#### NOISE AND VIBRATION FEASIBILITY STUDY PROPOSED RESIDENTIAL MIXED-USE DEVELOPMENT 1 FAIRVIEW ROAD EAST MISSISSAUGA, ONTARIO

FOR

#### EDENSHAW DEVELOPMENTS LIMITED

PREPARED BY

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**CHECKED BY** 

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**DECEMBER 19, 2019** 



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#### 1.0 INTRODUCTION

At the request of Edenshaw Developments Limited, J.E. COULTER ASSOCIATES LIMITED has completed a noise and vibration study of the proposed 36-storey (excluding mechanical penthouse) residential mixed-used development on the northeast corner of Hurontario Street and Fairview Road in Mississauga, Ontario. See Figure 1 in Appendix A for an Area Plan.

The purpose of the study is to prepare recommendations to address noise/vibration issues in support of the subject property's rezoning application. This report will show that applicable MECP and City of Mississauga noise guidelines can be met with modest noise control measures. These recommendations will take into consideration the sound from the surrounding roadways (and to some extent the railway) as well as the potential noise and vibration from the future Hurontario Light Rail Transit (LRT), which is currently undergoing detailed design. Please see Figure 2 in Appendix A for a Site Plan.

This report also briefly reviews the impact of the development on itself and surrounding areas.

A review of the area indicates that there are no significant sources of stationary noise that would have the potential to affect the occupants of the future building itself. As a result, stationary noise sources are not considered further within this report. This report focuses on the transportation noise and vibration impacts.

#### 2.0 APPLICABLE CRITERIA

The Ministry of the Environment and Climate Change's (MECP) applicable criteria to a site such as this are found in its publication *NPC-300* "Environmental Guide for Noise, Stationary and Transportation Sources – Approval and Planning."

As per NPC-300, this development would be considered a Class 1 – Urban area.

The MECP and the City of Mississauga do not promulgate vibration limits on new developments. Best practice standards in Ontario are based on the previous versions of the ISO-2631 vibration guidelines which suggested a maximum limit of 0.14mm/s RMS for vibration in areas where people sleep. MECP and TTC typically target 0.10 mm/s RMS at residences during transit expansions. These standards are reviewed within this study. Vibration control is not a strict requirement but a guideline.

#### 2.1 Transportation Noise Guidelines

Transportation noise sources addressed by *NPC-300* include aircraft, rail traffic, and roadway traffic (which include cars, trucks, buses, etc.).

Where the sound levels exceed 55 dB  $L_{eq}$  in private outdoor living areas (OLA), MECP requires noise mitigation measures to be incorporated into the subdivision design (i.e., intervening structures such as acoustic barriers or buildings and/or greater setbacks from the noise source). However, MECP will permit sound levels up to 60 dB  $L_{eq}$  daytime (5 dB above the criterion level of 55 dB  $L_{eq}$ ) in private outdoor living areas (OLA), if it is not technically feasible to achieve 55 dB. Where the criterion levels are marginally exceeded, a warning clause is required in the *Agreement of Purchase and Sale* and the subdivision agreement. With respect to condominiums or townhouses, balconies are considered OLAs only if they are 4m or greater in depth.

For residential buildings, the Ministry's ventilation requirements are based on the sound level at the exterior building façade. Where the sound levels at the exterior of the building façade exceed 55 dB  $L_{eq}$  daytime at the living room window or 50 dB  $L_{eq}$  nighttime at the bedroom window, the unit must be provided with forced air heating, with a provision for future air conditioning by the owner. An excess up to 10 dB is permissible, provided a warning clause is given. Where the sound levels exceed this limit (i.e., 65 dB  $L_{eq}$  daytime or 60 dB  $L_{eq}$  nighttime), air conditioning must be incorporated into the building design prior to occupancy. Warning clauses are applicable as well.

Air-conditioning requirements are applied so that adequate interior sound levels can be maintained with the windows closed.

The MECP also stipulates acceptable indoor sound levels limits, which vary depending on whether they are railway noise sources or roadway noise sources.

The applicable MECP criteria are summarized in Table 1, below.

Turne of Space	Ro	bad	Rail			
Type of Space	Daytime (dB L <sub>eq</sub> ) Nighttime (dB L <sub>eq</sub> ) (0700–2300) (2300–0700)		Daytime (dB L <sub>eq</sub> ) (0700–2300)	Nighttime (dB L <sub>eq</sub> ) (2300–0700)		
Outdoor Living Area (O.L.A.)	55	N/A	55	N/A		
Bedrooms	45	40	40	35		
Living/Dining	45	45	40	40		
Kitchen/Baths	45	45	40	40		

#### **Table 1: Noise Criteria Summary**

*Note:* OLAs for condominiums are terraces/balconies greater than 4m in depth and common amenity areas such as rooftop patios intended for quiet enjoyment.

