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Noise Feasibility Study
Proposed Mixed-Use/Residential Development
170 Lakeshore East
Mississauga, ON

Prepared for:

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October 7, 2021

HGC Project No: 02100286

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1 Introduction and Summary

HGC Engineering was retained by Lightpoint (170 Lakeshore Road East Port Credit) Inc. to conduct a noise feasibility study for a proposed mixed-use/residential development located at 170 Lakeshore Road East in Mississauga, Ontario. The residential development will consist of a 15-storey mixed-use building. The study is required by the City as part of the planning and approvals process.

The primary source of noise is road traffic on Lakeshore Road East. A secondary source of noise is rail traffic on the Metrolinx railway line to the north and road traffic on Hurontario Street to the west. Road traffic data was obtained from City of Mississauga personnel, and rail traffic data was obtained from past HGC Engineering files, originally from Metrolinx personnel. Road and rail traffic data was used to predict future traffic sound levels at the proposed building façades and outdoor living areas. The predicted sound levels were compared to the guidelines of the City of Mississauga and the Ministry of Environment, Conservation and Parks (MECP) to develop noise control recommendations.

The results of the study indicate that the proposed development is feasible with the noise control measures described in this report. Central air conditioning and upgraded building constructions are required for residential floors of the building. Acoustic barriers are required on the 6th floor outdoor amenity area. Noise warning clauses are also required for those units to inform future occupants of the traffic noise impact, to address sound level excesses, and proximity to existing commercial uses.

A computational model was created using acoustical modelling software to assess the potential impact of sound emissions from nearby stationary sources on the proposed development. The modelling results show that the predicted sound levels from nearby stationary sources are expected to be within the MECP guideline levels and mitigation is not required.

2 Site Description and Noise Sources

Figure 1 is a key plan indicating the location of the proposed site. The site is located north of Lakeshore Road East and west of Elmwood Avenue North in Mississauga, Ontario. Figure 2 shows the proposed site plan by IBI Group, dated July 30, 2021. The proposed development will consist of a 15-storey mixed-use building with outdoor amenity areas on the 6th floor, 16th floor, and ground

level, along with a mechanical penthouse/indoor amenity on the 16th floor and non-residential spaces on the ground floor level.

HGC Engineering personnel visited the site on September 24, 2021 to make observations of the acoustical environment. During the site visit, it was noted that the primary source of noise impacting the site was road traffic on Lakeshore Road East with some impact from the Metrolinx railway line, located 300 m to the north across several rows of intervening detached dwellings, and from Hurontario Street. Negligible impact from road traffic was observed on Elmwood Avenue and Rosewood Avenue. The site is currently occupied by a commercial plaza, which will be demolished for the construction of the proposed building.

Areas around the site are mostly flat, with existing detached residential buildings immediately to the north of the site area, and multi-family dwellings south of the site area across Lakeshore Road East. There are also commercial uses east and west of the site area. To the immediate west of the area is a single-storey commercial building housing an automotive repair shop (Midas) and a creative arts school (The School Creative Arts Education). The building features rooftop mechanical units, and auto repair bay doors facing west towards Rosewood Avenue. Further west of the site and across Rosewood Avenue is a bank (Scotiabank). To the east of the site and across Elmwood Avenue is an LCBO store.

3 Noise Level Criteria

3.1 Road and Rail Traffic Noise

Guidelines for acceptable levels of road and rail traffic noise impacting residential developments are given in the MECP publication NPC-300, “Environmental Noise Guideline Stationary and Transportation Sources – Approval and Planning”, release date October 21, 2013, and are listed in Table I below. The Federation of Canadian Municipalities (FCM) and Railway Association of Canada (RAC) “Guidelines for New Development in Proximity to Railway Operations”, dated May 2013 (RAC/FCM guidelines were also reviewed dated November 2006). The values in Table I are energy equivalent (average) sound levels [L_{EQ}] in units of A-weighted decibels [dBA].

Table I: MECP Road and Rail Traffic Noise Criteria (dBA)

Area	Daytime $L_{EQ\ (16\ hour)}$ Road / Rail	Nighttime $L_{EQ(8\ hour)}$ Road / Rail
Outdoor Living Area	55 dBA	--
Inside Living/Dining Rooms	45 / 40 dBA	45 / 40 dBA
Inside Bedrooms	45 / 40 dBA	40 / 35 dBA

Daytime refers to the period between 07:00 and 23:00. Nighttime refers to the time period between 23:00 and 07:00. The term "Outdoor Living Area" (OLA) is used in reference to an outdoor patio, a backyard, a terrace, or other area where passive recreation is expected to occur. Small balconies are not considered OLAs for the purposes of assessment. Terraces greater than 4 m in depth (measured perpendicular to the building façade) are considered to be OLAs.

The guidelines in the MECP publication allow the daytime sound levels in an Outdoor Living Area to be exceeded by up to 5 dBA, without mitigation, if warning clauses are placed in the purchase and rental agreements to the property. Where OLA sound levels exceed 60 dBA, physical mitigation is required to reduce the OLA sound level to below 60 dBA and as close to 55 dBA as technically, economically, and administratively practical. The City of Mississauga has accepted sound levels up to 60 dBA in OLA's in the past with mitigation.

A central air conditioning system as an alternative means of ventilation to open windows is required for dwellings where nighttime sound levels outside bedroom or living/dining room windows exceed 60 dBA (60 dBA or greater for the Region of Peel) or daytime sound levels outside bedroom or living/dining room windows exceed 65 dBA. Forced-air ventilation with ducts sized to accommodate the future installation of air conditioning is required when nighttime sound levels at bedroom or living/dining room windows are in the range of 51 to 60 dBA or when daytime sound levels at bedroom or living/dining room windows are in the range of 56 to 65 dBA.

Building components such as walls, windows and doors must be designed to achieve indoor sound level criteria when the plane of window nighttime sound level is greater than 60 dBA or the daytime sound level is greater than 65 dBA due to road traffic noise, or when nighttime sound level is greater than 55 dBA or the daytime sound level is greater than 60 dBA due to rail traffic noise. The indoor

sound level limits for rail noise sources are 5 dB more stringent than for road sources, to account for the additional low-frequency (rumble) components of locomotives, hence the façade insulation requirements are calculated separately and then combined.

3.2 Criteria Governing Stationary Noise Sources

An industrial or commercial facility is classified in MECP guidelines as a stationary source of sound (as opposed to sources such as traffic or construction, for example) for noise assessment purposes. The proposed development is located in an urban acoustical environment classified as Class I (urban) according to MECP guidelines, which can be characterized by the background sound level being dominated by traffic and human activity.

The façade of a residence, or any associated usable outdoor area, is considered a sensitive point of reception. NPC-300 stipulates that the exclusionary minimum sound level limit for a stationary noise source in an urban Class 1 area is 50 dBA during daytime (07:00 to 19:00) and evening (19:00 to 23:00) hours, and 45 dBA during nighttime hours (23:00 to 07:00). If the background sound levels due to road traffic exceed the exclusionary minimum limits, then the background sound level becomes the criterion. The background sound level is defined as the sound level that is present when the stationary source under consideration is not operating, and may include traffic noise and natural sounds. Background sound levels were observed to be as low as the exclusionary minimum during the site visit. As such, the exclusionary minimum criteria at all receptors will be adopted.

Commercial activities such as the occasional movement of customer vehicles, occasional deliveries, and garbage collection are not of themselves considered to be significant noise sources in the MECP guidelines. Accordingly, these sources have not been considered in this study. Noise from safety equipment (e.g. back-up beepers) are also exempt from consideration. Trucking activities have not been included in this assessment since they will occur on an infrequent basis.

The MECP guidelines stipulate that the sound level impact during a “predicable worst case hour” be considered. This is defined to be an hour when a typically busy “planned and predictable mode of operation” occurs at the subject facility, coincident with a period of minimal background sound. Compliance with MECP criteria generally results in acceptable levels of sound at residential receptors although there may still be residual audibility during periods of low background sound.

3.3 Ground-borne Vibration from Rail Traffic

As the railway line is more than 75 m away from the site area, measurements of ground-borne vibration are not required.

4 Traffic Sound Level Assessment

4.1 Rail Traffic Data

Rail traffic data for the GO Oakville Subdivision was obtained from HGC Engineering project files, originally obtained from GO and CN personnel and is attached in Appendix A. This line is used for mainly GO passenger operations with some freight operations and is classified as a principal main line. The maximum permissible train speed in the area is 97 kph (60 mph) for freight trains, 153 kph (95 mph) for VIA rail trains, and 129 kph (80 mph) for GO trains. In conformance with CN assessment requirements, the maximum speeds, maximum number of cars and locomotives per train were used in the traffic noise analysis to yield a worst case estimate of train noise. The data was projected to the year 2031 using a 2.5% per year growth rate. Table II summarizes the rail traffic data used in the analysis.

