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NOISE AND VIBRATION IMPACT STUDY

3085 Hurontario Street

Mississauga, Ontario

Prepared for:

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Table of Contents

List of Figures

List of Tables

VERSION CONTROL

Ver.	Date	Version Description / Changelog	Prepared By	Reviewed By
1	August 16, 2023	Noise and Vibration Impact Study for ZBA application	Adam Doiron	Brian Chapnik

1 INTRODUCTION AND SUMMARY

HGC Engineering was retained by 3085 Hurontario Limited Partnership to undertake a Noise and Vibration Impact Study for a proposed development at 3085 Hurontario Street in Mississauga, Ontario. This study is based on architectural plans dated July 31, 2023 ("Rezoning Set") by Diamond Schmitt Architects, as well as some preliminary information on mechanical layouts and systems by Smith + Andersen.

The subject site is located on the east side of Hurontario Street, between Dundas Street East and Kirwin Avenue/Hillcrest Avenue. The development proposal includes for the construction of four towers ranging between 24 storeys tall and 44 storeys tall, each incorporating a podium of 4 to 6 storeys. A key plan of the development area is attached as Figure 1, and the proposed site plan is attached as Figure 2. Outdoor amenity areas are indicated at grade, and on elevated podium rooftop terraces; Figure 3 shows the points of assessment for Outdoor Living Areas.

The subject site is in an urbanized area of Mississauga. Road traffic on Hurontario Street is the primary noise source with potential impact on the proposed development, although contributions from additional sources (rail and LRT traffic as well as vehicular traffic on Kirwin Avenue) were also considered. Traffic volumes were obtained from the City of Mississauga, the previously prepared noise impact study for the project, and HGC Engineering's project files, and adjusted as warranted to account for future potential growth. The traffic data was used to estimate future sound levels (L_{EQ}) at the location of the proposed building facades. The estimated sound levels were evaluated with respect to the guidelines of the Ministry of the Environment, Conservation, and Parks ("MECP") using *CadnaA,* a numerical software package suitable for complex modelling in 3-dimensions. The appropriate sound insulation requirements of the building façades, and related noise control measures and warning clauses are discussed in the body of the report.

The potential impact of ground-borne vibration from the future Hurontario LRT line was also assessed and was found to be less than the applicable criteria at all points of reception associated with the development.

An assessment of stationary noise sources at facilities surrounding the subject site was conducted, as was an assessment of stationary noise sources associated with both the existing buildings on the site and the proposed development itself. The potential noise impact from these noise sources on the development, as well as the potential impact of the development on the surroundings were determined to be in compliance with the established criteria.

In conclusion, with suitable controls integrated into the building and site plans, the proposed development is anticipated to meet MECP guidelines and acceptable standards from the perspective of noise impact. Details of the assessment leading to this conclusion are provided herein.

2 SITE DESCRIPTION AND SOURCES OF SOUND

The proposed mixed-use development at 3085 Hurontario includes for the construction of four towers. The 4-storey podium of Building 1 (northwest) will include commercial and amenity uses in the podium, with residential suites on the tower levels above. Levels 1 in Building 2 (southwest) will include additional retail space, and Level 2 will include mechanical space, with residential suites beginning on Level 3 and extending to the top floor, except for indoor amenity space on Level 5. Buildings 3 and 4 (southeast and northeast respectively) will include residential suites beginning on the ground floor with indoor amenity spaces shown on Level 7. Buildings 1, 3 and 4 will include an outdoor amenity terrace on the podium rooftop. The entire development will be constructed above 4 levels below grade, which will primarily consist of parking, but will also include utility and M&E spaces.

Site visits were conducted by HGC Engineering in July 2023 to conduct sound level measurements, and to make note of the acoustical environment. The primary source of sound emissions at the subject site is road traffic noise from Hurontario Street. Secondary sources of noise considered include road traffic on Kirwin Avenue, rail traffic on the CP rail line to the north, and noise from the Hurontario LRT line which is currently under construction. The acoustical environment surrounding the site is urban in nature, and thus is best categorized as a Class 1 (urban) area under MECP guidelines.

The minimum separation from the proposed building to the CP rail line is approximately 260 m. Noise emissions from the railway have been considered in accordance the document "*Guidelines for New Development in Proximity to Railway Operations*", published by the Railway Association of Canada (RAC) and the Federation of Canadian Municipalities (FCM).

The area surrounding the subject site consists primarily of mid and high-rise residential buildings, along with some low-rise commercial uses. A separate development at 3115 Hurontario is currently proposed, and the building massing of this development is included on the site plan for this development. Given that this proposed adjacent development is not yet approved, any beneficial screening that its massing will provide has not been considered in the analysis of environmental (traffic) noise presented herein, though receptors associated with the development have been considered in assessing the potential impact of the 3085 Hurontario development on its surroundings.

As mentioned above, the CP rail line is located greater than 250 m from the site; an assessment of ground-borne vibration from this source is not required. The potential impact of ground-borne vibration from the Hurontario LRT line was assessed.

The subject site is located approximately 8 km from the Toronto Pearson International Airport. A review of published Noise Exposure Forecast (NEF) contours for this facility confirms that the site is located outside the NEF 25 contour. Thus, potential noise impacts from the airport and air traffic noise are negligible, and further assessment is not required, per the MECP guideline.

3 NOISE CRITERIA

3.1 Road and Rail Traffic Noise

Guidelines for acceptable levels of road and rail traffic noise impacting residential developments are contained in the MECP publication NPC-300, "Environmental Noise Guideline, Stationary and Transportation Sources – Approval and Planning," August, 2013 (release date October 21, 2013), and are listed in Table 1 below. The values in Table 1 are energy equivalent (average) sound levels [L_{EQ}] in units of A-weighted deciBels [dBA].

Table 1: MECP Road/Rail Traffic Noise Criteria

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

Daytime refers to the period between 07:00 and 23:00. Nighttime refers to the period between 23:00 and 07:00. Corridors and washrooms are usually not considered to be noise-sensitive areas.

The term "Outdoor Living Area" (OLA) is used in reference to an outdoor patio, a backyard, a terrace, a playground, or common areas associated with high-rise multi-unit buildings where passive outdoor recreation is expected to occur. Balconies with a depth of less than 4 meters (measured perpendicular to the building façade) are not considered OLAs under MECP guidelines, and accordingly the noise criteria are not applicable there. Balconies and terraces with a minimum depth of 4 meters are only considered OLAs under MECP guidelines if they are the only OLA for the occupant; generally, common outdoor amenity spaces are the only spaces that require consideration for high-rise buildings under MECP guidelines.

In cases where a minor excess (up to 5 dBA) over the sound level limit in an OLA is anticipated, MECP guidelines allow the excess to be addressed by including a warning clause in the titles, deeds or tenancy agreements for the affected dwellings. 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 is feasible.

With respect to the building envelope, no controls are required where levels are under 50 dBA. Where the noise level (L_{EQ}) is greater than 60 dBA at night or greater than 65 dBA during the daytime, windows must be designed to achieve the indoor sound level criteria listed above. Otherwise, any glazing meeting the Ontario Building Code is considered adequate under MECP guidelines. Where the predicted nighttime and/or daytime sound levels exceed these thresholds, central air conditioning or some other heating and cooling system that will allow windows to remain closed is required.

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

4 TRAFFIC NOISE ASSESSMENT

4.1 Road Traffic Data

Ultimate road traffic data for Hurontario Street and Kirwin Avenue was obtained from City of Mississauga in the form of Ultimate Annual Average Daily Traffic (AADT) values. The ultimate data also included information on speed, commercial vehicle percentages and day/night volume split. The road traffic volumes used in the analysis are listed in Table 2. Road traffic data is provided in Appendix A.

Table 2: Ultimate Road Traffic Volumes

Roadway	Daytime (07:00 to 23:00)			Nighttime (23:00 to 07:00)			Speed [km/h]
	Cars	Medium Trucks	Heavy Trucks	Cars	Medium Trucks	Heavy Trucks	
Hurontario Street	45792	1049	859	5088	117	95	50
Kirwin Avenue	11025	124	101	1225	14	11	40

4.2 Future LRT Traffic Data

Traffic volume data for the Hurontario LRT line was obtained from the previous Noise and Vibration Feasibility Study for the site, originally obtained from the Noise and Vibration Impact Assessment prepared as part of the Environmental Assessment (EA) for the LRT line, which included future (2031) volumes in terms of daytime/nighttime pass-bys. The data was escalated to 2033 at a growth rate of 2.5% per year. The resulting volumes are 294 pass-bys and 46 pass-bys during the daytime and nighttime periods, respectively.

4.3 Rail Traffic Data

Rail traffic data for typical rail operations was obtained from HGC Engineering's project files, originally provided by Metrolinx and CP Rail, and is attached in Appendix A. The data provided has been forecasted to the year 2033. The maximum permissible speed for trains in the vicinity of the subject site is 104 km/h (65 mph) for GO trains and 81 km/h (50 mph) for CP freight trains. In conformance with GO Transit assessment requirements, the maximum speeds, number of cars and locomotives per train were used in the traffic noise analysis to yield a worst-case estimate of train noise. Table 3 summarizes the train volume data used in the analysis.

Table 3: Rail Traffic Data (Projected to 2033)

Type of Train	Number of Trains Day/Night	Number of Locomotives	Number of Cars	Max Speed (mph/kph)
GO (Diesel)	39/6	1	12	65/104
CPR (Diesel)	9/10	4	163	50/81

4.4 Methods

The future sound levels from traffic that will impact the development were predicted using computer modelling. *Cadna/A*, a commercially available noise prediction software package was used for this purpose, as it is well equipped to process calculations in complex, three-dimensional environments.

The sound emissions from each roadway were determined using STAMSON version 5.04, a computer algorithm developed by the MECP, based on traffic volumes determined above. Sound emissions for the LRT line were determined similarly, using STAMSON's "Custom" source, the same model utilized in the Noise and Vibration Study supporting the EA for the LRT, and the traffic volumes determined above. Sample STAMSON calibration sheets are attached as Appendix B.

The sound propagation portion of this modelling has been completed using methods from ISO Standard 9613-2, "Acoustics - Attenuation of Sound During Propagation Outdoors", which accounts for reduction in sound level with distance due to geometrical spreading, air absorption, ground attenuation and acoustical shielding by intervening structures. *Cadna/A, version 2023*, a dedicated noise prediction software package was used for this purpose, as it is well equipped to process calculations in complex, three-dimensional environments. ISO 9613-2 is a widely recognized standard for predicting sound propagation in the environment, and is accepted by many Ontario municipalities, and the MECP.

Modelling of rail traffic noise was conducted using the railway noise algorithm in the publication "*Noise and Vibration Impact Assessment Manual*", a guideline by the US Federal Transit Authority (FTA), by way of the implementation of this algorithm in *Cadna/A*. This same analysis procedure is used by Metrolinx in all recent environmental assessments for their operational expansions.

4.5 Prediction Results

The maximum road, LRT and rail traffic sound levels (as well as the total sound level from all traffic sources combined) predicted at the façades of the proposed development are summarized in Table 4 below. Figures 4-11 show the prediction results graphically.

Table 4: Predicted Future Sound Levels, Environmental Noise Sources

Location Description	Day (16-hr avg)				Night (8-hr avg)			
	Road Traffic	Future LRT	Rail Traffic	Total	Road Traffic	Future LRT	Rail Traffic	Total
Building 1 Podium								
North Façade	67	54	55	67	60	49	54	61
East Façade	58	45	53	59	51	40	52	55
South Façade	66	54	46	67	60	49	45	60
West Façade	70	57	53	70	63	52	52	64
Building 1 Tower								
North Façade	64	52	57	65	58	47	56	60
East Façade	57	45	55	59	51	40	54	55
South Façade	64	52	50	64	57	47	49	58
West Façade	67	55	53	67	61	50	52	61
Building 2 Podium								
North Façade	66	53	49	66	59	48	48	60
East Façade	53	42	47	54	47	37	47	50
South Façade	66	54	43	66	59	49	42	60
West Façade	69	56	50	69	62	51	49	63
Building 2 Tower								
North Façade	67	55	54	68	61	50	53	61
East Façade	64	52	54	65	58	47	53	59
South Façade	64	52	54	65	58	47	53	59
West Façade	64	52	54	65	58	47	53	59
Building 3 Podium								
North Façade	56	43	53	57	49	38	52	54
East Façade	46	32	50	52	40	27	49	50
South Façade	58	45	46	58	51	40	45	52
West Façade	59	47	52	60	53	42	52	55
Building 3 Tower								
North Façade	57	44	56	59	50	39	55	56
East Façade	48	33	54	55	42	28	53	54
South Façade	59	47	46	59	52	42	45	53
West Façade	60	48	53	60	53	43	52	55

Location Description	Day (16-hr avg)				Night (8-hr avg)			
	Road Traffic	Future LRT	Rail Traffic	Total	Road Traffic	Future LRT	Rail Traffic	Total
Building 4 Podium								
North Façade	64	48	57	65	58	43	56	59
East Façade	59	38	54	59	52	33	54	55
South Façade	52	40	50	55	46	35	49	51
West Façade	64	50	56	64	57	45	55	59
Building 4 Tower								
North Façade	61	47	58	63	55	42	57	59
East Façade	55	33	56	58	48	28	55	56
South Façade	56	43	49	57	49	38	48	52
West Façade	62	49	55	63	56	44	54	58

4.6 Road and Rail Traffic Noise Recommendations

The sound levels from road and rail traffic at the residential levels of the proposed development were predicted to be up to 70 dBA during the daytime and 64 dBA during the nighttime.