Transportation noise sources in the vicinity of the proposed development include road traffic on Hurontario Street. In the future, sound levels from the Hurontario LRT may contribute to the soundscape. The LRT will likely result in less traffic and there should not be much incremental noise as a result of the start of service. CP's Galt Subdivision, which carries GO Transit's Milton traffic, is located approximately 450m away. Due to the traffic volumes on this railway, some modest noise impacts are expected.

#### 2.2 Vibration Guidelines

As mentioned, the MECP and the City of Mississauga do not enforce vibration level limits for new developments. Instead, railways such as CP, CN, and Metrolinx request that vibration levels on the nearest residential floor not exceed 0.14mm/s RMS overall between 4 Hz and 200 Hz. If an excess above this level is expected, vibration control measures need to be incorporated into the development.

For railway transit, a second design consideration is vibration-induced noise or ground-borne noise. Vibration-induced noise is vibration that can be heard as a structure radiates noise (typically sounding like a rumble). For rail transit sources, the rumble generated by passing vehicles often occurs at very low vibration levels (less than 0.10 mm/s RMS).

There are no specific criteria in Ontario that set limits for the sound resulting from vibration (vibration-induced sound). The possibility for a noise impact as a result of vibration still exists. It is dependent on the frequency spectrum of the vibration as well as the levels. Based on the United States' Federal Transit Administration guidelines (2006), a guideline level of 35 dBA is used in this report for residential rooms and other rooms (e.g., hospitals) where people generally sleep, for cases where the ground-borne, vibration-generated noise dominates the impression of the passby.

## 3.0 TRANSPORATION NOISE SOURCES

The following sections summarize the noise sources surrounding the proposed development.

#### 3.1 Roadway Noise Sources

The site is bounded immediately to the west by Hurontario Street. Fairview Road carries significantly less traffic and is not considered further. Traffic volumes for Hurontario Street are taken from the 2014 EPR appendices. The 2031 AADT volumes were calculated from the AM peak hour as used in the noise and vibration assessment of the project. These volumes are summarized in Table 2 below. The speed limit in the area is assumed to be 60 km/hr for both LRVs and traffic.

<b>Table 2: Future</b>	(2031)	Road	Traffic	Volumes
------------------------	--------	------	---------	---------

Peedway	Daytime Traffic Nighttime Traffic							
Roduway	Cars	Medium	Heavy	LRT Sets	Cars	Medium	Heavy	LRT Sets
Hurontario @ Fairview	20,734	417	372	280	2,304	46	41	44

## 3.2 Light Rail Transit

The City of Mississauga and Metrolinx are planning to construct a light rail transit system between Port Credit and Steeles Avenue along Hurontario Street.

An Environmental Assessment of the project was originally completed in 2014. The 2014 plan for the LRT was to run in the centre of Hurontario Street in the area of the subject development. Please see Figure 3 in Appendix A for the local area plan from the 2014 EPR.

The 2014 study predicted that the LRT volume would be 280 vehicle sets during the daytime and 44 vehicle sets during the nighttime. Each vehicle was expected to produce a maximum sound level of 82 dBA at 7.5m while travelling at 60 km/hr.

## 3.3 Railway Noise Sound Levels

The nearby rail corridor is fairly busy and carries CP freight traffic as well as Metrolinx/GO Transit commuter rail traffic.

#### 4.0 TRANSPORTATION NOISE ASSESSMENT

Based on the volumes provided in Section 3.0, the sound levels have been calculated at several locations of the proposed development. The calculated sound levels are summarized in Table 3, below.

		Road	+ LRT	Rail			
Location	Description	Daytime (dBA L <sub>eq,16hr</sub> )	Nighttime (dBA L <sub>eq,8hr</sub> )	Daytime (dBA L <sub>eq,16hr</sub> )	Nighttime (dBA L <sub>eq,8hr</sub> )		
1	West Façade	68	61	58	60		
2	North Façade	65	58	51	53		
3	South Façade	65	58	61	63		
4	East Façade	58	51	58	60		
5	7 <sup>th</sup> Floor Amenity Area*	54	N/A	59	N/A		

**Table 3: Transportation Noise Summary** 

\* OLA sound level calculations assume the presence of a 1.3m high safety barrier that would also act as a noise barrier.

Please see Appendix B for sample calculations.

#### 4.1 Noise Control Recommendations

The calculated sound levels exceed the MECP guidelines. As a result, noise control measures will be required.

#### Ventilation Upgrades

As the sound levels exceed 65 dBA  $L_{eq}$  during the daytime and 60 dBA  $L_{eq}$  during the nighttime, the entire development should be provided with central air conditioning. All of the affected units will need to be supplied with Warning Clause D (see Appendix C) in their *Agreements of Purchase and Sale or Lease*. The use of central air-conditioning is fairly standard for new residential developments.

#### Noise Barriers

It is recommended that all private terraces/balconies be limited in depth to less than 4m. Otherwise, these terraces will require noise barriers.

The 7<sup>th</sup> floor amenity area sound levels will meet the MECP limit of 60 dBA assuming a slightly taller than standard 1.3m high safety screen or parapet. For rooftops, noise barriers can be constructed from a variety of materials including glass, concrete, masonry, metal, or plastic. As per *NPC-300*, such a rooftop noise barrier may have surface densities as low as 10 kg/m<sup>2</sup> and "should be structurally sound, appropriately designed to withstand wind and snow load, and constructed without cracks or surface gaps. 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."