Table II: Rail Traffic Data Projected to Year 2031

Type of Train	Number of Trains Day/Night	Number of locomotives	Number of cars	Max Speed (KPH)*
GO+	161 / 29	1	12	129
GO+	53 / 12	2	12	129
Freight	1.6 / 0.0	4	140	97
Way Freight	3.3 / 1.6	2	25	97
VIA Passenger	22.9 / 4.9	2	10	153

Notes: *Maximum permissible speed on STAMSON is 150 kph.
+All GO trains modelled as diesel trains in STAMSON

4.2 Road Traffic Data

Traffic data for Lakeshore Road and Hurontario Street was obtained from the City of Mississauga in the form of ultimate Average Annual Daily Traffic (AADT) traffic values, and is provided in Appendix B. A posted speed limit of 40 km/h was applied for Lakeshore Road, and a limit of 50 km/h was applied for Hurontario Street. For Lakeshore Road, a commercial vehicle percentage of 4 % was applied, split into 2.2 % for medium trucks and 1.8 % for heavy trucks. For Hurontario

Street, a commercial vehicle percentage of 7 % was applied, split into 3.9 % for medium trucks and 3.1 % for heavy trucks. A day/night split of 90 % / 10 % was used for both roadways.

Table III summarizes the traffic volume data used in this study.

Table III: Ultimate Road Traffic Data

Road Name		Cars	Medium Trucks	Heavy Trucks	Total
Lakeshore Road E	Daytime	27 475	630	515	28 620
	Nighttime	3 053	70	57	3 180
	Total	**30 528**	**700**	**572**	**31 800**
Hurontario Street	Daytime	17 828	748	594	19 170
	Nighttime	1 981	83	66	2 130
	Total	**19 809**	**831**	**660**	**21 300**

4.3 Road and Rail Traffic Noise Predictions

To assess the levels of road and rail traffic noise which will impact the study area in the future, sound level predictions were made using STAMSON version 5.04, a computer algorithm developed by the MECP. Sample STAMSON output is included in Appendix C.

Predictions of the traffic sound levels were chosen around the proposed residential building to obtain an appropriate representation of future sound levels at various façades. Sound levels were predicted at the plane of the top storey bedroom and/or living/dining room windows during daytime and nighttime hours to investigate ventilation and façade construction requirements. Sound levels were also predicted in possible OLA's to investigate the need for noise barriers. Figure 2 shows the site plan with prediction locations. The results of these predictions are summarized in Tables IV and V.

Table IV: Daytime Predicted Traffic Sound Levels [dBA], Without Mitigation

Prediction Location	Description	Daytime $L_{EQ-16\ hr}$		Daytime at Façade Total $L_{EQ-16\ hr}$	Daytime in the OLA Total $L_{EQ-16\ hr}$
		Road	Rail		
[A]	South façade facing Lakeshore Rd	66	--	66	--
[B]	West façade facing Rosewood Ave	64	65	67	--
[C]	East façade facing Elmwood Ave	62	65	67	--
[D]	North façade facing Forest Ave	<55	68	68	--
[E]	6th floor outdoor amenity+	<55	61	--	61
[F]	Ground level outdoor amenity	<55	<55	--	<55

Note: + with a minimum 1.07m high solid parapet wall

Table V: Nighttime Predicted Traffic Sound Levels [dBA], Without Mitigation

Prediction Location	Description	Nighttime – at the Façade $L_{EQ-8\ hr}$		Nighttime at Façade Total $L_{EQ-8\ hr}$
		Road	Rail	
[A]	South façade facing Lakeshore Rd	59	--	59
[B]	West façade facing Rosewood Ave	57	61	62
[C]	East façade facing Elmwood Ave	56	61	62
[D]	North façade facing Forest Ave	<50	64	64

5 Traffic Noise Recommendations

The sound level predictions indicate that the future traffic sound levels will exceed MECP guidelines at the proposed development. The following discussion outlines the recommendations for acoustic barrier requirements, ventilation requirements, upgraded building façade construction, and warning clauses to achieve the noise criteria stated in Table I.

5.1 Outdoor Living Areas

The predicted daytime sound levels at the ground level outdoor amenity area will be up to 54 dBA, which is within the MECP guideline level of 55 dBA. No further mitigation is required. Private balconies and terraces that are less than 4 m in depth are not considered to be outdoor living areas under the MECP guidelines, and therefore are exempt from traffic noise assessment.

The outdoor amenity area on the 16th floor is less than 4 m in depth. These areas are not considered to be outdoor living areas under the MECP guidelines, and therefore are exempt from traffic noise assessment.

The predicted daytime sound levels at the 6th floor outdoor amenity area will be up to 61 dBA with a minimum 1.07m high parapet wall, which exceeds the MECP guideline level of 55 dBA. Physical mitigation in the form of an acoustic barrier is required to address these excesses. Figure 3 shows the approximate location of the barrier. The various barrier heights required to achieve sound levels between 55 dBA and 60 dBA are provided in Table VI.

Table VI: Required Barrier Heights to Achieve Various Sound Levels

	Prediction Location	Sound Level in OLA [dBA]					
		55	56	57	58	59	60
Barrier Height [m]	[E]	3.8	3.4	3.0	2.5	1.9	1.3

An acoustic barrier height of 1.3 m is recommended for the 6th floor outdoor amenity area, designated by prediction location [E], to reduce the sound level to 60 dBA, which is within the 5 dBA allowable exceedance range over the 55 dBA guideline level as per MECP guidelines. Figure 3 shows the location of the required barriers.

All noise barriers must return back to the dwelling units so that the rear yards are entirely shielded from the roadway. The wall component of the barrier should be of a solid construction with a surface density of no less than 20 kg/m^2. The walls may be constructed from a variety of materials such as wood, glass, pre-cast concrete or other concrete/wood composite systems provided that it is free of gaps or cracks within or below its extent.

5.2 Indoor Living Areas and Ventilation Requirements

Air Conditioning

The predicted future sound levels outside the top storey windows at all façades will be greater than 60 dBA during nighttime hours and/or 65 dBA during daytime hours. To address these excesses, these units need to be equipped with central air conditioning systems so that windows may remain closed. Window or through-the-wall air conditioning units are not recommended because of the noise

they produce and because the units penetrate through the exterior wall which degrades the overall sound insulating properties of the envelope. Acceptable units are those that are housed in their own closet with an access door for maintenance. The location, installation and sound ratings of the outdoor air conditioning devices should minimize noise impacts and comply with criteria of MECP publication NPC-300, as applicable.

5.3 Building Façade Constructions

The predicted sound levels at all façades will exceed 65 dBA during daytime and/or 60 dBA during nighttime due to rail and road traffic noise. MECP guidelines stipulate that in such cases, building components including windows, walls, and doors be designed so that the indoor sound levels comply with the noise criteria in Table I.

Calculations were performed to determine the acoustical insulation factors to maintain indoor sound levels within MECP guidelines. The calculation methods were developed by the National Research Council (NRC). They are based on the predicted future sound levels at the building facades, and the anticipated area ratios of the facade components (walls, windows and doors) and the floor area of the adjacent room.

Exterior Wall Construction

Exterior walls that are not glazed should have sufficient acoustical insulation value such that the noise transmitted through is negligible in comparison with the windows; exterior wall assemblies with a rating of STC-50 or higher should be incorporated. Spandrel or metal panels with a typical sound insulation rating of STC-35, backed by an independent drywall assembly, should meet these requirements in most locations. These aspects can be verified as part of the detail design of the building envelope.

Exterior Doors

There may be glazed exterior doors (sliding or swing) for entry onto the balconies from living/dining rooms and some bedrooms. The glazing areas of the doors should be counted as part of the total window glazing area. All exterior doors should include good weather seals to reduce air infiltration to the minimum achievable levels.

Acoustical Requirements for Glazing

A summary of the preliminary STC requirements is given in Table VII for the building façades, based on the possibility of sound entering the building through windows and doors for all of the dwellings. Detailed floor plans and building elevations were not available for review at the time of this report. A window to floor ratio of 60% (50% fixed, 10% operable) for living/dining room and 50% (40% fixed, 10% operable) for bedrooms were assumed to determine preliminary window STC ratings required to mitigate road and rail traffic noise levels.

Table VII: Minimum STC Requirements

Prediction Location	Description	Space	STC Glazing Requirements
[A]	South façade facing Lakeshore Road	+Living/Dining	STC-33*
		+Bedroom	STC-33*
[B]. [C]	West and east façade flanking lakeshore Road	+Living/Dining	STC-33*
		+Bedroom	STC-33*
[D]	North façade facing Forest Ave	+Living/Dining	STC-35
		+Bedroom	STC-34

Notes: OBC – Ontario Building Code
+ Sound entering through windows
*While façades facing away from the railway are somewhat less impacted by traffic noise, we do not typically recommend less than a minimum of STC-33 for urban environments such as this

These calculations assume insignificant sound transmission through the walls in comparison with the windows. Operable sections, including doors and operable windows, must be well-fitted and weather-stripped in order to achieve the target STC values. Acoustical criteria for different façades can be optimized as part of the detail design of the development when floor plans and elevations for the buildings are available.