The following sections outline preliminary recommendations for building façade constructions and ventilation requirements to achieve the noise criteria discussed in Section 3.

4.6.1 Minimum Building Façade Constructions

Given the projected future sound levels at the building façades, MECP guidelines recommend that the building envelope be designed so that indoor sound levels comply with the MECP noise criteria.

Sound insulation calculations were performed based on the predicted sound levels at the building façades, and the areas of the associated façade components (windows and doors) relative to the floor area of the adjacent room. As the floor plans and building elevations have not advanced sufficiently to allow for a detailed specification of the acoustical performance of the building envelope, window-to-floor area ratios of 60% (fixed windows) and 20% (operable windows) were assumed for each suite.

The minimum sound transmission class ratings of the glazing components were calculated for the podium and the tower facades in each building. The analysis indicates that the maximum required rating is STC-32. Generally, a minimum rating of STC-33 for all fixed vision glass elements is recommended in any event, to help account for noise sources not specifically modelled (e.g., revving of engines or occasional noisy human activity). A rating of STC-33 can be achieved using standard glazing assemblies.

Shop drawings for any specific proposed assemblies must include test data for associated sound transmission losses and can be reviewed when available to help ensure the assembly will provide the anticipated degree of sound insulation. Note that the performance of operable elements is typically determined by the seals, and it is particularly important to qualify and include such elements with test data. Test data for glass alone (not installed in a framing assembly) is not considered sufficient to qualify that the proposed building envelope assemblies will meet the stated requirements.

The above calculations assume insignificant sound transmission through the walls in comparison with the windows. 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; to achieve this, exterior wall assemblies with a rating of at least 5-10 STC points above the surrounding window STC requirements are typically required, depending on the amount of wall area relative to window area. Typical insulated exterior wall assemblies will provide a rating in excess of STC-45. The validity of this assumption will be confirmed when the exterior wall assemblies and details are developed.

4.6.2 Ventilation Requirements

At many of the residential building façades, the predicted nighttime levels exceed 60 dBA, therefore central air conditioning systems in these suites (or some other heating and cooling system) are required so that windows may remain closed. In other areas, the predicted sound levels are lower, such that only the provision for the future installation of such a system is needed. Such a heating and cooling system will be provided for all residential suites in any event.

4.6.3 Outdoor Living Areas (OLA)

The site plan indicates outdoor amenity areas on the podium rooftop of Buildings 1, 3, and 4 (labelled as R1 through R3 on Figure 3). The site plan indicates an additional outdoor amenity space (a private park) between Buildings 3 and 4 at the east end of the site (R4), and additional outdoor amenity space at the east side of Building 3 at grade (R5). The sound level at these receptors (including the effect of a 1.07 m high parapet or solid safety screen around elevated terraces), was assessed, and are listed in Table 5 below.

Table 5: Predicted Sound Levels in Outdoor Amenity Areas (With the Inclusion of a 1.07 m High Parapet or Solid Screen at Elevated Terraces)

OLA	Predicted Sound Level [dBA]
R1a R1b R1c	61 58 58
R2	50
R3	52
R4	54
R5	46

The predicted total sound levels at R2 through R5 are less than the 55 dBA criteria established by the MECP. At R1, the predicted sound level within most of the amenity space is below 60 dBA, although at locations most exposed to Hurontario Street (R1a), the sound level is above 60 dBA. Physical mitigation to achieve sound levels in the range of 55 dBA to 60 dBA will be required, subject to technical, economic, or administrative constraints. An extension of the parapet to 1.3 m above the elevation of the amenity at the north, west, and south sides would reduce the predicted sound level to 60 dBA or less throughout the terrace, acceptable to the MECP with the inclusion of a warning clause. Further barrier heights that would be required to achieve sound levels down to 55 dBA in 1 dBA increments for receptors are provided below in Table 6. To function appropriately as an acoustic barrier, the screens should have a minimum surface density of 20 kg/m^2 and be free of gaps, cracks, or voids.

Table 6: Acoustic Barrier Heights Required to Achieve Various Sound Levels [m]

Receiver	55 dBA	56 dBA	57 dBA	58 dBA	59 dBA	60 dBA
R1a	2.5	2.2	1.9	1.7	1.5	1.3
R1b	1.9	1.7	1.4	--	--	--
R1c	1.7	1.5	1.3	--	--	--

5 GROUND-BORNE VIBRATION ASSESSMENT

As mentioned above, potential impact of ground-borne vibration from the proposed Light Rail Transit (LRT) system along the centre of Hurontario Street has been assessed. Information regarding vibration associated with the LRT was obtained from the Noise and Vibration Impact Study report prepared as part of the Transit Project Assessment Process (TPAP). That study concluded that the guideline limit will be met without any additional vibration control measures for any sensitive receptor located at 15 m or more from the centreline of the nearest track (with the LRT traveling at 50 km/h, the speed in the vicinity of the site).

The closest foundation wall of the proposed development will be set back more than 15 m from the tracks, and as such, the guideline limit is anticipated to be met. Further, residential suites will not begin until the 3rd floor in Building 2 (and not until the 5th floor in Building 1), which will provide additional attenuation. Thus, vibration induced noise and perceptible ground-borne vibration from the LRT vehicles are not anticipated to be an issue for this development.

6 STATIONARY NOISE SOURCE ASSESSMENT

As discussed in Section 2, an assessment of noise from stationary sources at facilities surrounding the proposed development, as well as sources of noise associated with the existing buildings on the site, and future noise sources associated with the new development, has been conducted as part of this study.

6.1 Criteria for Acceptable Sound Levels

In addition to the sound level criteria published for traffic noise sources, MECP guideline NPC-300 also includes criteria for acceptable sound levels from stationary noise sources. Mechanical and electrical equipment are referred to as stationary sources of sound (as compared to sources such as traffic or construction, for example) for noise assessment purposes.

NPC-300 states that the sound level limit for a non-impulsive (steady) stationary noise source operating in a Class I environment is the greater of the one-hour energy equivalent ambient sound level (L_{EQ}) at any potentially impacted noise-sensitive point of reception, and the exclusionary minimum sound level limits of 50 dBA during daytime hours and 45 dBA during nighttime hours. At outdoor points of reception, only the daytime limit applies. At the proposed building, the noise sensitive receptors include the outdoor amenity areas as well as the residential windows. For assessment of operation of emergency equipment in non-emergency situations (e.g., testing of an emergency generator), NPC-300 allows for an increase of + 5 dB above the established criteria to account for the occasional nature of the noise; this source is also assessed separately from other sources of stationary noise.

6.1.1 Minimum-Hour Road Traffic Sound Levels

To inform an estimate of sound levels from during the quietest hours, HGC Engineering deployed an automated noise monitor on the site in July 2023 to conduct sound level measurements over a period of four days. The monitor was located near the southwest corner of the roof of the existing building on the site, directly exposed to traffic on Hurontario Street, and shielded from existing mechanical equipment. The minimum single-hour L_{EQ} over the measurement period was extracted from the data for both daytime and nighttime hours and utilized to represent the minimum hour sound level for each period. The minimum daytime and nighttime L_{EQ}'s recorded were 62 dBA and 55 dBA respectively, though these levels are anticipated to be somewhat low, as road construction on Hurontario Street had closed lanes in the vicinity of the site. These L_{EQ} values were used to calibrate the sound power level of a “minimum-hour” Hurontario Street road traffic source in the *CadnaA* model (other sources considered above are much less significant than Hurontario Street, and were not included in the calibration or prediction of minimum-hour sound levels). The resulting criteria at all noise-sensitive receptors (the greater of the exclusionary criteria and the minimum traffic sound level) are shown as Figures 12 and 13 for typical stationary sources, and the applicable criteria for testing of emergency equipment (i.e., emergency generators) are shown in Figure 14. At facades nearby and with direct exposure to Hurontario Street, the applicable criteria are elevated above the exclusionary limits, but at receptors set back further from or screened from Hurontario Street, the exclusionary criteria apply.

6.2 Assessment of Off-Site Facilities

6.2.1 Description of the Surrounding Buildings and Equipment

Potential sources of noise associated with neighbouring properties were observed during a site visit as well as a review of aerial imagery. The commercial building to the south of the proposed development includes two kitchen exhaust fans at its north end, assumed to serve the two restaurants on the ground floor in approximately the same locations. These sources were also assessed as part of the previous noise study prepared for this development.

Other surrounding buildings include existing low-rise residential buildings to the southeast and east of the development site. Each of these rooftops includes small ventilation units, which were determined to be acoustically insignificant for the purpose of this assessment.

The site plan for the proposed development includes a building massing for a future development to be located 3114 Hurontario Street. The noise and vibration impact study prepared for that site indicates that mechanical equipment representing potential sources of noise are not yet designed/selected, and recommends that these potential noise impacts be reviewed during detailed design of that development to ensure noise impacts on adjacent properties are avoided. As such, no quantitative assessment of these sources is provided herein.

6.2.2 Assumed Operating Scenario and Sound Emission Levels

Detailed information on the manufacturer, model, and capacity of the kitchen exhaust fans to the south of the site was not available. The overall sound power level of each fan was assumed to be 86 dBA, the same sound power level as was utilized in the previous assessment of these sources. It was assumed that the kitchen exhaust fans operate continuously during a worst-case daytime hour, and are not in operation during a nighttime hour as these restaurants are not open during the nighttime hours.

6.2.3 Assessment Results

The aerial imagery, equipment information, and assumed operating scenarios were used as inputs to a 3D acoustical model of the development and surrounding area. The results of the assessment are shown graphically in Figure 15. The predicted sound level is within the exclusionary criteria at all points of reception.

For clarity, it is noted that the previous noise study for this site conducted a similar assessment of these exhaust fans (using the same overall sound power level and operational scenario), and identified an excess of 3 dBA above the exclusionary noise limit in a single location, at a building façade at the south property line. The current plans include a greater setback of the buildings from the southern property line to accommodate a public laneway, such that there is a larger intervening distance between the assessed noise sources and the location of the receptors, which explains the reduction in the predicted sound level from these fans.

6.3 Assessment of New Stationary Sources

Based on information provided by the mechanical consultant, the major potential sources of stationary noise associated with the new development are as follows:

- 1 cooling tower for each building, located on the mechanical penthouse level.
- 1 fresh-air unit for each building, located in the mechanical penthouse.
- 1 parking garage exhaust shaft, at the south end of the site.
- 1 emergency generator for each building, located in the mechanical penthouse.

As the mechanical and architectural design for this project has not yet sufficiently advanced to allow a detailed assessment of the potential noise impact from this equipment, the mechanical consultant provided noise data for representative equipment utilized on a separate project. As the development continues through design and construction, submittals should be monitored to help ensure that the installed equipment is consistent with these assumptions, or that any alternatives still meet the required performance targets.

The analysis of new stationary sources has considered noise-sensitive receptors associated with the existing residential buildings in the vicinity of the site, as well as the proposed building to the northeast of the development site, and receptors within the development itself.

It is understood that in addition to the mechanical systems described above, geothermal heating and cooling is being considered for this development. Mechanical equipment associated with such a heating and cooling system is typically located well below grade in dedicated rooms, and does not transmit noise to the outdoors.

Cooling Tower

The cooling tower for each building will be located in a screened outdoor well on the mechanical penthouse level. The unit will draw air from and discharge to above. Noise data for an Evapco unit (eco-LSWE-3K18, with two 20 hp fans) was provided by the mechanical consultant, indicating overall sound power levels of 93 dBA and 87 dBA at 100% speed and 50% speed, and was utilized in the assessment. The units were assumed to run continuously at full capacity during a worst-case daytime hour and continuously at 50% speed (via VFD operation) during a nighttime hour due to reduced cooling loads.

Corridor Makeup Air Unit

It is understood that each tower will include a single corridor makeup air unit on the MPH level. Noise data for a Daikin unit (model SWP050, operating at 17,000 cfm) with an overall inlet sound power level of 87 dBA was provided for review. These units will run on VFD as well, such that they will generally operate more quietly at nighttime, although this has not been considered in the current analysis; units have conservatively been considered to operate continuously at full speed during both daytime or nighttime hours. Each makeup air unit was assumed to be ducted to the exterior wall through a standard 1500 mm long duct silencer. It is noted that such silencers may not strictly be necessary in the finalized configuration of this equipment, as other means of limiting noise from this equipment may also be sufficient (i.e., a quieter unit, lengths of acoustically treated inlet ductwork, etc.) to limit the potential impact from these MUA.