As the sound levels are 5 dB higher than the target of 55 dB, all units should be provided with Warning Clause B in their Agreements of Purchase and Sale or Lease.

#### **Exterior Glazing and Walls/Panels**

In order to achieve indoor sound level targets, it is recommended that metal spandrel panels be configured as follows:

Metal Spandrel:

- Aluminum panel in aluminum frames
- 50mm rigid batt insulation
- 20 GA. galvanized steel backpan
- 12mm air space
- 64mm batt insulation
- 64mm steel studs @ 600mm o/c
- 6 MIL. poly vapour barrier
- 16mm gypsum board (Fire Code C).

The above should achieve an STC 40 to 45 rating. Glass spandrel, precast, and masonry exterior wall assemblies should not need special treatment. As the development is more than 100m from the railway corridor, brick veneering or its acoustical equivalent is not required.

The suite layouts for the proposed development have not been detailed. Preliminary sound levels have been calculated using the National Research Council's BPN-56 prediction procedure using the most current plans.

Due to the modest nature of the outdoor sound levels, all units in the development may use windows rated to STC 35. This typically consists of two panes of 6mm glass separated by a 13mm air space. This glazing configuration is fairly standard for most high-rise construction and does not represent a significant upgrade. Minor variations should not require changing the window configuration but it is recommended that an updated analysis be completed if necessary once the layouts have been finalized.

The analysis has been completed considering LRT service. As per the 2014 EPR findings, the sound levels with or without the LRT are not expected to be noticeably different. It is not expected that minor changes to the LRT alignment will affect the outdoor sound levels and noise control recommendations contained in this report.

#### 5.0 VIBRATION ASSESSMENT

CP and Metrolinx typically require vibration measurements for developments 75m or closer to their railway rights-of-way. The LRT is not operational and may not be constructed by the time this building is built and occupied. As of the writing of this report, Metrolinx had awarded the contract for the LRT and detailed design was progressing.

The 2014 EPR predicted vibration impacts and appropriate mitigation for the existing residences along the corridor. The reports assumed a basic level of vibration isolation would be provided everywhere along the corridor.

The proposed development will add residential units closer to the LRT right-of-way than are currently present (see proposed alignment in Figure 4). The distance between the nearest point of the building structure and the nearest track would be approximately 20m. The residential uses on the ground floor are further separated from Hurontario Street (and the associated LRT tracks) by 12–13m of intervening structure.

Based on the results of the 2014 Noise and Vibration Assessment, the predicted vibration levels at 20m from the LRT would be less than 0.10 mm/s RMS and even lower at the nearest unit. This is below the typical standard for vibration recommended by GO Transit, CP, and CN (0.14 mm/s RMS). As a result, vibration control is not required.

The vibration-induced sound levels (rumble) on the ground floor setback from the LRT were predicted to be less than 35 dBA. As a result, additional vibration control is similarly not needed to control the rumble or vibration-induced noise.

#### 6.0 IMPACT OF THE DEVELOPMENT ON ITSELF AND THE SURROUNDING AREA

The City requests that new developments consider the noise impact of the development both on itself and the surrounding area.

There is existing high-rise residential development north of the subject site. Typically, for a development such as this, exhaust fans and other mechanical equipment are the major noise generators.

In terms of the impact of the development on itself, the development's own mechanical/electrical equipment needs to be considered.

The mechanical design of the development has not yet progressed to the point where the impact of the development on itself or its surroundings can be accurately quantified. As plans mature, a review of the impacts of the development on itself as well as on the surrounding area can be completed. In most cases, the most critical receptors are often the building's own future occupants.

Noise control measures for the development's mechanical equipment can be readily incorporated into the design. In many cases, equipment can also be selected to avoid a noise impact entirely. It is recommended that a review of the outdoor noise impact of the development be completed at such a time when the mechanical design is completed, prior to the building permit application.

#### 7.0 CONCLUSIONS

The proposed development is located in an area with a modest amount of transportation noise. The transportation sound levels exceed the MECP guidelines, and noise control measures in the form of ventilation upgrades, noise barriers, and façade elements have been recommended. The extent and nature of these upgrades is similar to those required for residential development built nearby busy roadways.

This analysis has been completed to demonstrate the development's feasibility. The glazing recommendations may need to be revisited should there be changes to the layouts that affect the noise control measures noted in this report.

Overall, the transportation noise study demonstrates that the proposed development is technically feasible from a noise and vibration perspective. There are no major noise and/or vibration issues that would prove challenging to address at later stages of the design.