Sample window assemblies which may achieve the STC requirements are summarized in Table VIII below. Note that acoustic performance varies with manufacture's construction details, and these are only guidelines to provide some indication of the type of glazing likely to be required; the STC requirements in Table VII are provided as a guideline based on the preliminary drawings. Acoustical test data for the selected assemblies should be requested from the supplier, to ensure that the stated acoustic performance levels will be achieved by their assemblies.

Table VIII: Glazing Assemblies for STC Requirements

STC Requirement	Glazing Configuration (STC)
28 – 29	Any double glazed unit
30 – 31	3(13)3
32 – 33	4(10)4
34	4(19)4

In Table VIII, the number outside parentheses indicate minimum pane thicknesses in millimeters and the number in parentheses indicates the minimum inter-pane gap in millimeters.

Alternative assemblies may be required for operable windows and doors to achieve the required performance values, depending on the nature of seals.

Further Analysis

When detailed floor plans and building elevations are available, window glazing construction should be refined based on actual window to floor area ratios.

6 Stationary Source Assessment

Noise sources associated with industrial and commercial facilities are assessed separately from traffic sources under MECP guidelines. These facilities are considered to be Stationary Sources of Sound and criteria for their assessment are contained in the following section.

6.1 Stationary Source Noise Predictions

Predictive noise modelling was used to assess the sound impact of the nearby stationary sources at the most critically impacted façades and outdoor living areas of the proposed development in accordance to MECP guidelines. The noise prediction model was constructed based on a site visit, review of the proposed site plan, satellite aerial photos, and estimates of sound emission levels of stationary sources taken from similar past HGC Engineering project files. Octave-band sound level powers of sources are listed below in Table IX.

Table IX: Source Sound Power Levels [dB re 10-12 W]

Source	Octave Band Centre Frequency [Hz]							
	63	125	250	500	1k	2k	4k	8k
Lennox KGB060 (5 Tons)	--	67	72	77	76	73	68	51
Lennox KGB036 (2.5 Tons)	--	63	66	70	71	68	62	53
Powered Ventilation Fan	81	82	81	77	73	70	61	54
Open Auto Repair Bay Door	80	79	82	84	87	85	85	88

The above data were inputted into a predictive computer model. The software used for this purpose (*Cadna-A version 2021, build: 183.5110*) is a computer implementation of ISO Standard 9613-2.2 "Acoustics - Attenuation of Sound During Propagation Outdoors." The ISO method accounts for reduction in sound level with distance due to geometrical spreading, air absorption, ground attenuation and acoustical shielding by intervening structures such as barriers.

The following information and assumptions were used in the analysis.

- HGC personnel visited the roof of the auto repair shop during the site visit. There are two HVAC units (one Lennox KGB060 and one Lennox KGB036) at a height of 1.5 m above the roof and a powered ventilation fan at a height of 0.5 m above the roof.
- There are two open auto repair bay doors facing west.
- Other rooftop HVAC units at the LCBO liquor store to the east and the Scotiabank building further west of the development were assumed to be Lennox KG060 units.
- Location of the stationary noise sources are shown as green crosses and lines in Figure 4.

In this impact assessment, we have considered typical worst-case (busiest hour) scenarios for each time period to be as follows:

Assumed day worst-case scenario:

- All rooftop HVAC units and powered ventilation fan operating at full capacity.
- Powered ventilation fan on the auto shop roof operating at full capacity.
- Auto repair bay doors open for 20 minutes out of an hour.

Assumed night worst-case scenario:

- All rooftop HVAC units operating at 50% capacity to account for on/off cycling.
- Powered ventilation fan not operating (beyond auto shop hours of operation).

- Auto repair bay doors closed.

6.2 Results

The unmitigated sound levels due to stationary noise sources associated with the nearby stationary sources at the façades and outdoor living areas of the proposed building are summarized in Table X, and presented graphically in Figures 5 and 6.

Table X: Predicted Sound Levels from the Existing Stationary Sources on the Proposed Building [dBA]

	Daytime (07:00 – 23:00)	Nighttime (23:00 – 07:00)	Criteria (Daytime / Nighttime)
West façade	49	43	50 / 45
South façade	40	36	
North façade	45	41	
East façade	37	34	
6th floor amenity	32	--	50 / --
Ground level amenity	41	--	

The results of the calculations indicate that the predicted sound levels due to the operation of the existing nearby stationary sources are within MECP limits at the façades of the proposed building during a worst case operational scenario. Mitigation is not required.

7 Warning Clauses

The MECP guidelines recommend that warning clauses be included in the property and tenancy agreements and offers of purchase and sale for all units with anticipated traffic sound level excesses. The following noise warning clauses are required for specific dwellings as indicated in Table VI.

Suggested wording for future dwellings with sound levels exceeding the MECP limit is given below.

A):

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 and rail traffic may occasionally interfere with some activities of the dwelling occupants as the sound levels exceed the Municipality's and the Ministry of the Environment, Conservation and Parks noise criteria.

Suggest wording for future dwellings which will have central air conditioning units to be installed is given below.

B):

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.

Suggested wording for future dwelling units in close proximity to commercial buildings is given below.

C):

Purchasers are advised that due to the proximity of the existing commercial buildings, sound levels from the facilities may be at times be audible.

These sample clauses are provided by the MECP as examples, and can be modified by the Municipality as required.

GO Transit's standard warning clause for residential developments located within 300 m of a railway right-of-way (principal main line) is given below.

D):

Warning: Metrolinx, carrying on business as GO Transit, and its assigns and successors in interest are the owners of lands within 300 metres from the land which is the subject hereof. In addition to the current use of the lands owned by Metrolinx, there may be alterations to or expansions of the rail and other facilities on such lands in the future including the possibility that GO Transit or any railway entering into an agreement with GO Transit to use the Metrolinx lands or Metrolinx and their respective 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 dwellings. Metrolinx will not be responsible for any complaints or claims arising from use of such facilities and/or operations on, over or under its lands.

8 Impact of the Development on Itself

Section 5.8.1.1 of the Ontario Building Code (OBC), released on January 1, 2020, specifies the minimum required sound insulation characteristics for demising partitions, in terms of Sound Transmission Class (STC) or Apparent Sound Transmission Class (ASTC) values. In order to maintain adequate acoustical privacy between separate suites in a multi-tenant building, inter-suite walls must meet or exceed STC-50 or ASTC-47. Suite separation from a refuse chute or elevator

shaft must meet or exceed STC-55. In addition, it is recommended that the floor/ceiling constructions separating suites from any amenity or commercial spaces also meet or exceed STC-55. Tables 1 and 2 in Section SB-3 of the Supplementary Guideline to the OBC provide a comprehensive list of constructions that will meet the above requirements.

Tarion's Builder Bulletin B19R requires the internal design of condominium projects to integrate suitable acoustic features to insulate the suites from noise from each other and amenities in accordance with the OBC, and limit the potential intrusions of mechanical and electrical services of the buildings on its residents. If B19R certification is needed, an acoustical consultant is required to review the mechanical and electrical drawings and details of demising constructions and mechanical/electrical equipment, when available, to help ensure that the noise impact of the development on itself is maintained within acceptable levels.

9 Impact of the Development on the Environment

Sound levels from stationary (non-traffic) sources of noise such as rooftop air-conditioners, cooling towers, exhaust fans, etc. should not exceed the minimum one-hour L_{EQ} ambient (background) sound level from road traffic, at any potentially impacted residential point of reception, to avoid noise complaints. Based on the levels observed during our site visit, the typical minimum ambient sound levels in the area are expected to be 50 dBA or more during the day and 45 dBA or more at night. Thus any electro-mechanical equipment associated with this development (e.g. emergency generator testing, fresh-air handling equipment, etc.) should be designed with these targets in mind such that they do not result in noise impact beyond these ranges.

10 Summary and Recommendations

The following list and Table XI summarize the recommendations made in this report. The reader is referred to the previous sections of the report where these recommendations are applied and discussed in more detail.

1. Acoustic barriers are required for the 6th floor outdoor amenity area due to exposure to rail traffic noise. Figure 3 shows the approximate location of the barriers.

2. Central air conditioning will be required for the building

3. Upgraded wall and glazing constructions are required as noted in Section 5.3. When detailed floor plans and building elevations are available for the dwelling units with exposure to the roadways, window glazing construction should be refined on actual window to floor ratios.

4. The use of warning clauses in the property and tenancy agreements is recommended to inform future residents of traffic noise issues and proximity to exiting commercial uses.