Parking Garage Fans

The plans show a single shaft to exhaust air from the parking garage, located at the south end of the parking levels. Information on fans located in this shaft was not provided for review; it has been assumed that one large fan on each parking level will discharge air into this shaft. The shaft is shown to extend up through the ground floor of Building 3, where it has been assumed to discharge to the west, towards Building 2.

Each fan was assumed to be a Carnes LRBK 60 model, exhausting 40,500 cfm at full flow. Similar to the makeup air units, a 1500 mm long silencer was assumed in the shaft. It was conservatively assumed that two fans would operate for 30 minutes each during a worst-case daytime hour, and two fans would operate for 10 minutes each during a worst-case nighttime hour. Similar to the discussion above regarding the makeup air units, there are several possible treatments that could be utilized to ensure noise impacts from these fans are avoided; these include multiple speed fans operating at sufficiently low sound levels under non-emergency conditions, dedicated smaller, quiet fans which run continuously under non-emergency conditions, or acoustical insulation lining the walls and/or ceiling of the exhaust shaft. Noise emissions will continue to be monitored as design and construction progress.

Note that with this configuration, booster fans indoors on the parking levels may be needed to circulate air to the exhaust shaft at the south of the site. Such fans are located inside and generally do not transmit any significant noise to the outdoors.

Emergency Generator

Emergency generators will be located on the mechanical penthouse level of each building. For the unit to be exempt from approval/registration requirements of the Ministry of the Environment, Conservation and Parks (MECP), as per O. Reg. 524/98 (last amendment O. Reg 14/17), the overall sound pressure level at a distance of 7 m from the outdoor generator set must not exceed 75 dBA. Accordingly, utilized noise data for a generator set meeting this target has been utilized. Each unit has been assumed to be located in an outdoor air well screened from the surroundings by a solid wall to function as an acoustical barrier (similar to the configuration discussed above for the cooling towers). Emergency generators are assumed to be tested during the daytime hours only; the assessment is conservative in that testing of the generators would generally not coincide with the quietest daytime hour, it would typically occur when traffic sound levels are significantly higher (i.e., midday).

6.3.1 Assessment Results

The sound data and operating scenarios described above were used as input to the acoustical model. The resulting maximum sound levels from mechanical sources are shown in Figures 16 and 17, while Figure 18 shows the prediction results for the emergency generator scenario. The predicted results are within the established criteria at all receptors.

7 IMPACT OF THE DEVELOPMENT ON THE ENVIRONMENT

It is expected that any increase in local traffic associated with the development will not be substantial enough to affect noise levels significantly.

The potential impact of the major mechanical and electrical equipment associated with the development on the surrounding environment is discussed above, based on reasonable preliminary assumptions. Criteria for acceptable noise emissions from building mechanical and electrical equipment are provided by City of Mississauga Noise Control By-Law 360-79, and MECP Publication NPC-300. The potential noise impact of this equipment will be monitored through design and construction to help ensure that the installed equipment is consistent with any assumptions considered herein, or that any alternatives still meet the required performance targets.

8 IMPACT OF THE DEVELOPMENT ON ITSELF

The potential impact of the major mechanical and electrical equipment associated with the development on the building itself is discussed above with respect to outdoor noise.

Section 5.9.1 of the Ontario Building Code (OBC) specifies the minimum required sound insulation characteristics for demising partitions, in terms of Sound Transmission Class (STC) values. In order to maintain adequate acoustical privacy between separate suites in a multi-tenant building, inter-suite walls shall meet or exceed STC-50 or ASTC-47. Walls separating a suite from a noisy space such as a refuse chute, or elevator shaft, shall 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.

9 RECOMMENDED WARNING CLAUSES

MECP guidelines recommend that appropriate warning clauses be used in the Development Agreements and in purchase, sale and lease agreements (typically by reference to the Development Agreements) to inform future owners and occupants about potential noise concerns from sources in the area. The actual wording of the warning clause depends on the nature of the excess. Based on the review described above, the recommended warning clauses are as follows:

i) *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 and rail traffic will on occasion interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the Ministry of the Environment, Conservation and Parks.

ii) *Type D*: This dwelling unit has been supplied with a heating and cooling 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 Ministry of the Environment, Conservation and Parks.

iii) *Type E*: Purchasers/tenants are advised that due to the proximity of this development to nearby retail/commercial facilities, sound levels from the facilities will at times be audible.

10 SUMMARY OF RECOMMENDATIONS

The following list summarizes the recommendations made in this report. The reader is referred to the previous sections of the report where these recommendations are discussed in more detail.

1. A heating and cooling system which will allow residential unit windows to remain closed is required for some suites under MECP guidelines, as discussed in Section 4.6.2. Such a system is expected to be provided for all suites in any event.

2. Standard glazing constructions are anticipated to be required, to ensure adequate indoor sound levels from traffic noise, as outlined in Section 4.4.1. The preliminary requirements

outlined herein should be reviewed in greater detail once the building plans have been finalized.

3. Noise levels in most of the indicated outdoor amenity areas meet the targets provided by the MECP. A slightly increased parapet height or barrier along the west side of amenity areas fronting Hurontario Street would mitigate the identified minor excesses. A warning clause to inform tenants of potential minor excesses is recommended. Noise barrier heights to achieve predicted sound levels down to 55 dBA are provided in Section 4.6.3.

4. Based on a screening assessment of commercial facilities and residential buildings surrounding the proposed development, noise from stationary sources is expected to be within the limits established in NPC-300. An additional assessment of future sources of stationary noise (major mechanical and electrical equipment) associated with the proposed new building, based on the in-progress design, indicates that no adverse impacts are anticipated. Section 6 outlines these assessments.

5. Noise warning clauses should be included in the property and tenancy agreements and offers of purchase and sale for the residential suites to inform future residents of potential noise intrusions from the roads in the area. Recommended wording for these clauses is provided in Section 7.

6. Demising assemblies must be selected to meet the minimum requirements of the Ontario Building Code (OBC). The mechanical and electrical design of the new building should continue to be monitored through design development and construction, to help ensure that the installed equipment is consistent with any assumptions considered herein, or that any alternatives still meet the required performance targets.

11 CONCLUSION

The results of this study indicate that the proposed development is feasible on this site from a noise and vibration impact perspective, with the inclusion of appropriate standard acoustical features into the design, and that the development is compatible with the surrounding land uses.