#### 8.0 SUMMARY OF RECOMMENDATIONS

To meet the requirements of the Ministry of the Environment, Conservation and Parks and the City of Mississauga, the following noise control measures will be required:

- 1. All units will be supplied with central air conditioning. Warning Clause Type D will be inserted into the *Agreements of Purchase and Sale or Lease* for all units.
- 2. Terraces and private balconies greater than 4m in depth should be avoided. If included, such areas will need to be addressed to ensure the guidelines are met.
- 3. All units within the development need to be supplied with Warning Clause Type B in their *Agreements of Purchase and Sale or Lease*.
- 4. General glazing and spandrel panel recommendations have been provided based on current suite layouts. An updated analysis should be completed if there are changes to the floor plans and window elevations that would affect the glazing requirements. The traffic sound levels are, however, modest and the recommendations for glazing are unlikely to change.
- Assuming a slightly taller than standard 1.3m tall acoustic barrier (which can double as a standard safety screen or parapet), the sound levels in the 7<sup>th</sup> floor outdoor amenity area are expected to meet the guidelines. Further noise control is not required.
- 6. While the development is outside of the 300m zone, railway traffic is expected to contribute notably to the ambient sound levels at the future development. As such, it is recommended that these units be provided with the standard CP and Metrolinx Warning Clauses in any case. The warning clauses are to be inserted into the *Agreements of Purchase and Sale or Lease*.
- 7. Vibration control is not required as the vibration levels and vibration-induced sound levels (rumble) from the LRT are predicted to be below 0.14 mm/s RMS and 35 dBA, respectively, in the nearest residential suites. As the design of the LRT is still in progress, coordination between the developer and Metrolinx/City may be needed to confirm the vibration impacts. It would be more practical to provide the vibration control at the source, if needed.
- 8. Prior to the building permit application, a review of the proposed development's mechanical and electrical equipment should be completed to ensure that applicable noise guidelines are met at the surrounding areas as well as at the future development itself.

# **APPENDIX A: FIGURES**



Figure 1: Key Plan



Figure 2: Site Plan



Figure 3: Proposed LRT Alignment (Hurontario LRT Rollout Map)

# APPENDIX B: DATA AND SAMPLE CALCULATIONS



800 - 1290 Central Parkway West Mississauga, Ontario Canada L5C 4R3 T 905 803 3429 E josie\_tomei@cpr.ca

November 21, 2019

Via email: skulendran@jecoulterassoc.com

Sam Kulendran J.E. Coulter Associates Limited 1210 Sheppard Ave. East North York, ON M2K 1E3

Dear Sir/Madam:

# *Re: Rail Traffic Volumes, CP Mileage 15.25, Galt Subdivision, 3383 Hurontario Street, Mississauga*

This is in reference to your request for rail traffic data in the vicinity of 3383 Hurontario Street in the City of Mississauga. The study area is located at mile 15.25 of our Galt Subdivision, which is classified as a Principal Main line.

The information requested is as follows:

1.	Number of freight trains between 0700 & 2300:	7
	Number of freight trains between 2300 & 0700:	7
2.	Maximum cars per train freight:	167
3.	Number of locomotives per train:	2, 4 maximum
4.	Maximum permissible train speed:	60 mph

- 5. The whistle signal is prohibited approaching public grade crossings through the study area, however, the whistle may be sounded if deemed necessary by the train crew for safety reasons at any time.
- 6. There are 2 mainline tracks through this area, both with continuously welded rail.

Please note, GO Trains operate on the noted line, but the data is not included in the above. Please contact Metrolinx directly for GO Train data.

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

Yours truly,

Josie Tomei SR/WA Specialist Real Estate Sales & Acquisitions – Ontario

Subject: RE: Rail Data Request - 3383 Hurontario Street, Mississauga
From: Rail Data Requests <RailDataRequests@metrolinx.com>
Date: 2019-11-15, 2:02 p.m.
To: Sam Kulendran <skulendran@jecoulterassoc.com>
CC: Brandon Gaffoor <Brandon.Gaffoor@metrolinx.com>

Hi Sam,

Further to your request dated November 15, 2019, the subject property (3383 Hurontario Street) is located in proximity to the Cooksville GO Station on CP's Galt Subdivision, which carries Milton GO train service.

It is anticipated that GO service on this line will be comprised of diesel trains within (at least) a 10-year time horizon. The preliminary midterm weekday train volume forecast at this location, including both revenue and equipment trips, is in the order of 20 trains – (19 day and 1 night). Trains will be comprised of a single locomotive and up to 12 passenger cars.

The maximum track design speed at this location on this corridor is 65 mph (105 km/h).

There are no anti-whistling by-laws in place at Hurontario Street.

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

Please also note that this information is only as it relates to Metrolinx service. It would be prudent to contact the other train operators in the area directly for rail traffic information.

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

Warm regards,

Alexandra Goldstein

Third Party Projects Officer Third Party Projects Review, Capital Projects Group Metrolinx | 20 Bay Street | Suite 600 | Toronto | Ontario | M5J 2W3 T: 416.202.5708 C: 647.535.6760

-----Original Message-----From: Sam Kulendran [mailto:skulendran@jecoulterassoc.com] Sent: November-15-19 8:33 AM To: Brandon Gaffoor; Rail Data Requests Subject: Rail Data Request - 3383 Hurontario Street, Mississauga

Hi Brandon,

Could you please provide GO Transit volumes for the Milton Corridor near the above noted address? The subject site is near the Cooksville GO Station.