Table XI: Summary of Noise Control Requirements and Noise Warning Clauses

Description	Acoustic Barrier	Ventilation Requirements*	Type of Warning Clause	Upgraded Glazing Constructions
South façade	--	Central A/C	A, B, C	LR/DR: STC-33 BR: STC-33
West façade	--			
East façade	--			
North façade	--			LR/DR: STC-35 BR: STC-34
6th floor outdoor amenity	✓	--	--	--
Ground level outdoor amenity	--	--	--	--

Notes:
* The location, installation and sound rating of the air conditioning condensers must be compliant with MECP Guideline NPC-300, as applicable.
-- No specific requirements
✓ Outdoor living areas require acoustic barriers. Refer to Section 5.1
LR/DR – Living Room/Dining Room
BR – Bedroom

10.1 Implementation

To ensure that the noise control recommendations outlined above are properly implemented, it is recommended that:

1. Prior to the issuance of building permits for this development, a Professional Engineer qualified to perform acoustical engineering services in the Province of Ontario should review the detailed architectural plans and building elevations to refine glazing requirements based on actual window to floor areas ratios.

2. Prior to the issuance of occupancy permits for this development, the Municipality's building inspector or a Professional Engineer qualified to perform acoustical engineering services in the Province of Ontario should certify that the noise control measures have been properly incorporated, installed, and constructed.