Figure 1: Key Plan

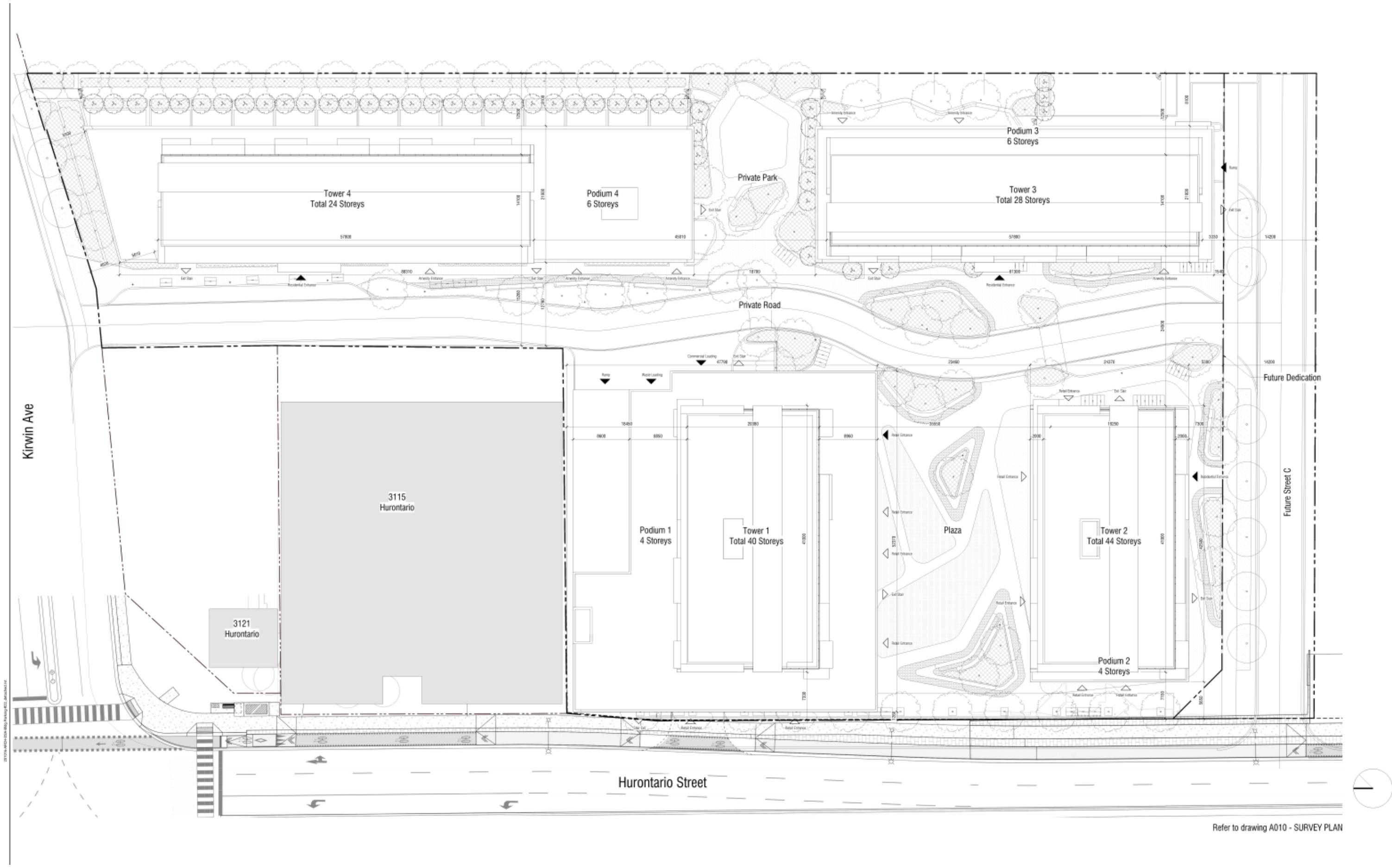

Figure 2: Proposed Site Pan

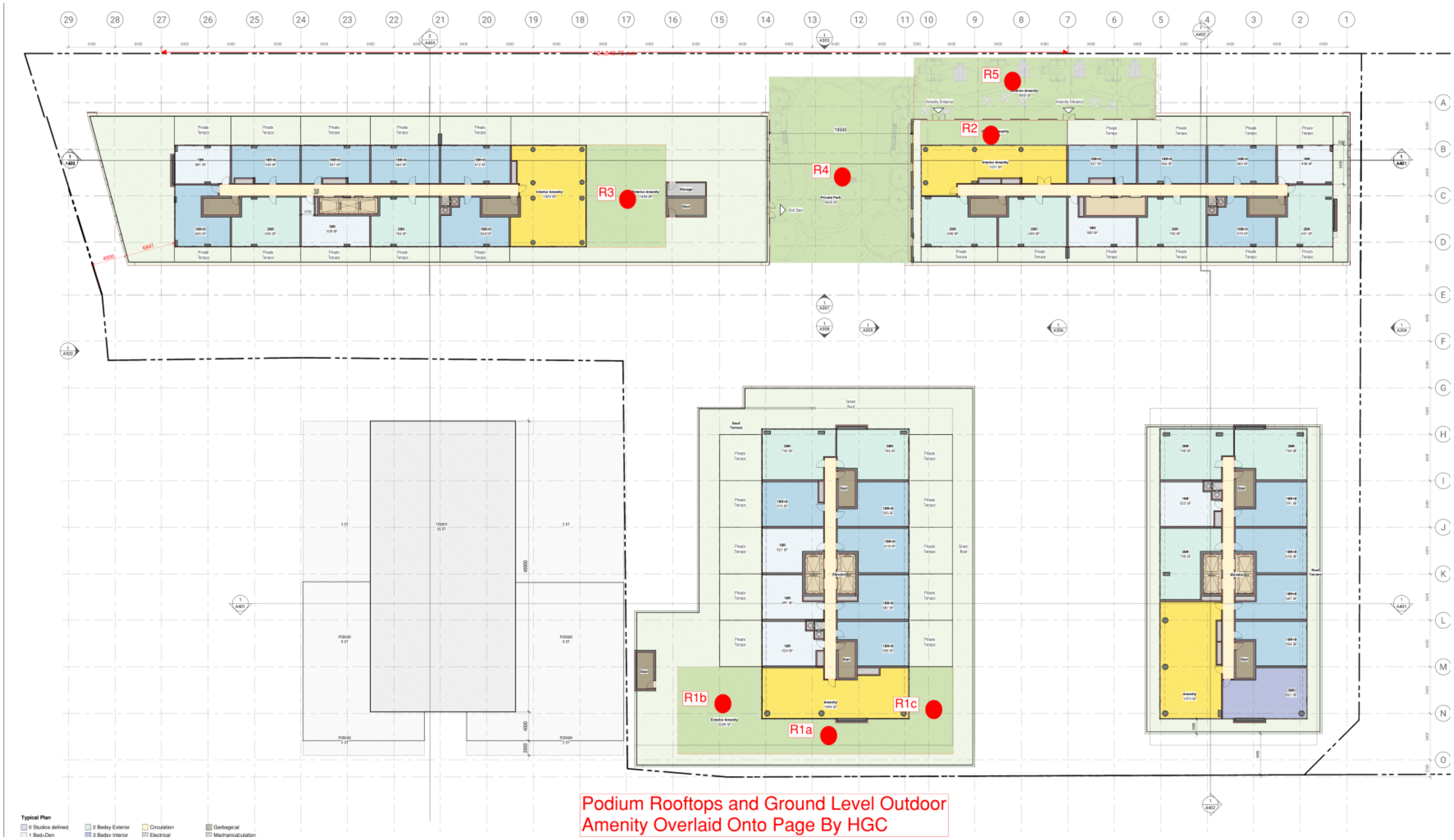

Figure 3: Podium Rooftop Plan

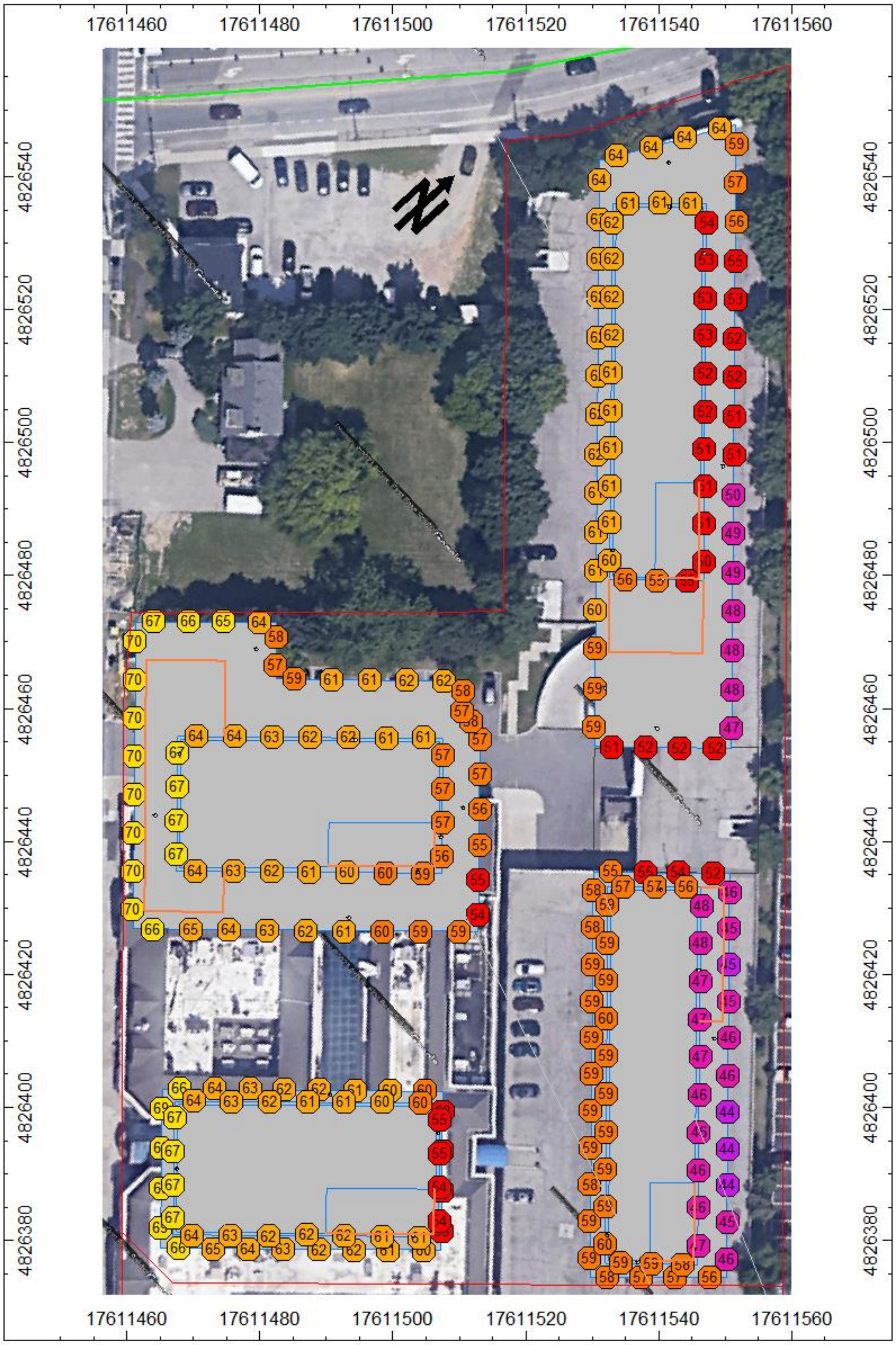

Figure 4: Predicted Sound Levels From Road Traffic, Daytime

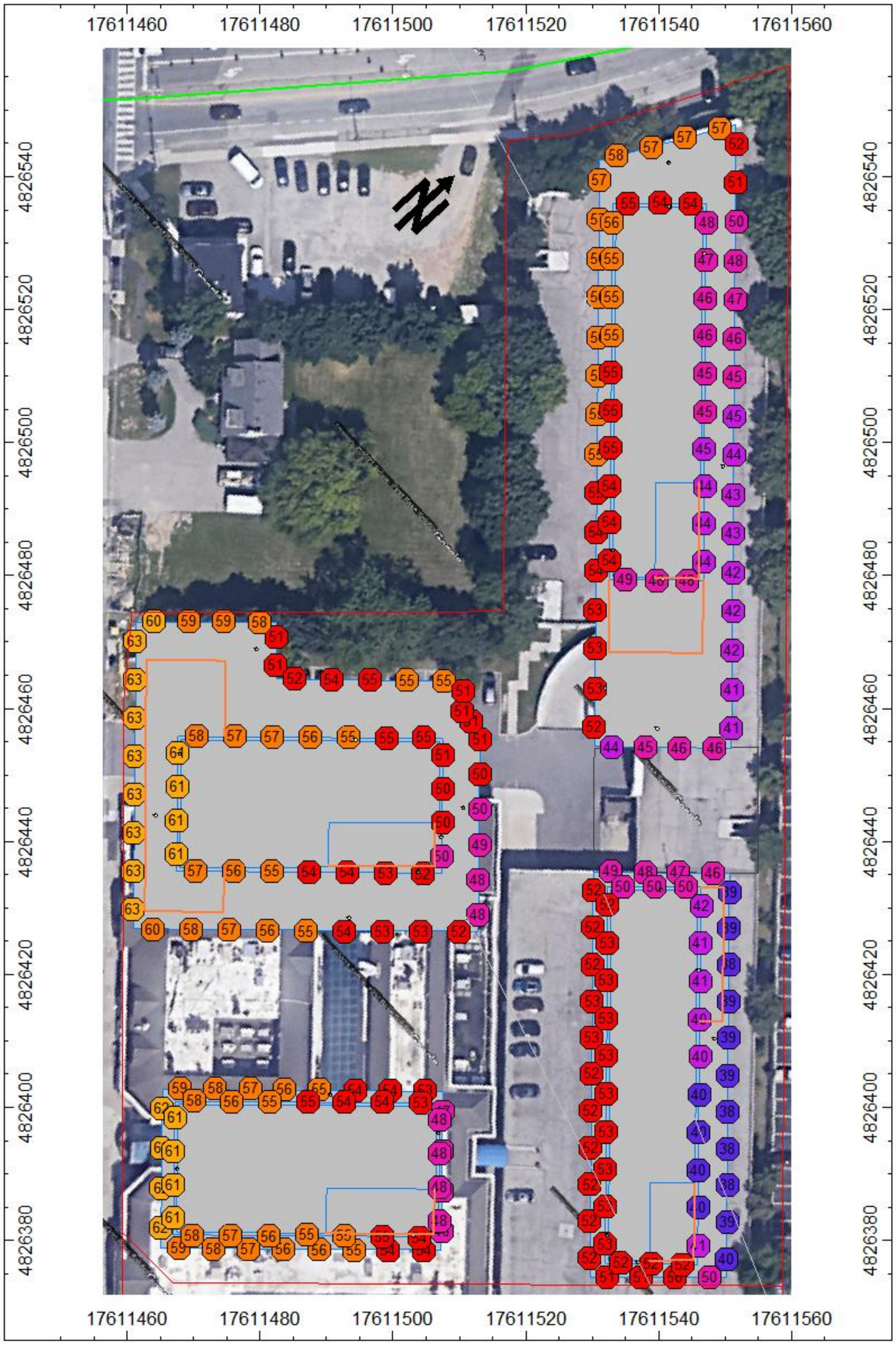

Figure 5: Predicted Sound Levels From Road Traffic, Nighttime

Figure 6: Predicted Sound Levels From LRT Traffic, Daytime