Thanks, Sam ---Sam Kulendran, B.A.Sc., P.Eng. J.E. Coulter Associates Limited T: 416-502-8598 ext. 228 E: <u>skulendran@jecoulterassoc.com</u>

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Boodwov	Intersection		Daytime Traffic					Night-time Traffic			
Roduway	Intersection	POR	Cars	Medium	Heavy	LRT Sets	Cars	Medium	Heavy	LRT Sets	
Hurontario St.	Park St.	1	18,717	597	518	280	2,080	66	58	44	
Hurontario St.	Mineola Rd.	2	21,845	574	557	280	2,427	64	62	44	
Hurontario St.	Paisley Ave.	3	15,570	371	353	280	1,730	41	39	44	
Hurontario St.	Fairview Rd.	4	20,734	417	372	280	2,304	46	41	44	
Hurontario St.	Matthew's Gate	5	22,830	445	418	280	2,537	49	46	44	
Burnhamthorpe Rd.	Duke of York Blvd.	6	26,181	893	667	280	2,909	99	74	44	
Hurontario St.	Elia Ave.	7	20,637	518	482	280	2,293	58	54	44	
Hurontario St.	Bristol Rd.	8	21,218	679	521	280	2,358	75	58	44	
Hurontario St.	Superior Blvd.	9	29,817	738	702	280	3,313	82	78	44	
Hurontario St.	County Court Blvd.	10	15,648	422	377	280	1,739	47	42	44	
Main St.	Elgin Dr.	11	9,780	254	209	280	1,087	28	23	44	
Main St.	Clarence St.	12	4,058	94	94	280	451	10	10	44	
Main St.	Queen St.	13	12,414	689	231	280	1,379	77	26	44	
Main St.	Church St.	14	21,168	322	322	280	2,352	36	36	44	

Table 4: Future 2031 "With Project" Traffic Volumes

STAMSON 5.0 NORMAL REPORT Date: 20-12-2019 17:33:55 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT Filename: south.te Time Period: Day/Night 16/8 hours Description: South Facade - Railway Only Rail data, segment # 1: Galt (day/night) \_\_\_\_\_ \_\_\_\_\_ ! Trains ! Speed !# loc !# Cars! Eng !Cont ! !(km/h) !/Train!/Train! type !weld Train Туре !(km/h) !/Train!/Train! type !weld \_\_\_\_\_+ \* 1. CP ! 9.0/9.0 ! 80.0 ! 4.0 !167.0 !Diesel! Yes \* 2. GO ! 19.0/1.0 ! 105.0 ! 1.0 ! 12.0 !Diesel! Yes \* The identified number of trains have been adjusted for future growth using the following parameters: ! Unadj. ! Annual % ! Years of ! ! Trains ! Increase ! Growth ! Train type: No Name -----+ ! 7.0/7.0 ! 2.50 ! 10.00 ! ! 19.0/1.0 ! 0.00 ! 10.00 ! 1. CP 2. GO Data for Segment # 1: Galt (day/night) \_\_\_\_\_ -----Angle1 Angle2 : -90.00 deg 90.00 deg : 0 Wood depth (No woods.) : 0 / 0 No of house rows 2 Surface : (Reflective ground surface) Receiver source distance : 450.00 / 450.00 m Receiver height : 1.50 / 30.00 m : Topography 1 (Flat/gentle slope; no barrier) No Whistle Reference angle : 0.00 Results segment # 1: Galt (day) \_\_\_\_\_ LOCOMOTIVE (0.00 + 59.75 + 0.00) = 59.75 dBA Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq \_\_\_\_\_ -90 90 0.00 74.53 -14.77 0.00 0.00 0.00 0.00 59.75 \_\_\_\_\_ WHEEL (0.00 + 52.80 + 0.00) = 52.80 dBAAngle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq \_\_\_\_\_ -90 90 0.00 67.57 -14.77 0.00 0.00 0.00 0.00 52.80 \_\_\_\_\_

Segment Leq : 60.55 dBA

Total Leq All Segments: 60.55 dBA

Results segment # 1: Galt (night) -----LOCOMOTIVE (0.00 + 61.78 + 0.00) = 61.78 dBA Angle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq \_\_\_\_\_ -90 90 0.00 76.55 -14.77 0.00 0.00 0.00 0.00 61.78 \_\_\_\_\_ WHEEL (0.00 + 54.91 + 0.00) = 54.91 dBAAngle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq \_\_\_\_\_ \_\_\_\_\_ . \_ \_ \_ \_ \_ \_ \_\_\_\_\_ \_\_\_\_\_ -----\_\_\_\_\_ -90 90 0.00 69.68 -14.77 0.00 0.00 0.00 0.00 54.91 \_\_\_\_\_

Segment Leq : 62.59 dBA

Total Leq All Segments: 62.59 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 60.55 (NIGHT): 62.59