Limitations

This report was prepared by HGC Engineering solely for the client to whom it is addressed and is to be used exclusively for the purposes set out in the report. Any conclusions and/or recommendations herein reflect the judgment of HGC Engineering based on information available at the time of preparation, and has relied in good faith on information provided by others, as noted in the report, which has been assumed to be factual and accurate. Changed conditions or information occurring or becoming known after the date of this report could affect the results and conclusions presented.

Any use, reliance or decisions made based on this report by any third party are the responsibilities of such third parties. HGC Engineering accepts no responsibility for damages, if any, suffered by any third party that may arise through the use, reliance or decisions made based on this report. If a third party requires reliance on this report, written authorization from HGC Engineering must be sought and granted. HGC Engineering disclaims responsibility of consequential financial effects on transactions or property values, or requirements for follow-up actions and costs.

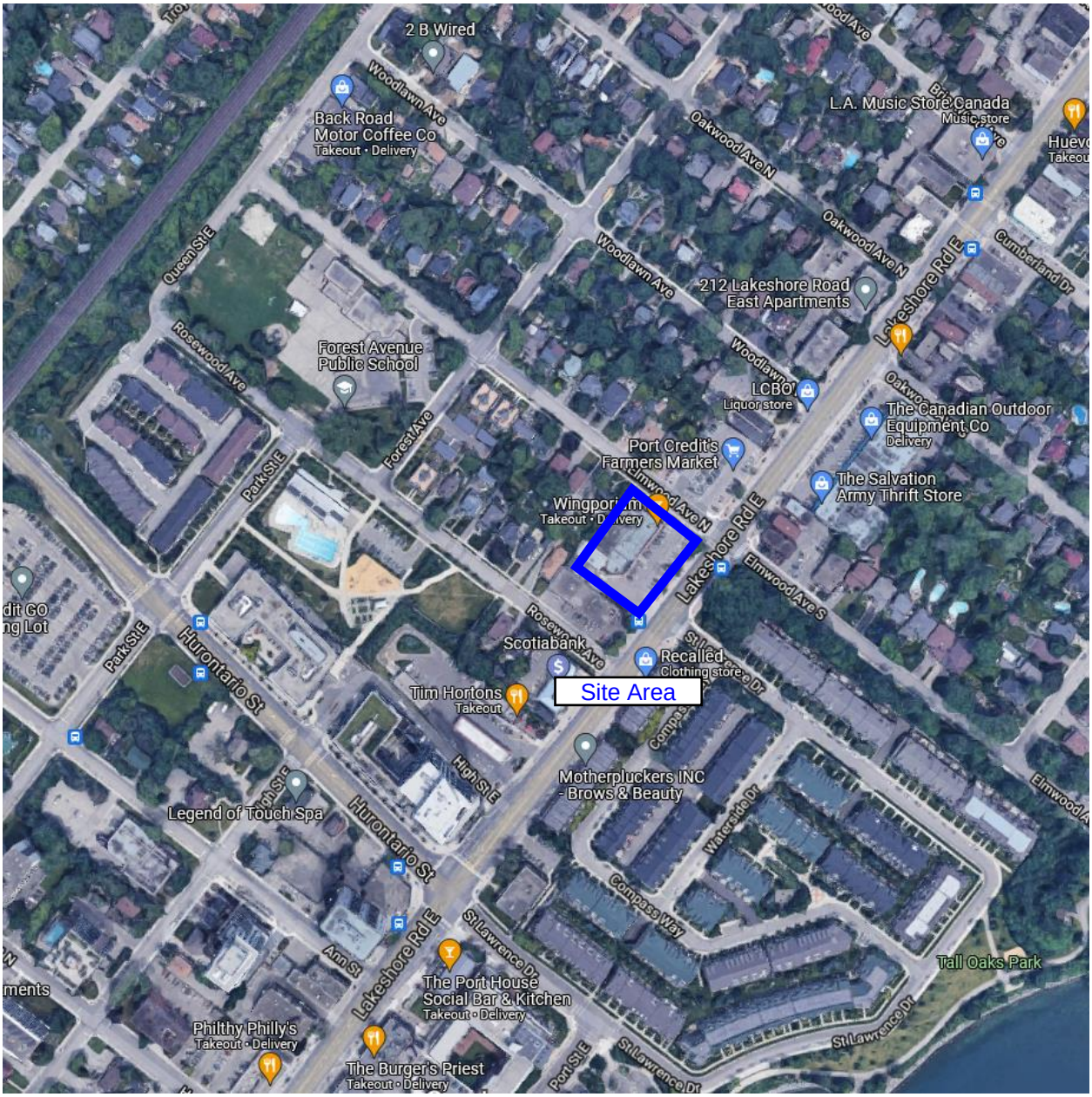
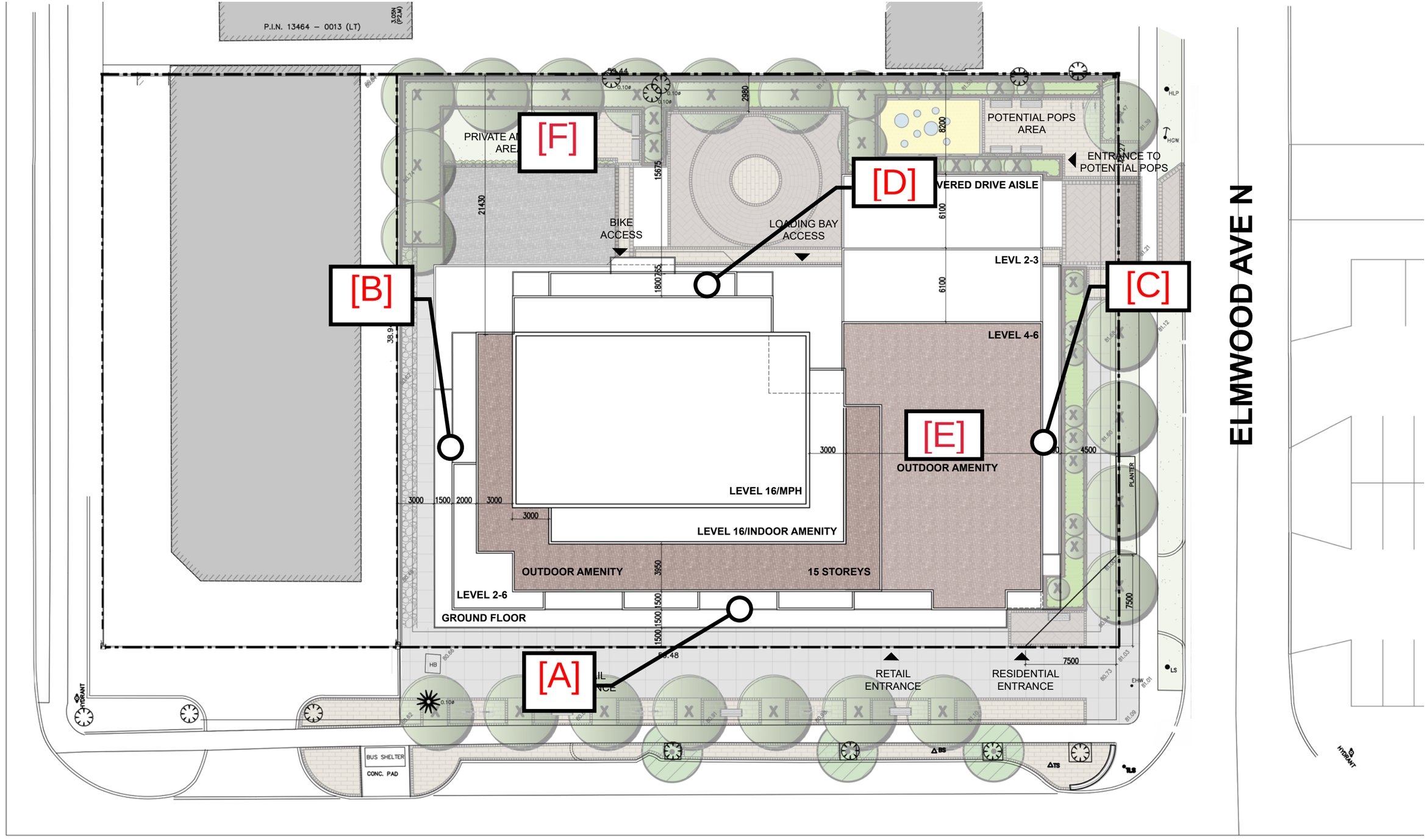
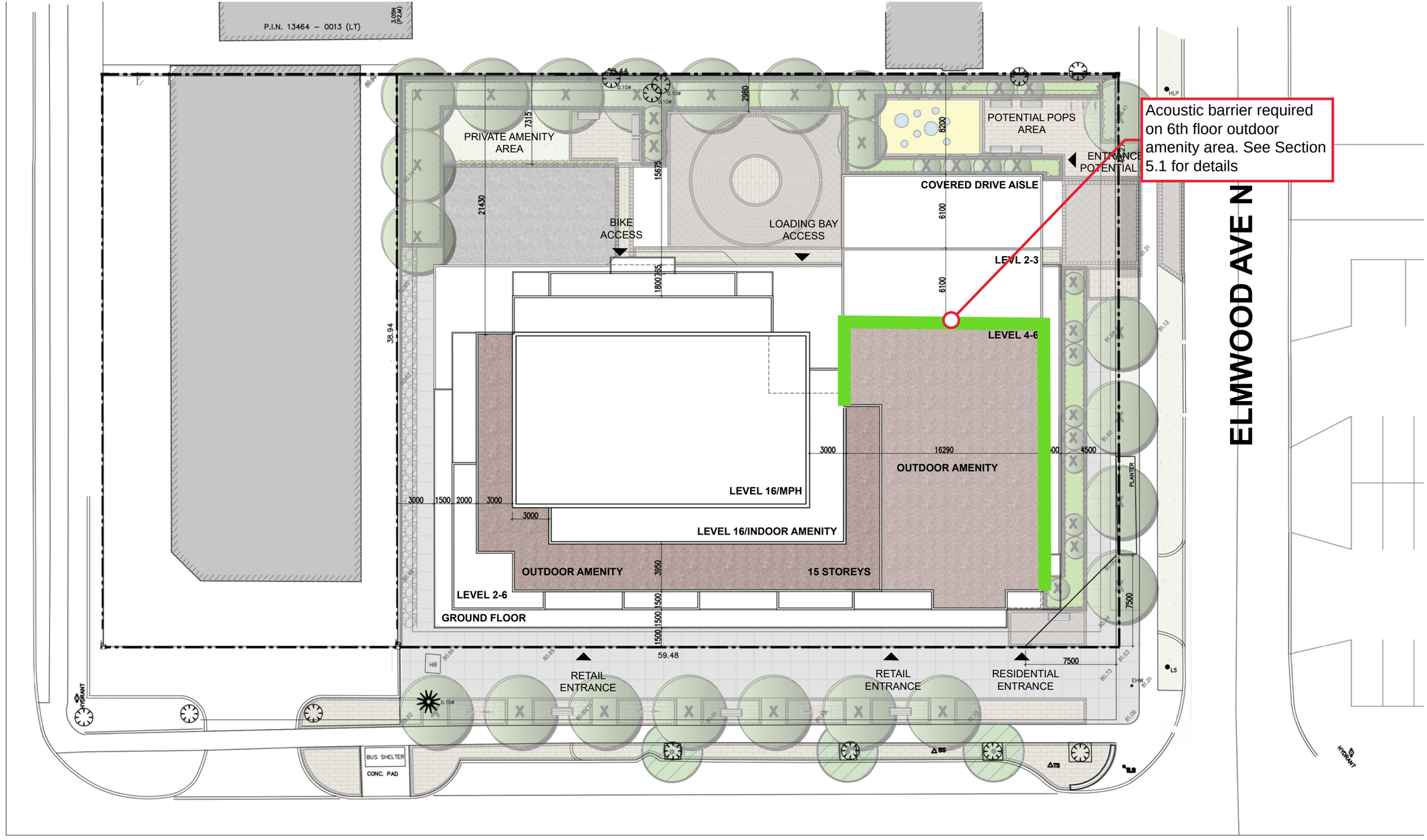