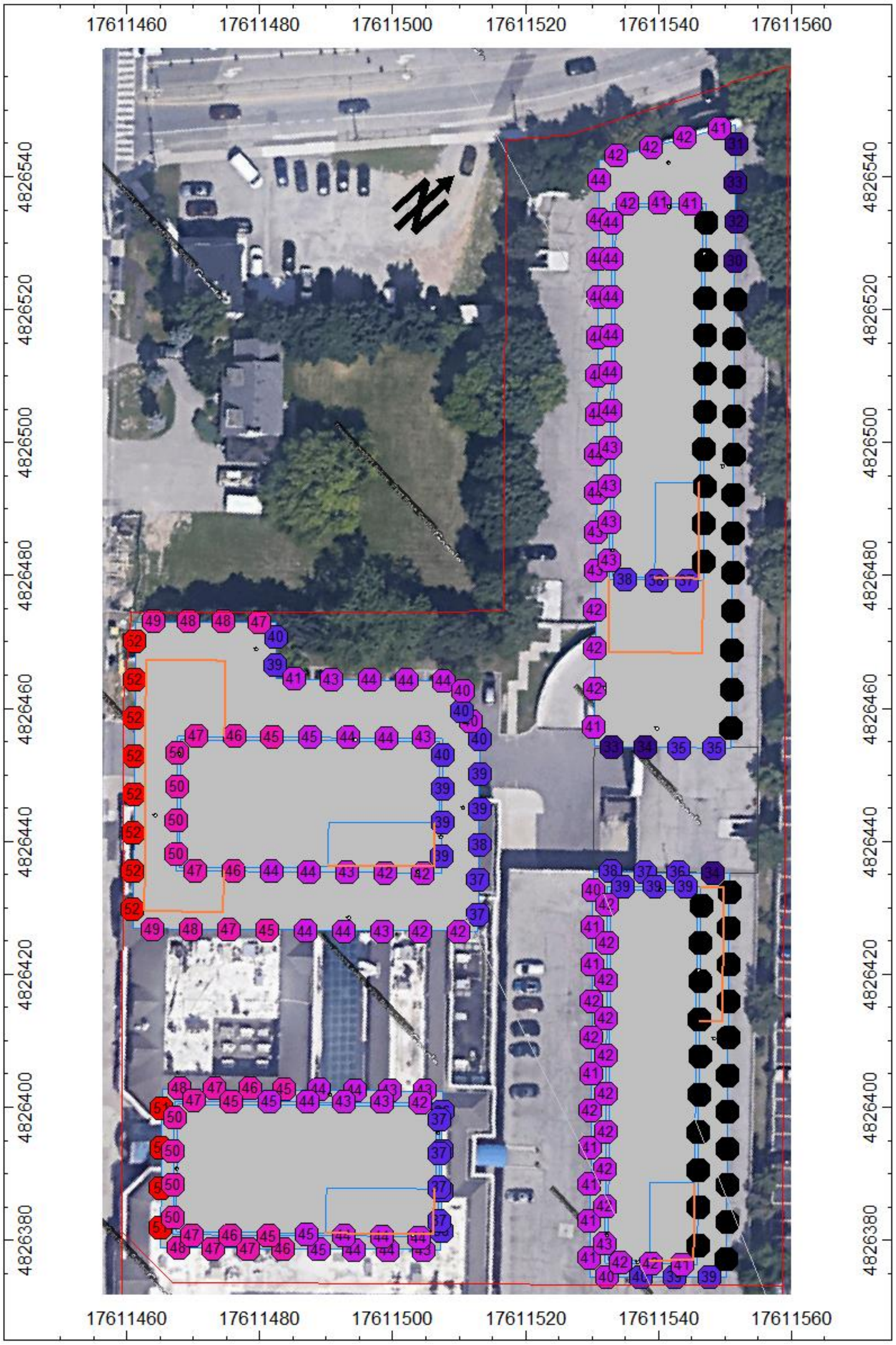

Figure 7: Predicted Sound Levels From LRT Traffic, Nighttime

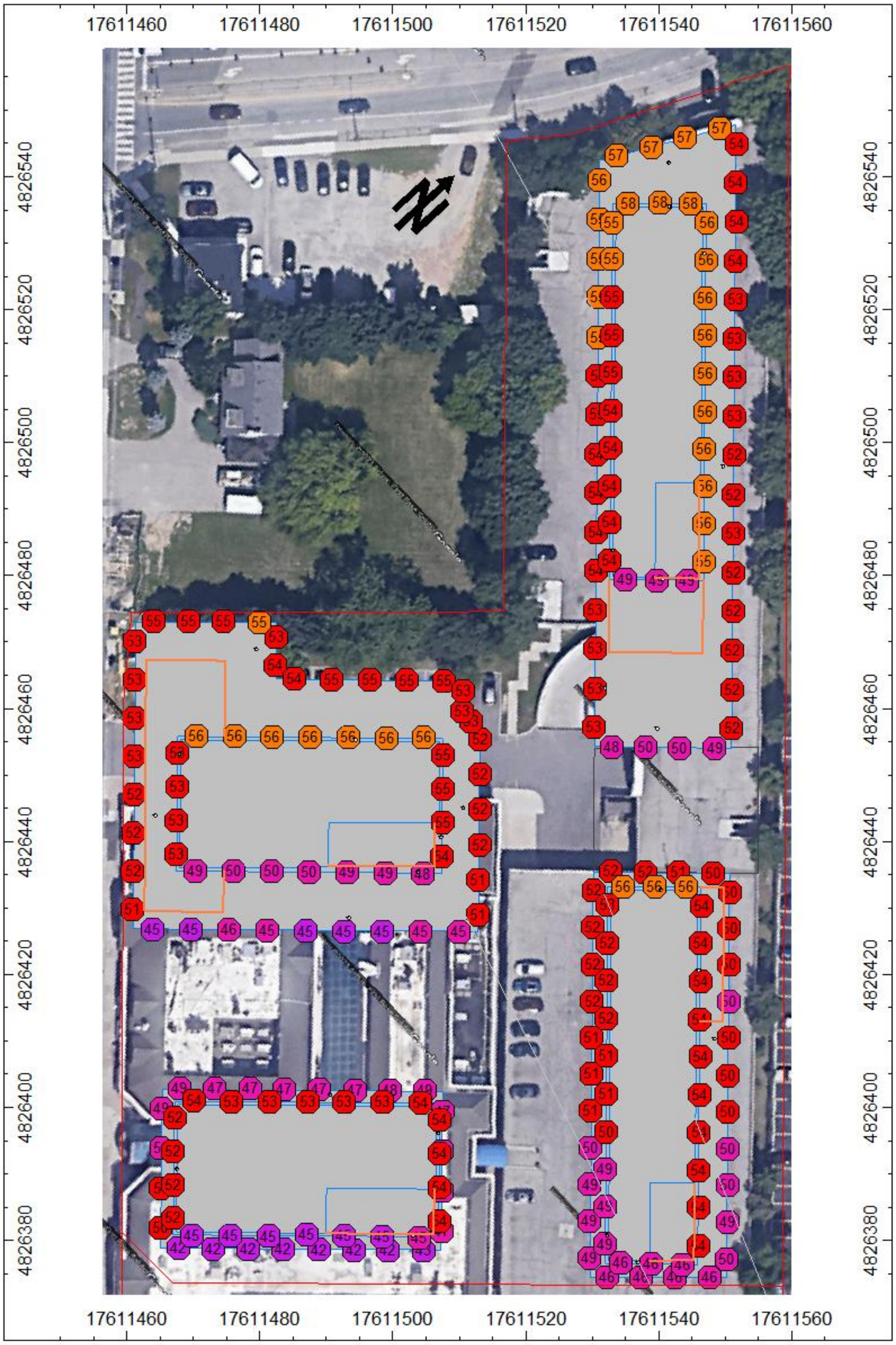

Figure 8: Predicted Sound Levels From Rail Traffic, Daytime

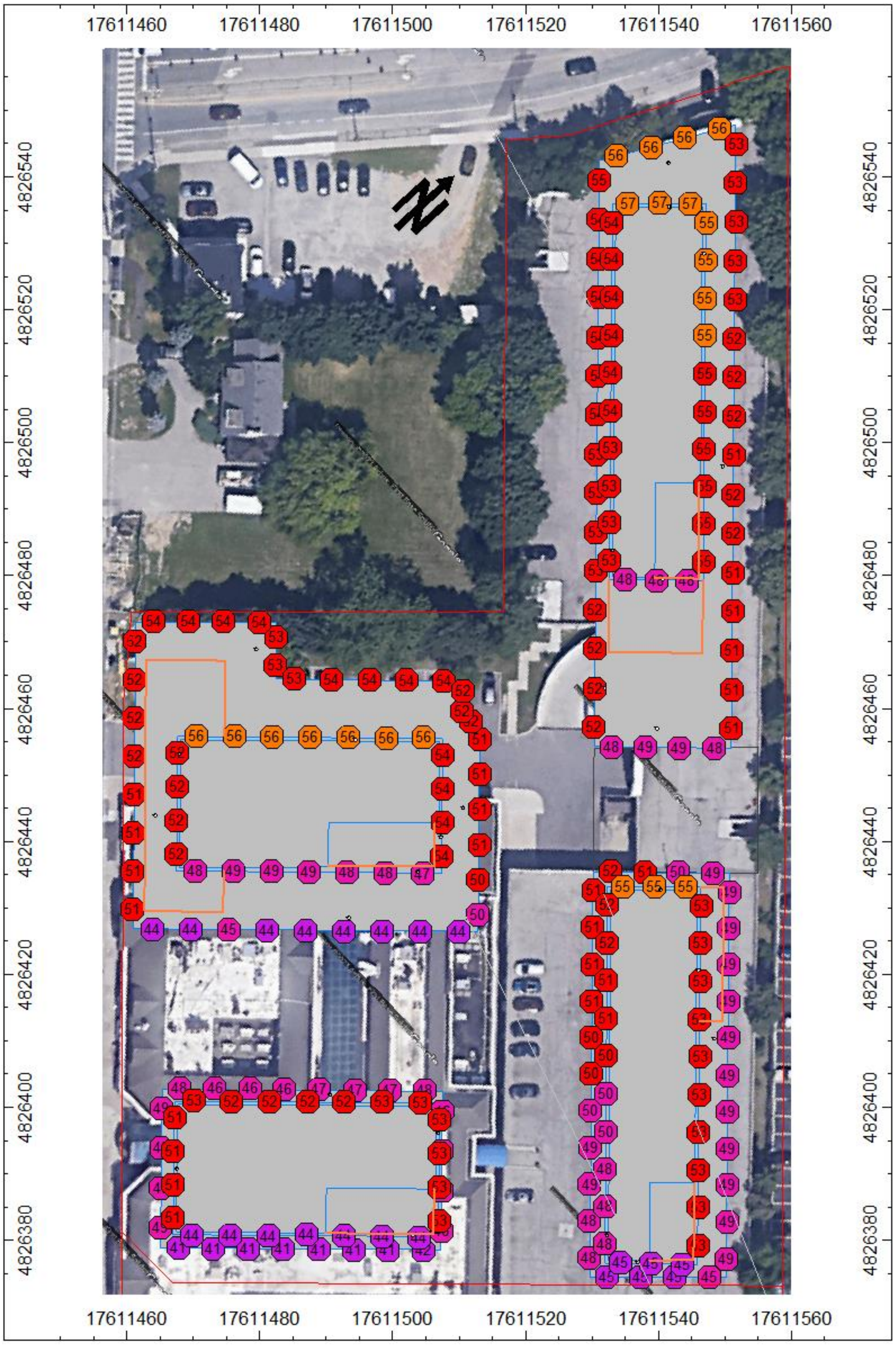

Figure 9: Predicted Sound Levels From Rail Traffic, Nighttime

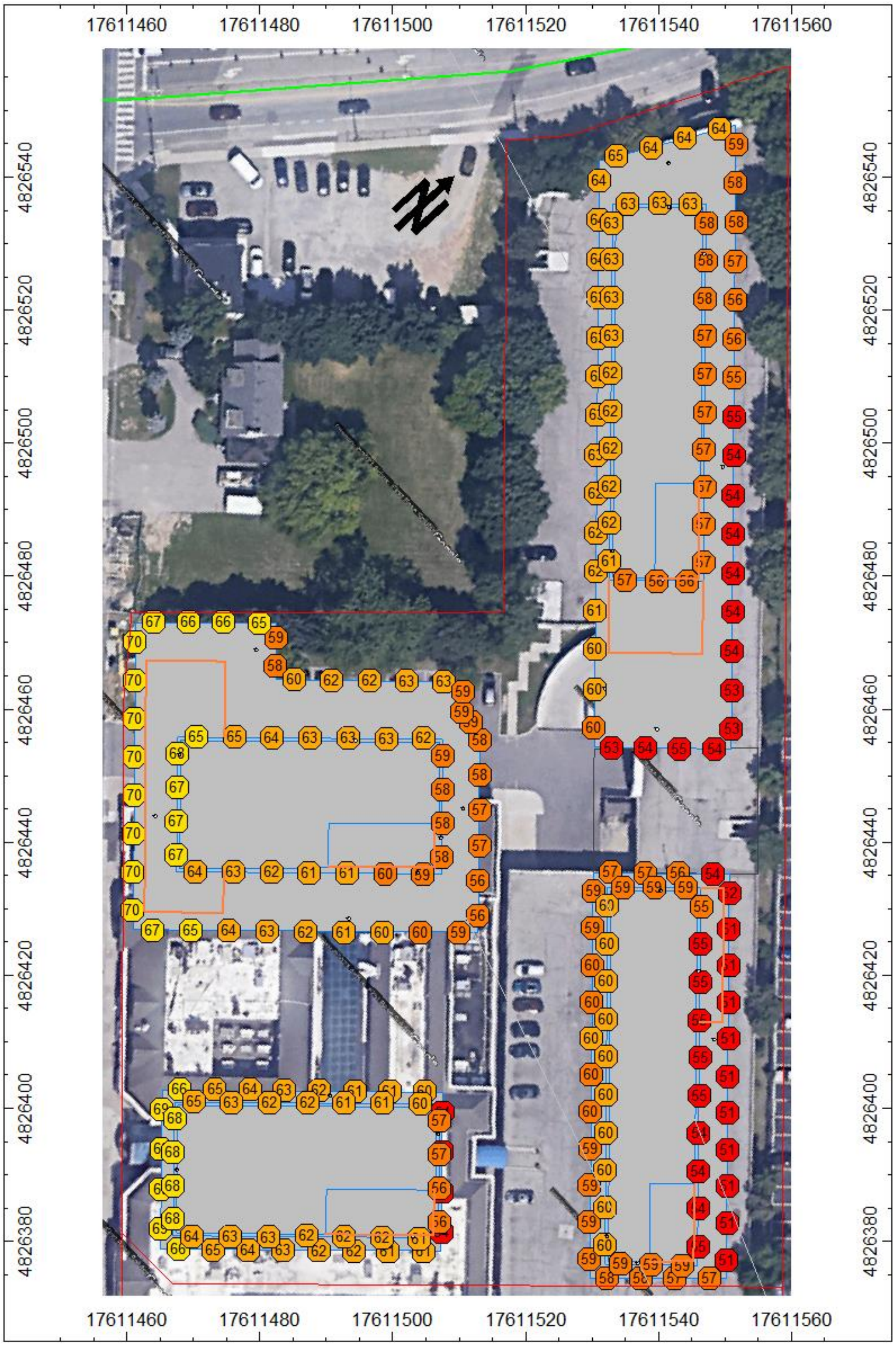

Figure 10: Predicted Sound Levels From All Traffic Sources, Daytime

