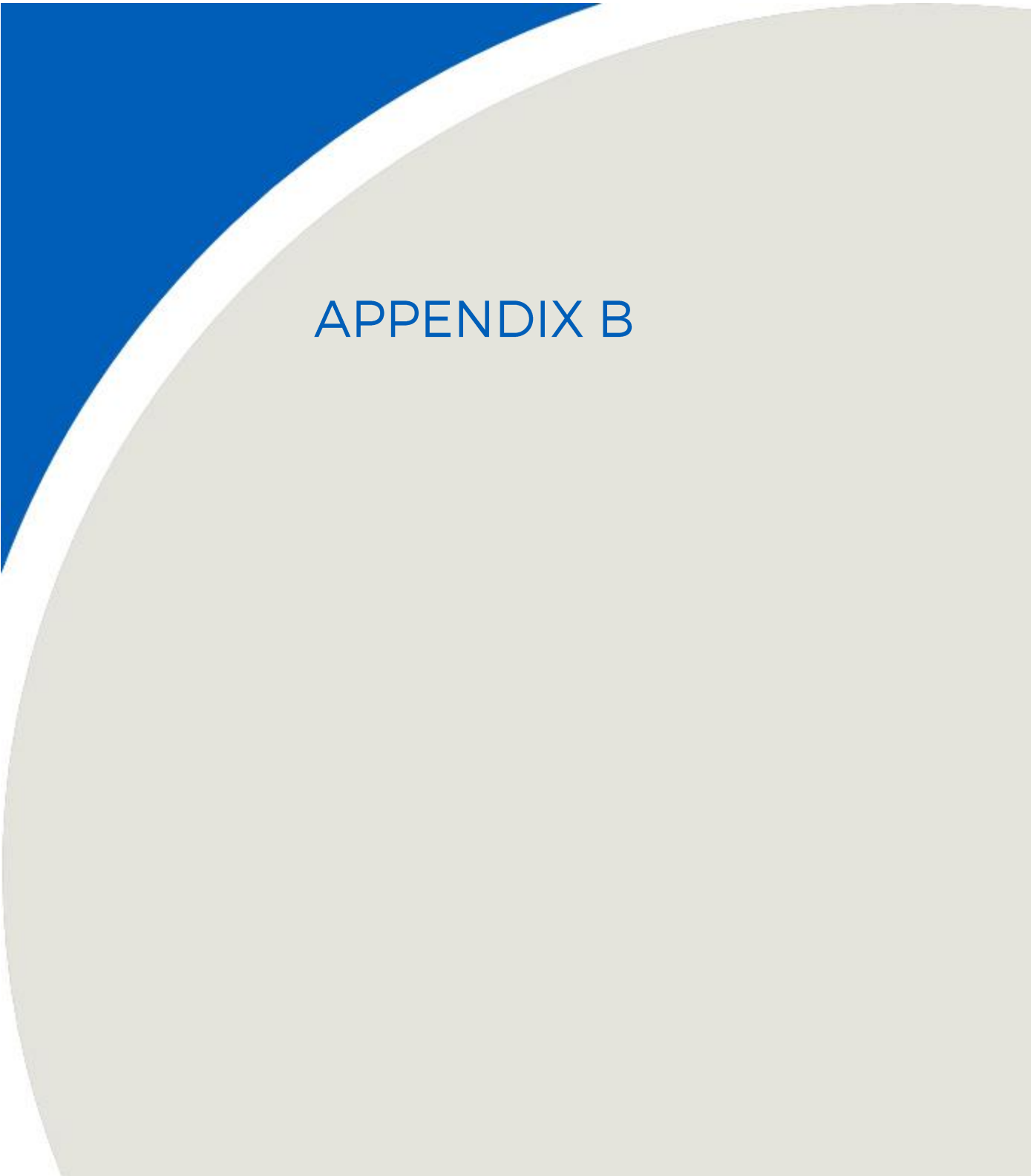
Note(s):

1. Measured from Property Line to Property Line.

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

Table 12: Guideline D-6 Industrial Categorization Criteria

Criteria	Class I	Class II	Class III
Outputs	• Sound not audible off property • 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

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APPENDIX B

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. Not all warning clauses shown below are necessarily recommended for this proposed development, but are provided for context. See the report body text for which warning clauses are recommended.

Transportation Sources

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

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

NPC-300 Type B: Recommended to address surface transportation sound levels in OLAs if the sound level is in the range of >55 dBA but ≤ 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."