Figure 1: Key Plan



LAKESHORE RD E

Figure 2: Site Plan Showing Prediction Locations



LAKESHORE RD E

Figure 3: Site Plan Showing Barrier Requirements

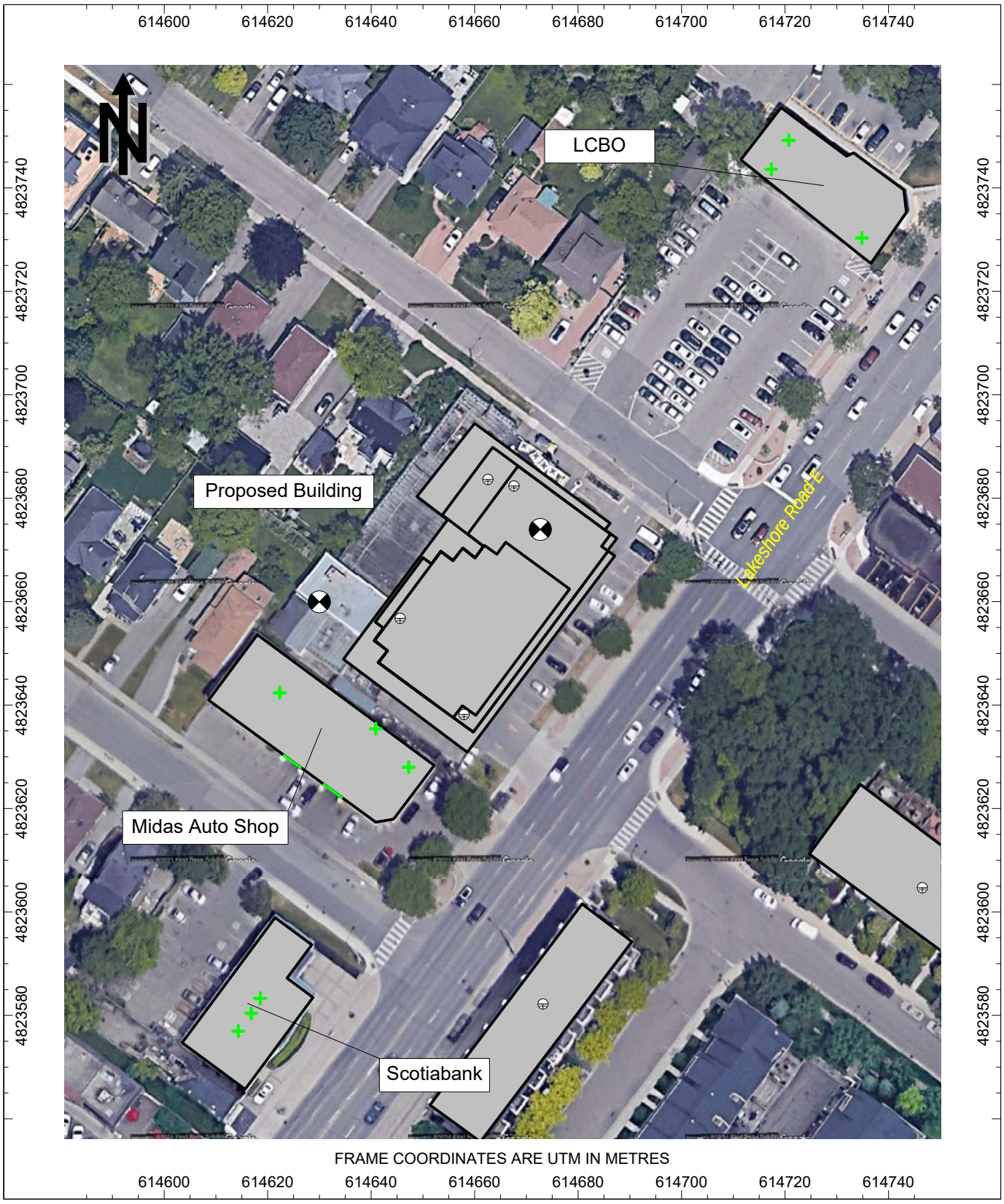


Figure 4: Locations of Existing Nearby Stationary Sources

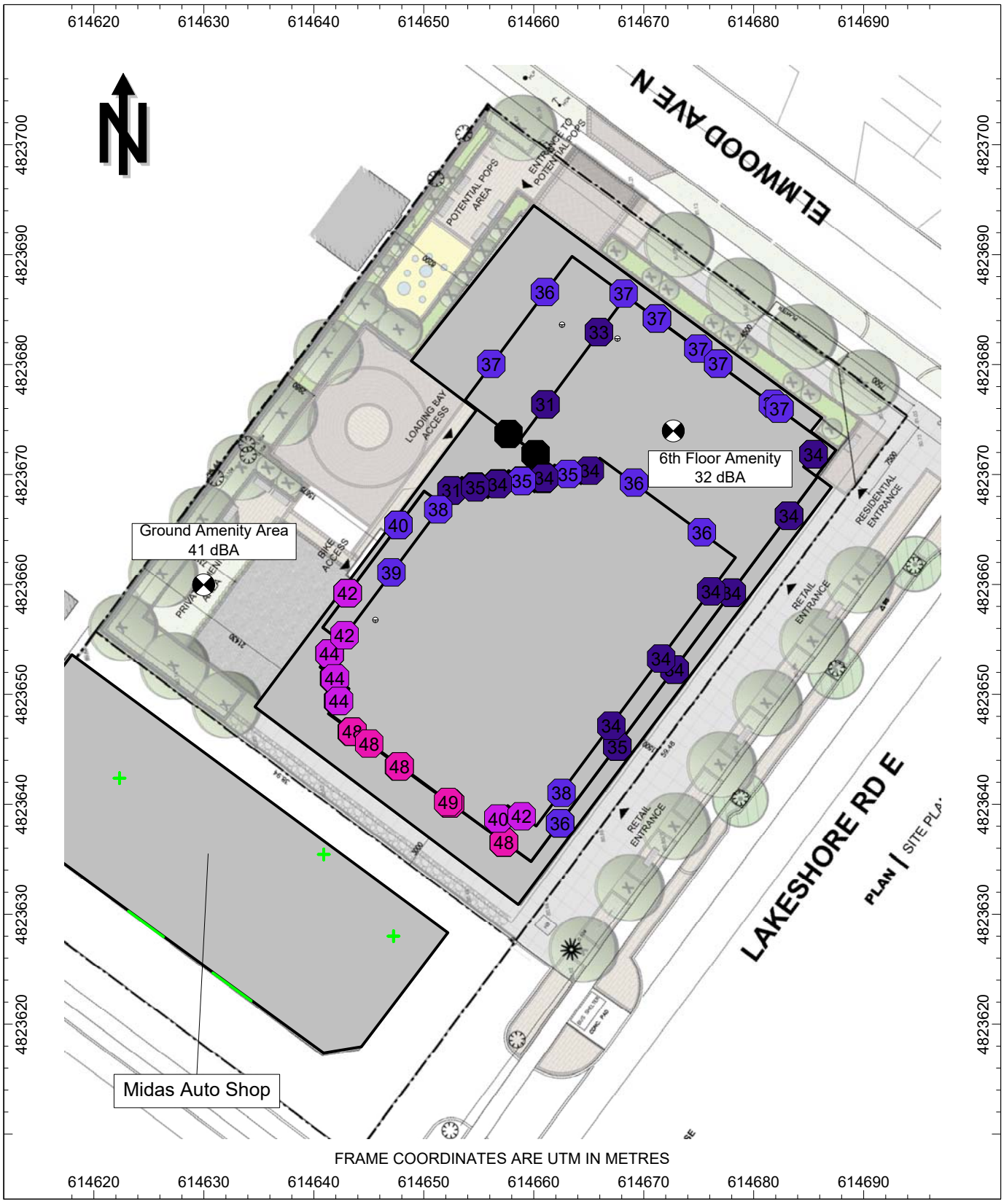


Figure 5: Stationary Noise Impact
Daytime (07:00 - 23:00), [dBA]

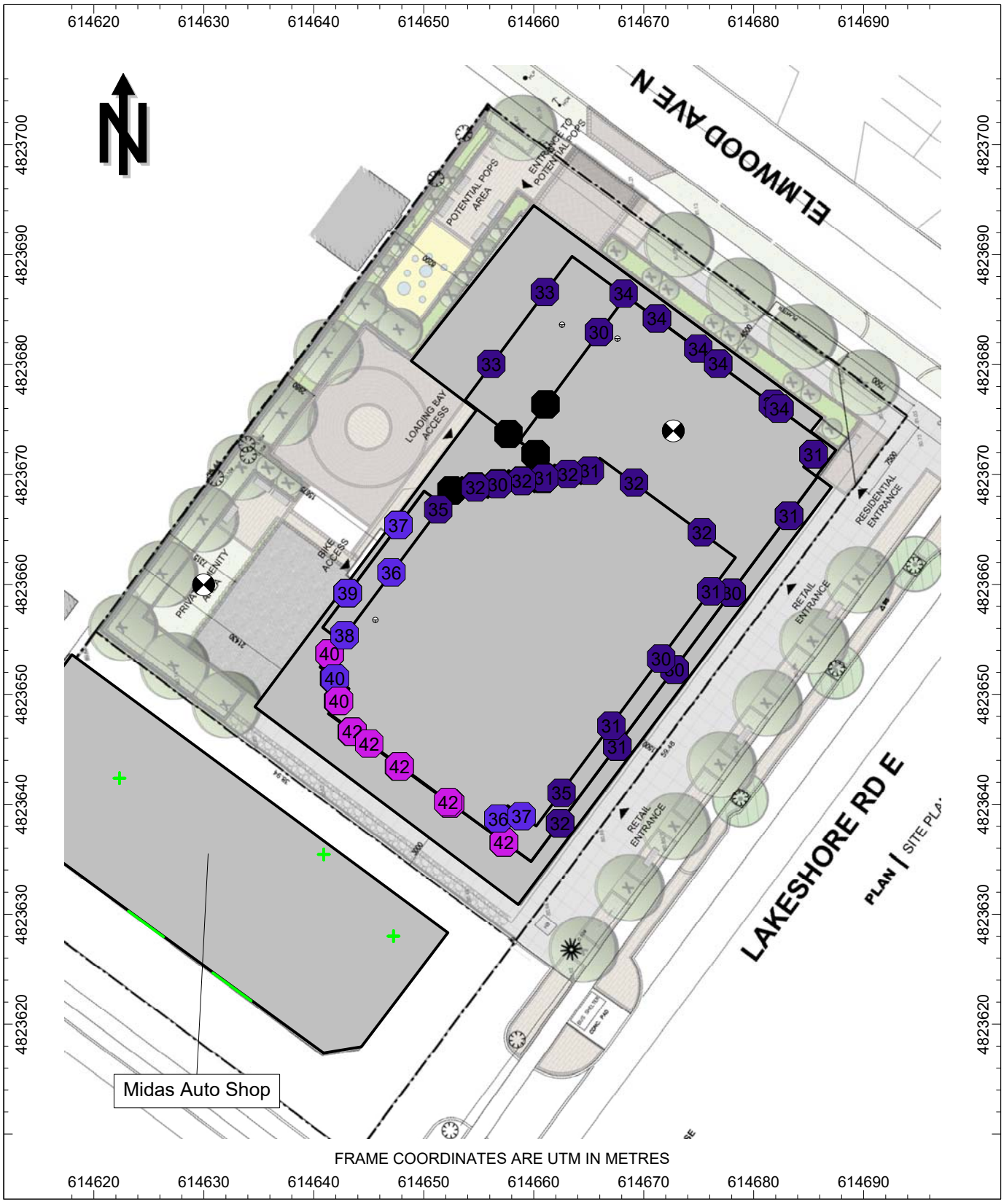


Figure 6: Stationary Noise Impact
Nighttime (23:00 - 07:00), [dBA]

Appendix A

Rail Traffic Information

From: Rail Data Requests
To: Victor Garcia
Date: February-23-21 4:26:32 PM
Attachments: image001.png

Hi Victor:

Further to your request dated February 16, 2021, the subject lands (157-165 Cross Ave, Oakville) are located within 300 metres of the Metrolinx Oakville Subdivision (which carries Lakeshore West GO rail service).

It's anticipated that GO rail service on this Subdivision will be comprised of diesel and electric trains. The GO rail fleet combination on this Subdivision will consist of up to 2 locomotives and 12 passenger cars. The typical GO rail weekday train volume forecast near the subject lands, including both revenue and equipment trips is in the order of 255 trains. The planned detailed trip breakdown is listed below:

	1 Diesel Locomotive	2 Diesel Locomotives	1 Electric Locomotive	2 Electric Locomotives		1 Diesel Locomotive	2 Diesel Locomotives	1 Electric Locomotive	2 Electric Locomotives
Day (0700-2300)	60	11	101	42	Night (2300-0700)	8	4	21	8

The current track design speed near the subject lands is 80 mph (129 km/h).

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

Options have been studied as part of the Transit Project Assessment Process (TPAP) for the GO Expansion program, currently in the procurement phase. The successful proponent team will be responsible for selecting and delivering the right trains and infrastructure to unlock the benefits of GO Expansion. The contract is in a multi-year procurement process and teams are currently completing the bids that will close in 2021. GO Expansion construction will get underway in 2022.