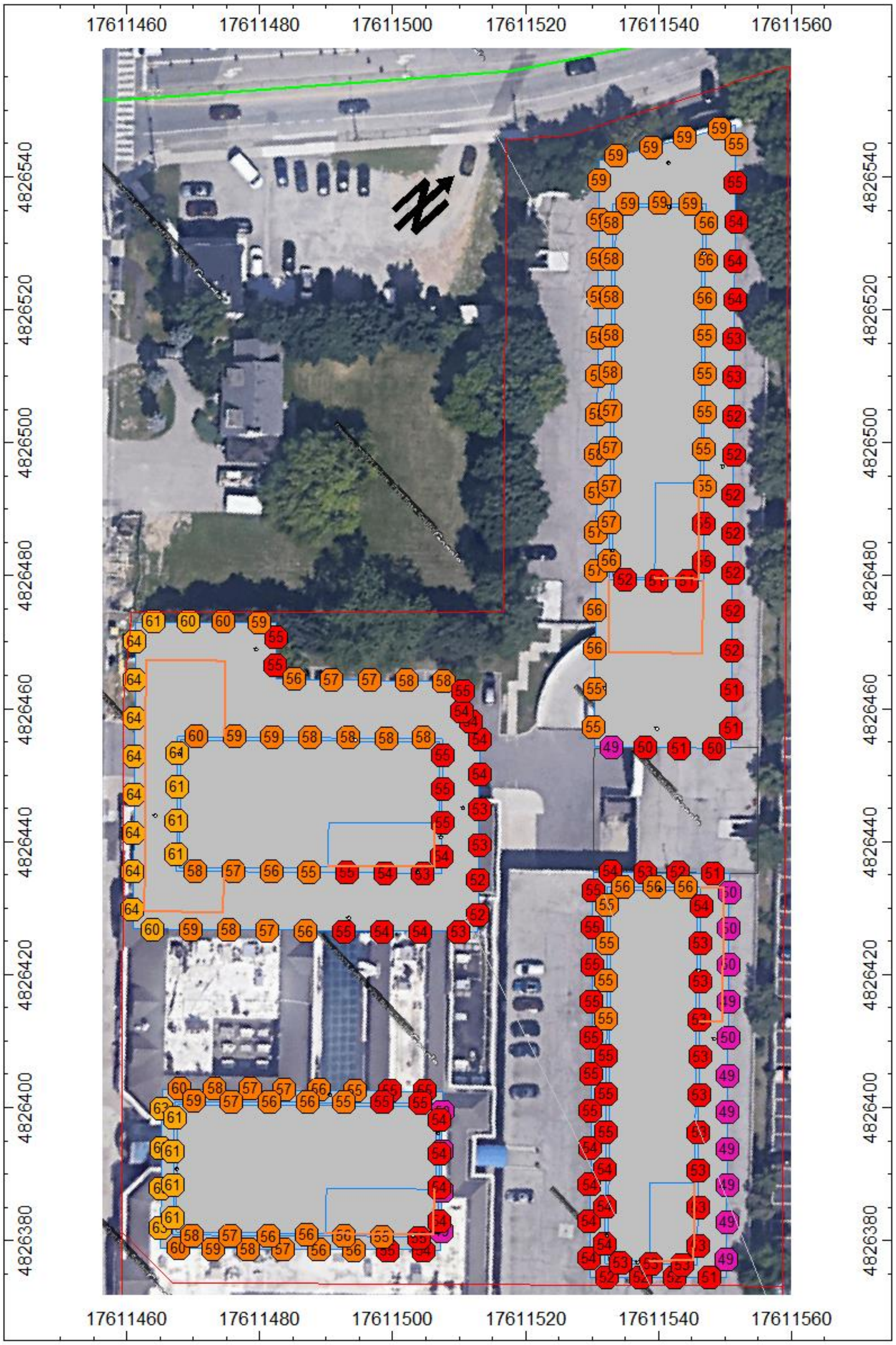

Figure 11: Predicted Sound Levels From All Traffic Sources, Nighttime

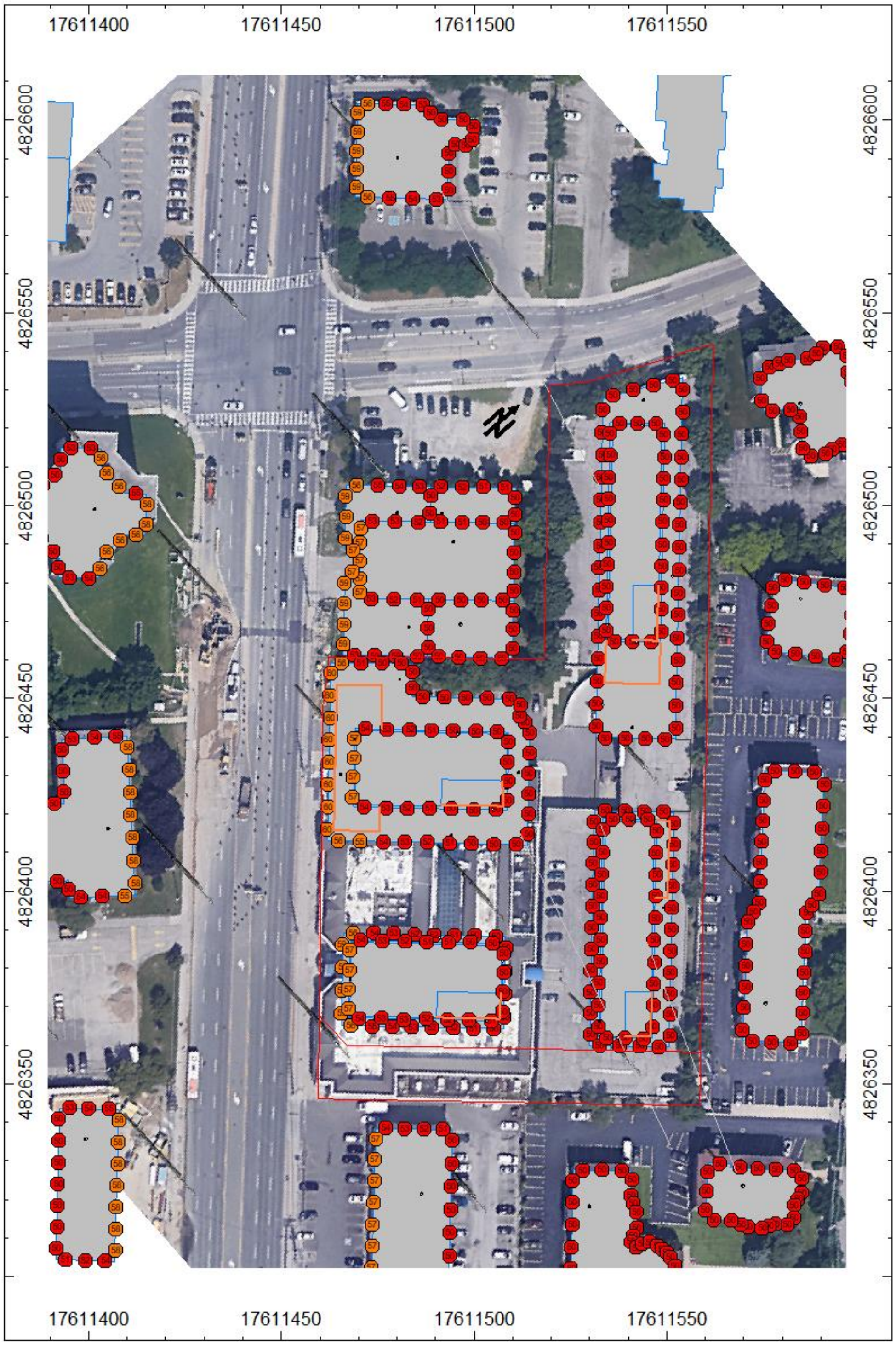

Figure 12: Sound Level Criteria, Steady Stationary Sources, Daytime

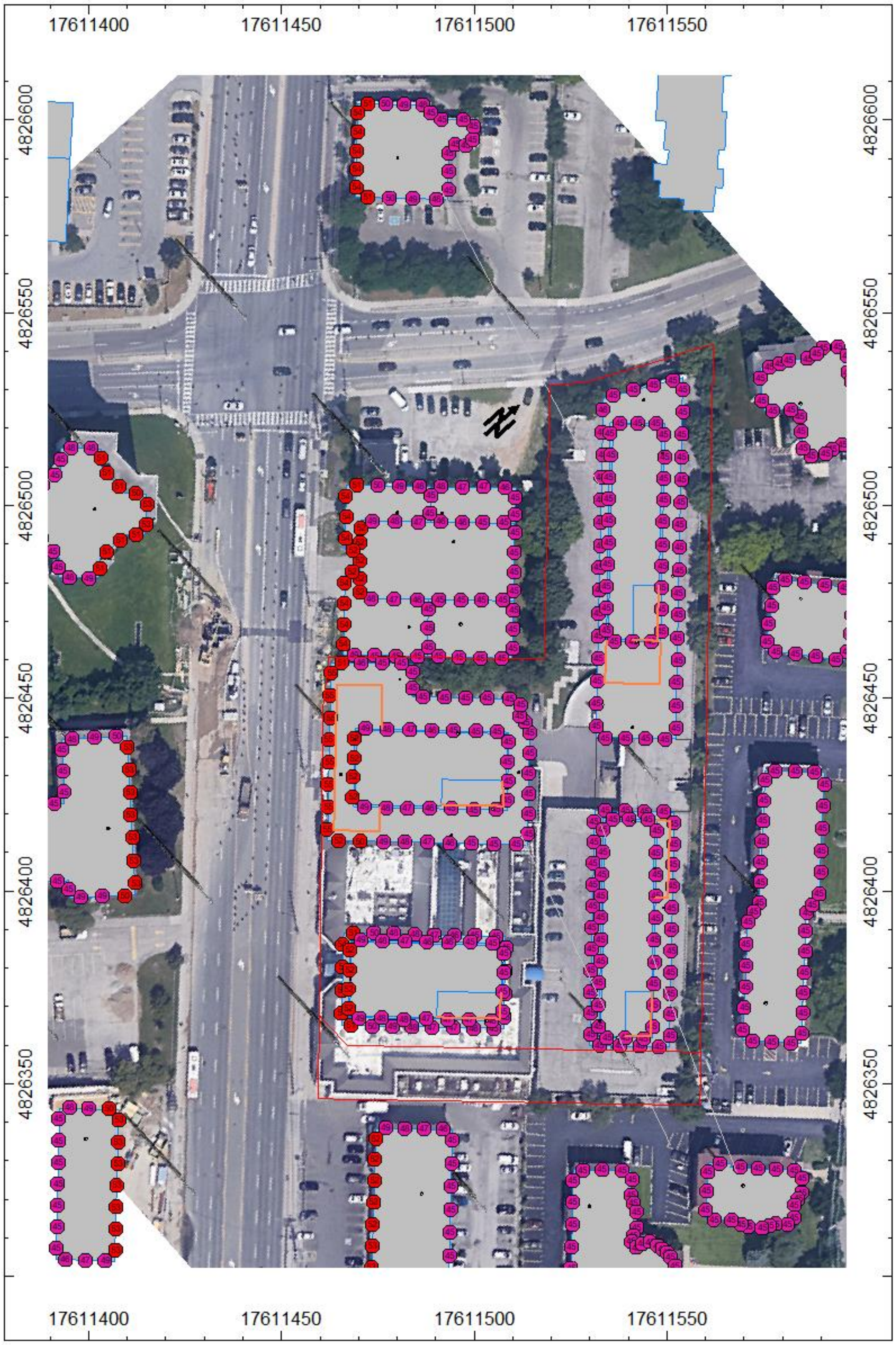

Figure 13: Sound Level Criteria, Steady Stationary Sources, Nighttime

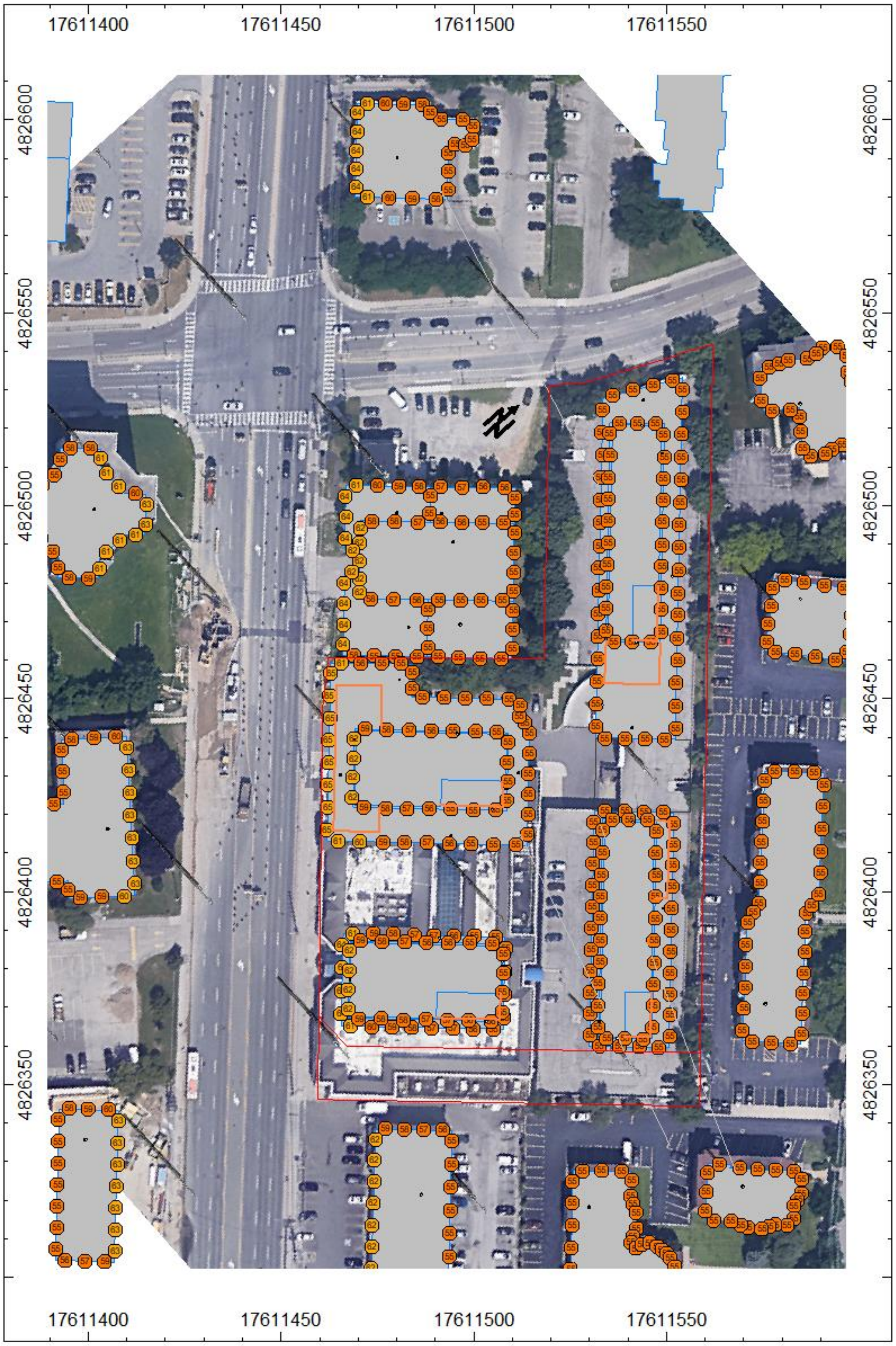