STAMSON 5.0 NORMAL REPORT Date: 20-12-2019 01:28:01 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT Filename: olalrt.te Time Period: Day/Night 16/8 hours Description: 7th Floor Amenity - Roadway + LRT Road data, segment # 1: Hurontario (day/night) \_\_\_\_\_ Car traffic volume : 20734/2304 veh/TimePeriod Medium truck volume : 417/46 veh/TimePeriod Heavy truck volume : 372/41 veh/TimePeriod Posted speed limit : 60 km/h Road gradient : 0 % Road pavement : 1 (Typical asphalt or concrete) Data for Segment # 1: Hurontario (day/night) \_\_\_\_\_ : -90.00 deg 90.00 deg Angle1 Angle2 : 0 (No woods.) : 0 / 0 : 2 (Reflective ground surface) Wood depth No of house rows Surface Receiver source distance : 25.00 / 22.00 m Receiver height : 1.50 / 4.50 m Topography:2(Flat/gentle slope; with barrier)Barrier angle1:-90.00 degAngle2 : 90.00 degBarrier height:1.30 m Barrier receiver distance : 4.00 / 4.00 m Source elevation: 0.00 mReceiver elevation: 22.00 mBarrier elevation: 22.00 m : 0.00 Reference angle Results segment # 1: Hurontario (day) \_\_\_\_\_ Source height = 1.15 mBarrier height for grazing incidence ------\_\_\_\_\_ Source ! Receiver ! Barrier ! Elevation of Height (m) ! Height (m) ! Height (m) ! Barrier Top (m) 1.15 ! 1.50 ! -2.08 ! 19.92 ROAD (0.00 + 52.99 + 0.00) = 52.99 dBAAngle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq \_\_\_\_\_ -90 90 0.00 68.78 0.00 -2.22 0.00 0.00 0.00 -13.57 52.99

\_\_\_\_\_ \_ \_ Segment Leq : 52.99 dBA Total Leq All Segments: 52.99 dBA Results segment # 1: Hurontario (night) ------Source height = 1.14 mBarrier height for grazing incidence -----Source ! Receiver ! Barrier ! Elevation of Height (m) ! Height (m) ! Height (m) ! Barrier Top (m) 1.14 ! 4.50 ! -0.11 ! 21.89 ROAD (0.00 + 53.16 + 0.00) = 53.16 dBAAngle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq \_\_\_\_\_ -90 90 0.00 62.23 0.00 -1.66 0.00 0.00 0.00 -7.41 53.16 \_\_\_\_\_ Segment Leg : 53.16 dBA Total Leq All Segments: 53.16 dBA RT/Custom data, segment # 1: LRT (day/night) \_\_\_\_\_ 1 - Custom (76.0 dBA): Traffic volume : 560/88 veh/TimePeriod Speed : 60 km/h Data for Segment # 1: LRT (day/night) -----Angle1 Angle2 : -90.00 deg 90.00 deg Wood depth : 0 (No woods.) : No of house rows 0 / 0 2 Surface (Reflective ground surface) : Receiver source distance : 25.00 / 22.00 m Receiver height : 1.50 / 4.50 m Topography : 2 (Flat/gentle slope; with barrier) : -90.00 deg Angle2 : 90.00 deg : 1.30 m Barrier angle1 : 1.30 m Barrier height

Barrier receiver distance : 4.00 / 4.00 m Source elevation:0.00 mReceiver elevation:22.00 mBarrier elevation:22.00 mReference angle:0.00 Results segment # 1: LRT (day) \_\_\_\_\_ Source height = 0.50 mBarrier height for grazing incidence -----Source ! Receiver ! Barrier ! Elevation of Height (m) ! Height (m) ! Height (m) ! Barrier Top (m) \_\_\_\_\_ 0.50 ! 1.50 ! -2.18 ! 19.82 RT/Custom (0.00 + 44.51 + 0.00) = 44.51 dBAAngle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq \_\_\_\_\_ -90 90 0.00 60.42 -2.22 0.00 0.00 0.00 -13.69 44.51 \_\_\_\_\_ Segment Leg : 44.51 dBA Total Leq All Segments: 44.51 dBA Results segment # 1: LRT (night) \_\_\_\_\_ Source height = 0.50 mBarrier height for grazing incidence -----Source ! Receiver ! Barrier ! Elevation of Height (m) ! Height (m) ! Height (m) ! Barrier Top (m) \_\_\_\_\_+ 0.50 ! 4.50 ! -0.23 ! 21.77 RT/Custom (0.00 + 46.08 + 0.00) = 46.08 dBAAngle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq \_\_\_\_\_ -90 90 0.00 55.39 -1.66 0.00 0.00 0.00 -7.65 46.08 \_\_\_\_\_ Segment Leg : 46.08 dBA Total Leq All Segments: 46.08 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 53.57 (NIGHT): 53.94