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

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

There are anti-whistling by-laws in affect at Kerr St and Chartwell Rd at-grade crossings.

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

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

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

Regards,

Lyndsy You, B.Eng.
Project Manager
Third Party Projects Review, Capital Projects Group
Metrolinx|30 Wellington St. W |Toronto, Ontario|M5J 2N8

From: Victor Garcia <vgarcia@hgcengineering.com>
Sent: February 16, 2021 11:42 AM
To: Rail Data Requests <RailDataRequests@metrolinx.com>
Subject: Rail Traffic Data Requests

Good morning,

HGC Engineering is conducting a noise feasibility study for a proposed residential development located at 157 – 165 Cross Avenue in Oakville, Ontario. A google link is included for your reference:

https://goo.gl/maps/7G5T3Uj5vL8GTjAc6

Please let me know if you have rail traffic data available for the nearby railway?

Thanks,

Victor Garcia, P.Eng
Associate

HGC Engineering **NOISE | VIBRATION | ACOUSTICS**
Howe Gastmeier Chapnik Limited
2000 Argentia Road, Plaza One, Suite 203, Mississauga, Ontario, Canada L5N 1P7
t: 905.826.4044 **e**: vgarcia@hgcengineering.com
Visit our website – www.hgcengineering.com **Follow Us** – LinkedIn | Twitter | YouTube

AECOM
5080 Commerce Boulevard
Mississauga, ON, Canada L4W 4P2
www.aecom.com

905 238 0007 tel
905 238 0038 fax

Transmittal Form

Date	September 26, 2011	Project Number	60114380-0800-11-27
Contact	Sheeba Paul, MEng, PEng	Routing	spaul@hgcengineering.com
Company	HGC Engineering - Howe Gastmeier Chapnik Limited		
Address	2000 Argentia Road, Plaza One, Suite 203 Mississauga, Ontario, Canada L5N 1P7		
Telephone #	905-826-4044		
Sent By	Warren D'Andrade	Copies To	Nick Coleman, CN – email Adam Snow, Metrolinx – email
Project Name	Train Traffic Data – Oakville Subdivision in the vicinity of Cawthra Road – Approximately at Mile 11.47		

[ ] Urgent [X] For Your Use [ ] For Review [ ] For Your Information [ ] Confidential

Comments: Please find attached the requested Train Traffic Data.

Should you have any questions, please do not hesitate to contact the undersigned at 905-238-0007 ext. 8214.

Sent Via: [ ] mail [ ] courier [ ] picked up [ ] by hand [X] email [ ] fax [ ] other

Authorized Signature: 

Name *(please print)*: Warren D'Andrade **Title:** Project Manager

Sheeba Paul, MEng, PEng
HGC Engineering - Howe Gastmeier Chapnik Limited
2000 Argentia Road, Plaza One, Suite 203
Mississauga, Ontario, Canada L5N 1P7

Dear Sheeba:

Project No: 60114380-0800-11-27

Regarding: Train Traffic Data – Oakville Subdivision in the vicinity of Cawthra Road – Approximately at Mile 11.47

The following is provided in response to your September 13th, 2011 request for information regarding rail traffic in the vicinity of Cawthra Road, at approximately Mile 11.47 on the Oakville Subdivision.

Typical daily traffic volumes are recorded below. However, traffic volumes may fluctuate due to overall economic conditions, varying traffic demands, weather conditions, track maintenance programs, statutory holidays and traffic detours that when required may be heavy although temporary.

Typical daily traffic volumes at this site location are as follows:
***Maximum train speed is given in Miles per Hour**

Eastbound	**0700 - 2300**			
Type of Train	**Volumes**	**Max. Consist**	**Max. Speed**	**Max. Power**
Freight	0	140	60	4
Way Freight	1	25	60	2
Passenger	6	10	95	2

Westbound	**0700 - 2300**			
Type of Train	**Volumes**	**Max. Consist**	**Max. Speed**	**Max. Power**
Freight	1	140	60	4
Way Freight	1	25	60	2
Passenger	8	10	95	2

Eastbound	**2300 - 0700**			
Type of Train	**Volumes**	**Max. Consist**	**Max. Speed**	**Max. Power**
Freight	0	140	60	4
Way Freight	0	25	60	2
Passenger	2	10	95	2

Westbound	**2300 - 0700**			
Type of Train	**Volumes**	**Max. Consist**	**Max. Speed**	**Max. Power**
Freight	0	140	60	4
Way Freight	1	25	60	2
Passenger	1	10	95	2

The volumes recorded reflect eastbound and westbound freight, way freight and passenger operations on the Oakville Subdivision. Not included in the above data are GO Transit commuter trains running east and west on the Oakville Subdivision. For more information regarding existing and projected commuter operations, Mr. Adam Snow, Transportation Planner, should be contacted directly through Metrolinx offices at 20 Bay Street, Suite 600, Toronto, Ontario M5J 2W3, Fax 416-869-1563 and phone 416-869-3600.

Except where anti-whistling bylaws are in effect, engine-warning whistles and bells are normally sounded at all at-grade crossings. There are three at-grade crossings in the immediate vicinity of the study area, Ogden Avenue (Mile 10.84), Alexandra Avenue (Mile 11.02) and Revus Avenue (Mile 12.02). Anti-whistling bylaws are in effect at these crossings. Please note that engine warning whistles may be sounded in cases of emergency, as a safety and or warning precaution at station locations and pedestrian crossings and occasionally for operating requirements.

With respect to equipment restrictions, the gross weight of the heaviest permissible car is 286,000 lbs. The three mainline tracks of the Oakville Subdivision are constructed of continuously welded rail throughout the study area.

The Canadian National Railway continues to be strongly opposed to locating developments near railway facilities and rights-of-way due to potential safety and environmental conflicts. Development adjacent to the Railway Right-of-Way is not appropriate without sound impact mitigation measures to reduce the incompatibility. For confirmation of the applicable rail noise, vibration and safety standards, Mr. Nick Coleman, Canadian National Railway Properties at 905-760-5007 should be contacted directly.

We trust the above information will satisfy your current request.

Sincerely,
AECOM Canada Ltd.

Warren D'Andrade
warren.dandrade@aecom.com

cc: Nick Coleman, CN – email
Adam Snow, Metrolinx – email

Appendix B

Road Traffic Information

NOISE REPORT FOR PROPOSED DEVELOPMENT

Date:	20-Sep-21

REQUESTED BY:

Name:	Sheeba Paul, M.Eng., P.Eng.
Company:	HGC Engineering

PREPARED BY:

Nam	Steven Guan
Tel#:	905-615-3200 ext. 5933

MISSISSAUGA

Location: Lakeshore Road East - Hurontario Street to Seneca Avenue
Hurontario Street - Lakeshore Road East to Park Street

ID 524

ON SITE TRAFFIC DATA

Specific	*Street Names*				
[redacted]	Lakeshore Rd E	Hurontario St			
AADT:	31,800	21,300			
# of Lanes:	4 Lanes	4 Lanes			
% Trucks:	4%	7%			
Medium/Heavy Trucks Ratio:	55/45	55/45			
Day/Night Split:	90/10	90/10			
Posted Speed Limit:	40 km/h*	50 km/h			
Gradient Of Road:	<2%	<2%			
Ultimate R.O.W:	26 m	30 m			

Comments:

Ultimate traffic data only (2041).

*Note: Lakeshore Road East transitions from 40 km/h to 50 km/h east of Woodlawn Avenue.

Appendix C

Sample STAMSON 5.04 Output

STAMSON 5.0 NORMAL REPORT Date: 07-10-2021 15:35:25
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: b.te Time Period: Day/Night 16/8 hours
Description: Pred. Loc. [B], west facade facing Rosewood Ave

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

Train Type	Trains ! Speed (km/h)	# loc /Train	# Cars /Train	Eng type	Cont weld
1. GO 1 loc	161.0/29.0	129.0	1.0	12.0	Diesel! Yes
2. GO 2 loc	53.0/12.0	129.0	2.0	12.0	Diesel! Yes
3. Freight	1.6/0.0	97.0	4.0	140.0	Diesel! Yes
4. Way Freight	3.3/1.6	97.0	2.0	25.0	Diesel! Yes
5. VIA	22.9/4.9	150.0	2.0	10.0	Diesel! Yes

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

24 hr Traffic Volume (AADT or SADT): 31800
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 2.20
Heavy Truck % of Total Volume : 1.80
Day (16 hrs) % of Total Volume : 90.00

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

Angle1 Angle2 : 0.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 360.00 / 360.00 m
Receiver height : 48.30 / 48.30 m
Topography : 1 (Flat/gentle slope; no barrier)
No Whistle
Reference angle : 0.00

Results segment # 1: GO (day)