Figure 14: Sound Level Criteria, Emergency Generator Testing, Daytime

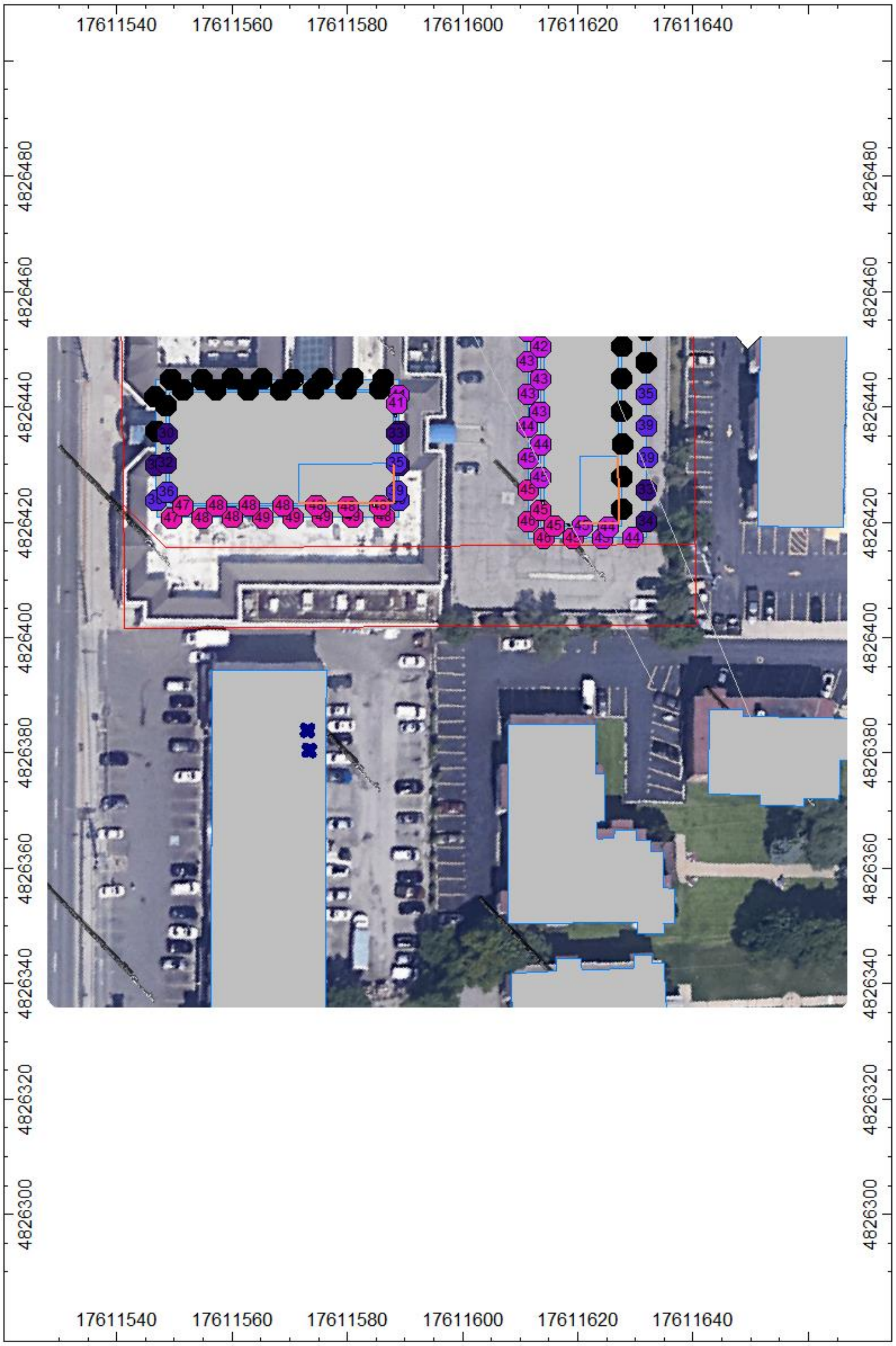

Figure 15: Predicted Sound Levels From Offsite Stationary Noise Sources, Daytime

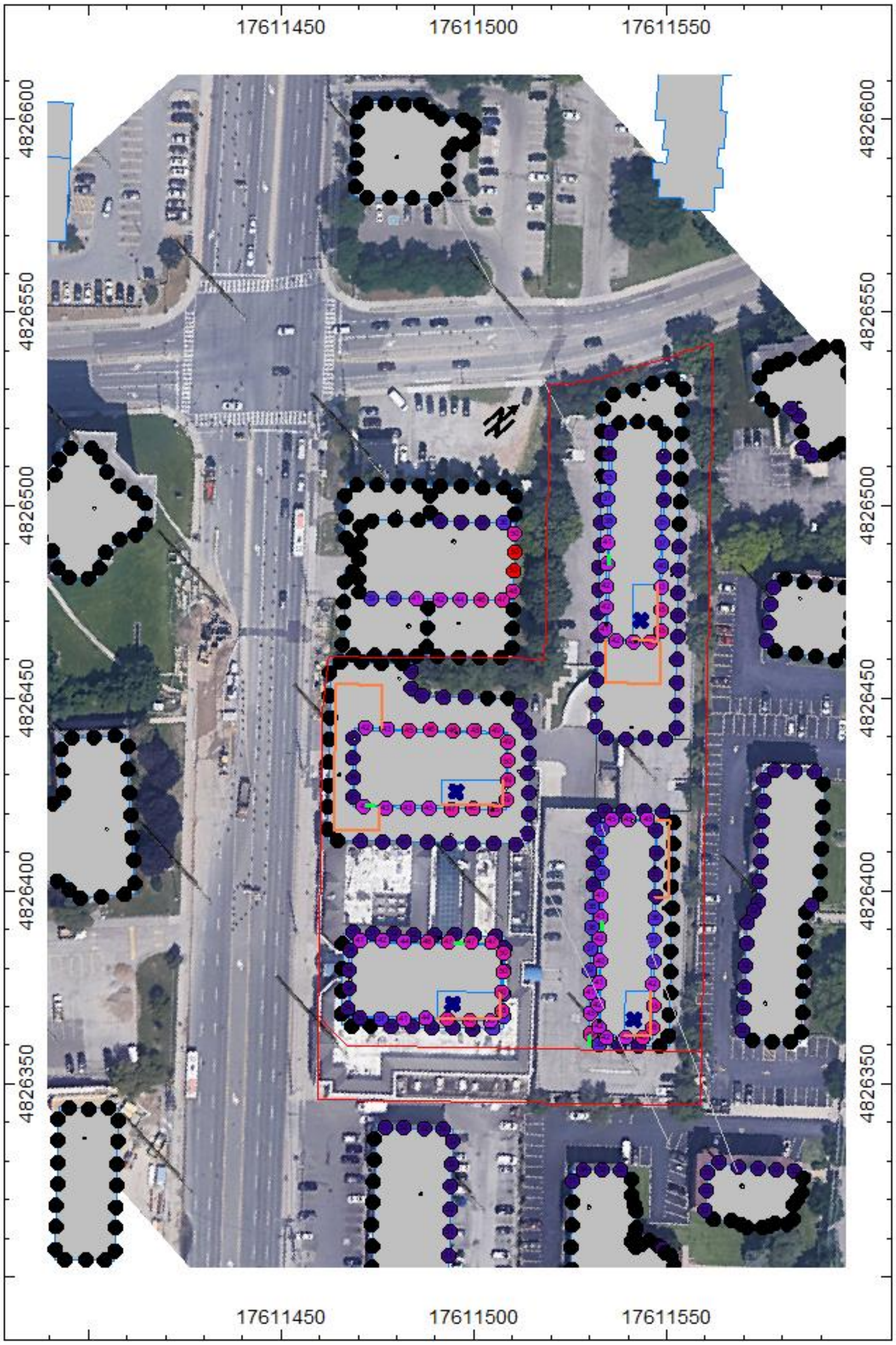

Figure 16: Predicted Sound Levels From Onsite Stationary Noise Sources, Daytime

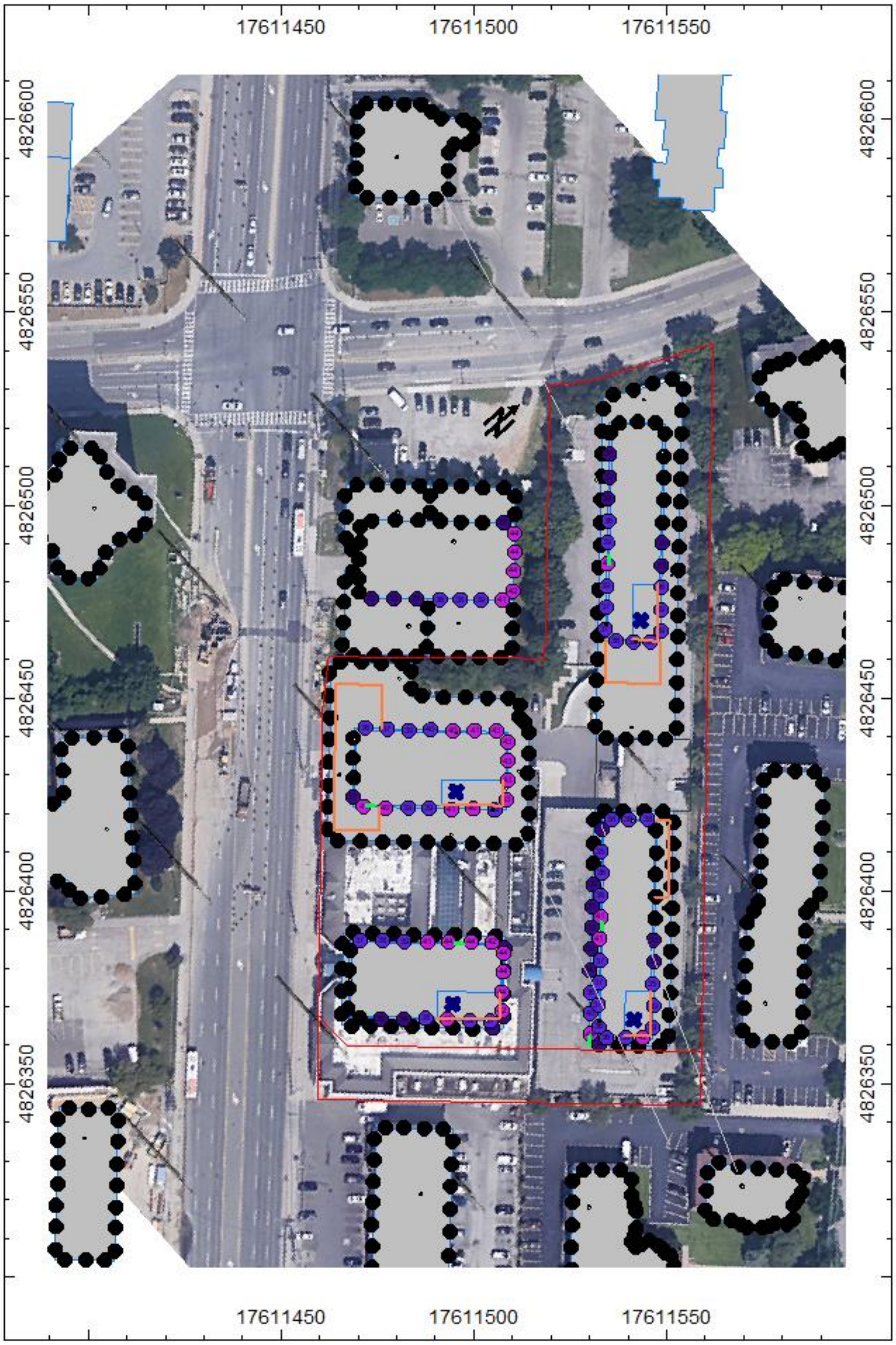

Figure 17: Predicted Sound Levels From Onsite Stationary Noise Sources, Nighttime