STAMSON 5.0 NORMAL REPORT Date: 20-12-2019 17:32:49 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT Filename: OLA.te Time Period: Day/Night 16/8 hours Description: 7th Floor Amenity - Railway Only Rail data, segment # 1: Galt (day/night) \_\_\_\_\_ ! Trains ! Speed !# loc !# Cars! Eng !Cont ! !(km/h) !/Train!/Train! type !weld Train Туре !(km/h) !/Train!/Train! type !weld \_\_\_\_\_+ \* 1. CP ! 9.0/9.0 ! 80.0 ! 4.0 !167.0 !Diesel! Yes \* 2. GO ! 19.0/1.0 ! 105.0 ! 1.0 ! 12.0 !Diesel! Yes \* The identified number of trains have been adjusted for future growth using the following parameters: Train type: ! Unadj. ! Annual % ! Years of ! No Name ! Trains ! Increase ! Growth ! -----+ 1. CP!7.0/7.0!2.50!10.00!2. GO!19.0/1.0!0.00!10.00! Data for Segment # 1: Galt (day/night) -----Angle1Angle2: -90.00 deg60.00 degWood depth:0(No woods 0 / 0 2 : 0 (No woods.) : No of house rows (Reflective ground surface) Surface : Receiver source distance : 450.00 / 450.00 m Receiver height : 1.50 / 30.00 m Topography : 2 (Flat (Flat/gentle slope; with barrier) No Whistle Barrier angle1 : -90.00 deg Angle2 : 60.00 deg Barrier height : 1.30 m Barrier receiver distance : 4.00 / 4.00 m Source elevation:0.00 mReceiver elevation:22.00 mBarrier elevation:22.00 mReference angle:0.00 Results segment # 1: Galt (day) \_\_\_\_\_ Barrier height for grazing incidence \_\_\_\_\_ Source ! Receiver ! Barrier ! Elevation of Height (m) ! Height (m) ! Height (m) ! Barrier Top (m) \_\_\_\_\_ 4.00 !1.50 !1.33 !23.330.50 !1.50 !1.30 !23.30

LOCOMOTIVE (0.00 + 58.96 + 0.00) = 58.96 dBAAngle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq \_\_\_\_\_ -90 60 0.00 74.53 -14.77 -0.79 0.00 0.00 -5.00 53.97\* -90 60 0.00 74.53 -14.77 -0.79 0.00 0.00 0.00 58.96 \_\_\_\_\_ \* Bright Zone ! WHEEL (0.00 + 47.00 + 0.00) = 47.00 dBAAngle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq \_\_\_\_\_ -90 60 0.00 67.57 -14.77 -0.79 0.00 0.00 -5.00 47.00 \_\_\_\_\_ Segment Leq : 59.23 dBA Total Leq All Segments: 59.23 dBA Results segment # 1: Galt (night) \_\_\_\_\_ Barrier height for grazing incidence \_\_\_\_\_ Source ! Receiver ! Barrier ! Elevation of Height (m) ! Height (m) ! Height (m) ! Barrier Top (m) \_\_\_\_\_ 4.00 ! 30.00 ! 29.57 ! 51.57 30.00 ! 29.54 ! 0.50 ! 51.54 LOCOMOTIVE (0.00 + 60.99 + 0.00) = 60.99 dBAAngle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq \_\_\_\_\_ 60 0.00 76.55 -14.77 -0.79 0.00 0.00 -0.00 60.99\* -90 -90 60 0.00 76.55 -14.77 -0.79 0.00 0.00 0.00 60.99 \_\_\_\_\_ \* Bright Zone ! WHEEL (0.00 + 54.11 + 0.00) = 54.11 dBAAngle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq \_\_\_\_\_ -90600.0069.68-14.77-0.790.000.00-0.0054.11\*-90600.0069.68-14.77-0.790.000.0054.11 \_\_\_\_\_ \* Bright Zone ! Segment Leq : 61.80 dBA Total Leq All Segments: 61.80 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 59.23 (NIGHT): 61.80

STAMSON 5.0 NORMAL REPORT Date: 20-12-2019 01:25:37 MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT Filename: westlrt.te Time Period: Day/Night 16/8 hours Description: West Facade - LRT + Roadway Only Road data, segment # 1: Hurontario (day/night) \_\_\_\_\_ Car traffic volume : 20734/2304 veh/TimePeriod Medium truck volume : 417/46 veh/TimePeriod Heavy truck volume : 372/41 veh/TimePeriod Posted speed limit : 60 km/h Road gradient : 0 % Road pavement : 1 (Typical asphalt or concrete) Data for Segment # 1: Hurontario (day/night) \_\_\_\_\_ : -90.00 deg 90.00 deg Angle1 Angle2 Wood depth:0No of house rows:0 / 0Surface:2 (No woods.) (Reflective ground surface) : Receiver source distance : 22.00 / 22.00 m Receiver height : 1.50 / 4.50 m : 1 (Flat/gentle slope; no barrier) Topography Reference angle : 0.00 Results segment # 1: Hurontario (day) \_\_\_\_\_ Source height = 1.15 mROAD (0.00 + 67.12 + 0.00) = 67.12 dBAAngle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq \_\_\_\_\_ -90 90 0.00 68.78 0.00 -1.66 0.00 0.00 0.00 0.00 67.12 \_\_\_\_\_ \_ \_ Segment Leg : 67.12 dBA Total Leg All Segments: 67.12 dBA Results segment # 1: Hurontario (night) \_\_\_\_\_ Source height = 1.14 m