LOCOMOTIVE (0.00 + 64.29 + 0.00) = 64.29 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.00	81.10	-13.80	-3.01	0.00	0.00	0.00	64.29

WHEEL (0.00 + 56.48 + 0.00) = 56.48 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.00	73.30	-13.80	-3.01	0.00	0.00	0.00	56.48

Segment Leq : 64.96 dBA

Total Leq All Segments: 64.96 dBA

Results segment # 1: GO (night)

LOCOMOTIVE (0.00 + 60.24 + 0.00) = 60.24 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.00	77.06	-13.80	-3.01	0.00	0.00	0.00	60.24

WHEEL (0.00 + 52.30 + 0.00) = 52.30 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.00	69.12	-13.80	-3.01	0.00	0.00	0.00	52.30

Segment Leq : 60.89 dBA

Total Leq All Segments: 60.89 dBA

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

Car traffic volume : 27475/3053 veh/TimePeriod *
Medium truck volume : 630/70 veh/TimePeriod *
Heavy truck volume : 515/57 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 2 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 31800
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 2.20
Heavy Truck % of Total Volume : 1.80
Day (16 hrs) % of Total Volume : 90.00

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

Angle1 Angle2 : -90.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 22.00 / 22.00 m
Receiver height : 48.30 / 48.30 m
Topography : 1 (Flat/gentle slope; no barrier)

Reference angle : 0.00

Road data, segment # 2: Hurontario (day/night)

Car traffic volume : 17828/1981 veh/TimePeriod *
Medium truck volume : 748/83 veh/TimePeriod *
Heavy truck volume : 594/66 veh/TimePeriod *
Posted speed limit : 50 km/h
Road gradient : 2 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 21300
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 3.90
Heavy Truck % of Total Volume : 3.10
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 2: Hurontario (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 200.00 / 200.00 m
Receiver height : 48.30 / 48.30 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Lakeshore (day)

Source height = 1.16 m

ROAD (0.00 + 62.31 + 0.00) = 62.31 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.00	66.98	0.00	-1.66	-3.01	0.00	0.00	0.00	62.31

Segment Leq : 62.31 dBA

Results segment # 2: Hurontario (day)

Source height = 1.33 m

ROAD (0.00 + 57.58 + 0.00) = 57.58 dBA

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

---
-90 90 0.00 68.83 0.00 -11.25 0.00 0.00 0.00 0.00 57.58

Segment Leq : 57.58 dBA

Total Leq All Segments: 63.57 dBA

Results segment # 1: Lakeshore (night)

Source height = 1.16 m

ROAD (0.00 + 55.76 + 0.00) = 55.76 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 0 0.00 60.44 0.00 -1.66 -3.01 0.00 0.00 0.00 55.76

Segment Leq : 55.76 dBA

Results segment # 2: Hurontario (night)

Source height = 1.33 m

ROAD (0.00 + 51.04 + 0.00) = 51.04 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.00 62.29 0.00 -11.25 0.00 0.00 0.00 0.00 51.04

Segment Leq : 51.04 dBA

Total Leq All Segments: 57.02 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 67.33
(NIGHT): 62.38

STAMSON 5.0 NORMAL REPORT Date: 07-10-2021 15:33:18
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: eola1.te Time Period: 16 hours
Description: 6th floor outdoor area, daytime, unmitigated

Rail data, segment # 1: GO

Train Type	Trains	Speed (km/h)	# loc /Train	# Cars /Train	Eng type	Cont weld
1. GO 1 loc	161.0/29.0	129.0	1.0	12.0	Diesel	Yes
2. GO 2 loc	53.0/12.0	129.0	1.0	12.0	Diesel	Yes
3. Freight	1.6/0.0	97.0	4.0	140.0	Diesel	Yes
4. Way Freight	3.3/1.6	97.0	2.0	25.0	Diesel	Yes
5. VIA	22.9/4.9	150.0	2.0	10.0	Diesel	Yes

Data for Segment # 1: GO

Angle1 Angle2 : -25.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 360.00 m
Receiver height : 1.50 m
Topography : 4 (Elevated; with barrier)
No Whistle
Barrier angle1 : -25.00 deg Angle2 : 90.00 deg
Barrier height : 1.07 m
Elevation : 20.00 m
Barrier receiver distance : 12.00 m
Source elevation : 0.00 m
Receiver elevation : 20.00 m
Barrier elevation : 20.00 m
Reference angle : 0.00

Results segment # 1: GO

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
4.00	1.50	0.92	20.92
0.50	1.50	0.80	20.80

LOCOMOTIVE (0.00 + 59.82 + 0.00) = 59.82 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-25	90	0.00	80.60	-13.80	-1.95	0.00	0.00	-5.04	59.82

WHEEL (0.00 + 51.95 + 0.00) = 51.95 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-25	90	0.03	73.23	-14.16	-2.01	0.00	0.00	-5.12	51.95

Segment Leq : 60.48 dBA

Total Leq All Segments: 60.48 dBA

Road data, segment # 1: Lakeshore

Car traffic volume : 27475 veh/TimePeriod *
Medium truck volume : 630 veh/TimePeriod *
Heavy truck volume : 515 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 2 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Lakeshore

Angle1 Angle2 : -45.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 35.00 m
Receiver height : 1.50 m
Topography : 4 (Elevated; with barrier)
Barrier angle1 : -45.00 deg Angle2 : 90.00 deg
Barrier height : 1.07 m
Elevation : 20.00 m
Barrier receiver distance : 12.00 m
Source elevation : 0.00 m
Receiver elevation : 20.00 m
Barrier elevation : 20.00 m
Reference angle : 0.00

Results segment # 1: Lakeshore

Source height = 1.16 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.16	1.50	-5.47	14.53

ROAD (0.00 + 45.32 + 0.00) = 45.32 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-45	90	0.00	66.98	0.00	-3.68	-1.25	0.00	0.00	-16.73	45.32

Segment Leq : 45.32 dBA

Total Leq All Segments: 45.32 dBA

TOTAL Leq FROM ALL SOURCES: 60.61

STAMSON 5.0 NORMAL REPORT Date: 07-10-2021 15:33:54
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: eola1.te Time Period: 16 hours
Description: 6th floor outdoor area, daytime, mitigated

Rail data, segment # 1: GO

Train Type	Trains	Speed (km/h)	# loc /Train	# Cars /Train	Eng type	Cont weld
1. GO 1 loc	161.0/29.0	129.0	1.0	12.0	Diesel	Yes
2. GO 2 loc	53.0/12.0	129.0	1.0	12.0	Diesel	Yes
3. Freight	1.6/0.0	97.0	4.0	140.0	Diesel	Yes
4. Way Freight	3.3/1.6	97.0	2.0	25.0	Diesel	Yes
5. VIA	22.9/4.9	150.0	2.0	10.0	Diesel	Yes

Data for Segment # 1: GO

Angle1 Angle2 : -25.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 360.00 m
Receiver height : 1.50 m
Topography : 4 (Elevated; with barrier)
No Whistle
Barrier angle1 : -25.00 deg Angle2 : 90.00 deg
Barrier height : 1.30 m
Elevation : 20.00 m
Barrier receiver distance : 12.00 m
Source elevation : 0.00 m
Receiver elevation : 20.00 m
Barrier elevation : 20.00 m
Reference angle : 0.00

Results segment # 1: GO

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
4.00	1.50	0.92	20.92
0.50	1.50	0.80	20.80

LOCOMOTIVE (0.00 + 59.63 + 0.00) = 59.63 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-25	90	0.00	80.60	-13.80	-1.95	0.00	0.00	-5.23	59.63

WHEEL (0.00 + 51.90 + 0.00) = 51.90 dBA

Angle1	Angle2	Alpha	RefLeq	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-25	90	0.01	73.23	-13.97	-1.97	0.00	0.00	-5.39	51.90

Segment Leq : 60.31 dBA

Total Leq All Segments: 60.31 dBA

Road data, segment # 1: Lakeshore

Car traffic volume : 27475 veh/TimePeriod *
Medium truck volume : 630 veh/TimePeriod *
Heavy truck volume : 515 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 2 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: Lakeshore

Angle1 Angle2 : -45.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 35.00 m
Receiver height : 1.50 m
Topography : 4 (Elevated; with barrier)
Barrier angle1 : -45.00 deg Angle2 : 90.00 deg
Barrier height : 1.07 m
Elevation : 20.00 m
Barrier receiver distance : 12.00 m
Source elevation : 0.00 m
Receiver elevation : 20.00 m
Barrier elevation : 20.00 m
Reference angle : 0.00

Results segment # 1: Lakeshore

Source height = 1.16 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.16	1.50	-5.47	14.53

ROAD (0.00 + 45.32 + 0.00) = 45.32 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-45	90	0.00	66.98	0.00	-3.68	-1.25	0.00	0.00	-16.73	45.32

Segment Leq : 45.32 dBA

Total Leq All Segments: 45.32 dBA

TOTAL Leq FROM ALL SOURCES: 60.45