ROAD (0.00 + 60.57 + 0.00) = 60.57 dBAAngle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq \_\_\_\_\_ -90 90 0.00 62.23 0.00 -1.66 0.00 0.00 0.00 0.00 60.57 \_\_\_\_\_ \_\_\_ Segment Leq : 60.57 dBA Total Leg All Segments: 60.57 dBA RT/Custom data, segment # 1: LRT (day/night) \_\_\_\_\_ 1 - Custom (76.0 dBA): Traffic volume : 560/88 veh/TimePeriod Speed : 60 km/h Data for Segment # 1: LRT (day/night) \_\_\_\_\_ \_\_\_\_\_ : -90.00 deg 90.00 deg Angle1 Angle2 : 0 (No woods.) Wood depth 0 / 0 2 : No of house rows (Reflective ground surface) Surface : Receiver source distance : 22.00 / 22.00 m Receiver height : 1.50 / 4.50 m : 1 (Flat/gentle slope; no barrier) Topography Reference angle : 0.00 Results segment # 1: LRT (day) \_\_\_\_\_ Source height = 0.50 mRT/Custom (0.00 + 58.76 + 0.00) = 58.76 dBAAngle1 Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq \_\_\_\_\_ -90 90 0.00 60.42 -1.66 0.00 0.00 0.00 0.00 58.76 \_\_\_\_\_ Segment Leq : 58.76 dBA Total Leg All Segments: 58.76 dBA

Results segment # 1: LRT (night)

------Source height = 0.50 m RT/Custom (0.00 + 53.73 + 0.00) = 53.73 dBA Anglel Angle2 Alpha RefLeq D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq -90 90 0.00 55.39 -1.66 0.00 0.00 0.00 0.00 53.73 Segment Leq : 53.73 dBA

Total Leq All Segments: 53.73 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 67.71 (NIGHT): 61.39

#### **APPENDIX C: WARNING CLAUSES**

- **TYPE A:** "Purchasers/tenants are advised that sound levels due to increasing road traffic and rail traffic may occasionally interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the Municipality and the Ministry of the Environment, Conservation and Parks."
- **TYPE B:** "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 and rail 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, Conservation and Parks."
- **TYPE C:** "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, Conservation and Parks."
- **TYPE D:** "This dwelling unit has been supplied with a central air-conditioning system which will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment, Conservation and Parks."
- **TYPE E:** "Purchasers/tenants are advised that due to the proximity of the adjacent industry, noise from the industry may at times be audible."
- **CN:** "Warning: Canadian National Railway Company or its assigns or successors in interest has or have a right-of-way within 300 metres from the land the subject thereof. 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 will not be responsible for any complaints or claims arising from use of such facilities and/or operations on, over or under the aforesaid right-of-way."
- **Metrolinx:** "Metrolinx, carrying on business as GO Transit, and its assigns and 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 GO Transit or any railway entering into an agreement with GO Transit to use the right-of-way or their assigns or successors as aforesaid may expand their 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). Metrolinx will not be responsible for any complaints or claims arising from use of such facilities and/or operations on, over or under the aforesaid right-of-way."

**CP:** "All persons intending to acquire an interest in the real property by purchase or lease are advised of the existence of the right-of-way of the Canadian Pacific Railway. In future, it is possible that such rail facilities and operations may be altered or expanded, which expansion or alteration may affect the living environment of residents despite the inclusion of noise and vibration attenuating measures in the design of the subdivision and individual units and that the Canadian Pacific Railway will not be responsible for complaints or claims arising from its use of its facilities and/or arising from its operations."

## **APPENDIX D: REFERENCES**

- 1. Ministry of the Environment, "Model Municipal Noise Control By-Law, Final Report", August 1978.
- 2. Ontario Ministry of the Environment, Environmental Approvals and Land Use Planning Branch, "Guidelines for Road Traffic Noise Assessment", July 1986.
- 3. Ministry of the Environment's *STAMSON* Computer Programme (Version 5.03) for the IBM PC.
- 4. Ministry of the Environment, *ORNAMENT*, "Ontario Road Noise Analysis Method for Environment and Transportation", November 1988.
- 5. Quirt, D.J., "Controlling Sound Transmission into Buildings", National Research Council, Building Practice Note 56, Update 1.1.
- 6. Ministry of the Environment, *STEAM* "Sound from Trains Environmental Analysis Method", July 1990.
- 7. Ministry of the Environment, "Environmental Noise Guideline: Stationary and Transportation Sources Approval and Planning", Publication NPC-300, August 2013.
- 8. J.E. Coulter Associates Limited, "Noise and Vibration Impact Assessment, Hurontario-Main Light Rail Transit, June 2014.