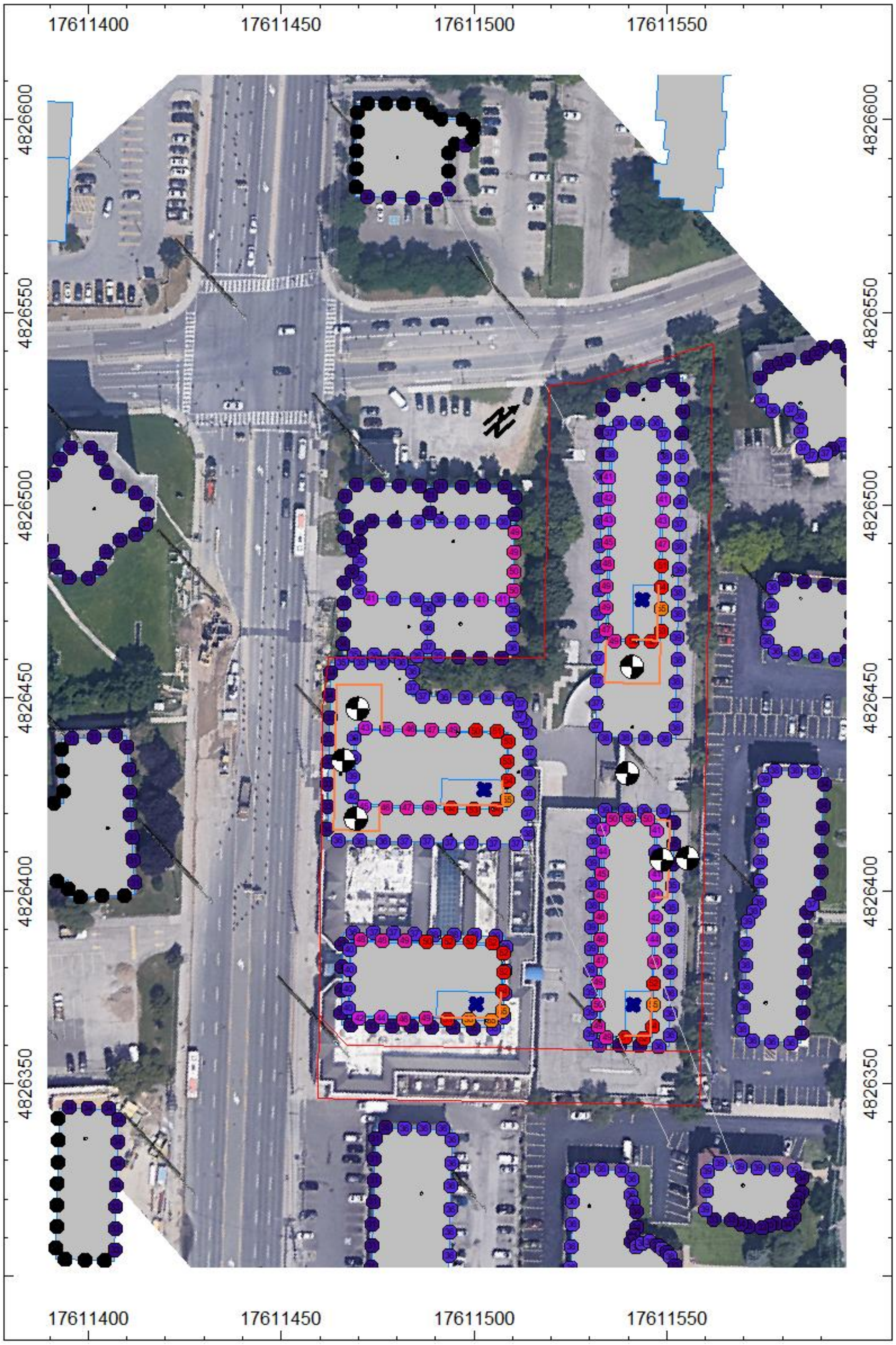

Figure 18: Predicted Sound Levels From Onsite Emergency Generator Testing, Daytime

APPENDIX A

Road, LRT, and Rail Traffic Data

Date: 19-Jul-23

NOISE REPORT FOR PROPOSED DEVELOPMENT

REQUESTED BY:

Name: Adam Doiron

Company: HGC Engineering

PREPARED BY:

Name Naveda Dukhan C.E.T

Tel#: 905-615-3200

Location:
1. Hurontario Street
2. Kirwin Ave

ID# 597

ON SITE TRAFFIC DATA

Specific	*Street Names*				
	1. Hurontario St	2. Kirwin Ave			
AADT:	53000	12500			
# of Lanes:	4 Lanes	2 Lanes			
% Trucks:	4%	2%			
Medium/Heavy Trucks Ratio:	55/45	55/45			
Day/Night Split:	90/10	90/10			
Posted Speed Limit:	50km/hr	40km/hr			
Gradient Of Road:	2%	2%			
Ultimate R.O.W:	35m	26m			

Comments:

There is a proposed LRT line along Hurontario Street. Existing lanes may be converted from 6 lanes to 4 lanes with 2 LRT lines in the middle.

Please contact Rory O'Sullivan @ (905) 615-3200 ext. 8813 or Rory.OSullivan@mississauga.ca for more info regarding LRT.

Ultimate Traffic Data Only (2041)

Table 4: Future 2031 "With Project" Traffic Volumes

Roadway	Intersection		Daytime Traffic				Night-time Traffic			
		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

Adam Doiron

From: Rail Data Requests <RailDataRequests@metrolinx.com>
Sent: January-08-19 2:42 PM
To: Adam Doiron
Subject: RE: 600 Lolita Gardens Mississauga Traffic Data Requests

Follow Up Flag: Follow up
Flag Status: Flagged

Good Afternoon Adam,

I apologize for the delay.

Further to your request dated December 4, 2018 (attached below), the subject site (600 Lolita Gardens, Mississauga) is located within 300 metres of CPR's Galt Subdivision, which carries Milton GO Train service.

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

The current maximum design speed on this corridor is 60 mph (97 km/h).

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 CPR operates trains in this area and it would be prudent to contact them directly for rail traffic information.

I trust this information is useful. Should you have any questions, please feel free to contact myself.

Best Regards,

IVAN CHEUNG, **M.Sc, B.URPl**
Intern
Metrolinx
Pre-Construction Services | Capital Projects Group
20 Bay Street, Suite 600 | Toronto | Ontario | M5J 2W3
T: 416-202-5920

METROLINX

From: Adam Doiron [mailto:adoiron@hgcengineering.com]
Sent: January-08-19 12:36 PM
To: Rail Data Requests
Subject: RE: 600 Lolita Gardens Mississauga Traffic Data Requests

Hello,

Following up on the request below, is rail data for the GO Line to the south of 600 Lolita gardens available?

Thanks,
Adam

Adam Doiron, EIT
HGC Engineering **NOISE | VIBRATION | ACOUSTICS**
Howe Gastmeier Chapnik Limited
t: 905.826.4044 x 234

From: Adam Doiron
Sent: December-12-18 2:59 PM
To: 'RailDataRequests@Metrolinx.com' <RailDataRequests@Metrolinx.com>
Subject: RE: 600 Lolita Gardens Mississauga Traffic Data Requests

Good Afternoon,

Following up on the below request, if the data for the GO line to the south is available.

Thank you,
Adam

Adam Doiron, EIT
HGC Engineering **NOISE | VIBRATION | ACOUSTICS**
Howe Gastmeier Chapnik Limited
t: 905.826.4044 x 234

From: Adam Doiron
Sent: December-04-18 1:44 PM
To: 'RailDataRequests@Metrolinx.com' <RailDataRequests@Metrolinx.com>
Subject: 600 Lolita Gardens Mississauga Traffic Data Requests

Hello,

HGC is working on a noise study for a development at 600-620 Lolita Gardens in Mississauga ON, and would like to request data for the rail line to the south.

Location link for your reference.

Thank you,

Adam Doiron, EIT
Project Consultant

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 x 234 **e**: adoiron@hgcengineering.com
Visit our website – www.hgcengineering.com **Follow Us** – LinkedIn | Twitter | YouTube

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

T 905 803 3429
E josie_tomei@cpr.ca

January 23, 2019

Via email: adoiron@hgcengineering.com

Adam Doiron
HGC Engineering
2000 Argentia Road
Plaza One, Suite 203
Mississauga, Ontario L5N 1P7

Dear Sir/Madam:

Re: Rail Traffic Volumes, CP Mileage 14.07, Galt Subdivision, 600 Lolita Gardens, Mississauga

This is in reference to your request for rail traffic data in the vicinity of 600 Lolita Gardens in the City of Mississauga. The study area is located at mile 14.07 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: 6
   Number of freight trains between 2300 & 0700: 7

2. Maximum cars per train freight: 163

3. Number of locomotives per train: 2 (4 max.)

4. Maximum permissible train speed: 50 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 with continuously welded rail at this location along with a cross connection. Train noise may increase as trains pass through the connections.

7. Please note, the information provided is for freight trains only. Metrolinx operates GO passenger service through this location. Passenger data should be obtained directly from Metrolinx.

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

Yours truly,

J Tomei

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

APPENDIX B

STAMSON Calibration Sheets

STAMSON 5.0 NORMAL REPORT Date: 16-08-2023 16:36:56
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: hur_av.te Time Period: Day/Night 16/8 hours
Description: Calibration, Hurontario Street

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

Car traffic volume : 45792/5088 veh/TimePeriod
Medium truck volume : 1049/117 veh/TimePeriod
Heavy truck volume : 859/95 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

Data for Segment # 1: road (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 : 15.00 / 15.00 m
Receiver height : 1.50 / 1.50 m
Topography : 0 (Define your own alpha.)
Barrier angle1 : -90.00 deg Angle2 : 90.00 deg
Barrier height : 0.00 m
Barrier receiver distance : 10.00 / 10.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Alpha : 0.00
Reference angle : 0.00
Results segment # 1: road (day)

Source height = 1.16 m
ROAD (0.00 + 70.67 + 0.00) = 70.67 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	70.67	0.00	0.00	0.00	0.00	0.00	0.00	70.67

Segment Leq : 70.67 dBA
Total Leq All Segments: 70.67 dBA

Results segment # 1: road (night)

Source height = 1.16 m
ROAD (0.00 + 64.13 + 0.00) = 64.13 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	64.13	0.00	0.00	0.00	0.00	0.00	0.00	64.13

Segment Leq : 64.13 dBA
Total Leq All Segments: 64.13 dBA
TOTAL Leq FROM ALL SOURCES (DAY): 70.67
(NIGHT): 64.13

STAMSON 5.0 NORMAL REPORT Date: 16-08-2023 16:38:19
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT
Filename: kir_av.te Time Period: Day/Night 16/8 hours
Description: Calibration, Kirwin Avenue
Road data, segment # 1: road (day/night)

Car traffic volume : 11025/1225 veh/TimePeriod
Medium truck volume : 124/14 veh/TimePeriod
Heavy truck volume : 101/11 veh/TimePeriod
Posted speed limit : 50 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)
Data for Segment # 1: road (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 : 15.00 / 15.00 m
Receiver height : 1.50 / 1.50 m
Topography : 0 (Define your own alpha.)
Barrier angle1 : -90.00 deg Angle2 : 90.00 deg
Barrier height : 0.00 m
Barrier receiver distance : 10.00 / 10.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Alpha : 0.00
Reference angle : 0.00

Results segment # 1: road (day)

Source height = 0.97 m
ROAD (0.00 + 62.89 + 0.00) = 62.89 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	62.89	0.00	0.00	0.00	0.00	0.00	0.00	62.89

Segment Leq : 62.89 dBA
Total Leq All Segments: 62.89 dBA
Results segment # 1: road (night)

Source height = 0.97 m
ROAD (0.00 + 56.33 + 0.00) = 56.33 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	56.33	0.00	0.00	0.00	0.00	0.00	0.00	56.33

Segment Leq : 56.33 dBA
Total Leq All Segments: 56.33 dBA
TOTAL Leq FROM ALL SOURCES (DAY): 62.89
(NIGHT): 56.33

STAMSON 5.0 NORMAL REPORT Date: 16-08-2023 16:32:34
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT
Filename: cltr_rec.te Time Period: Day/Night 16/8 hours
Description: LRT Calibration
RT/Custom data, segment # 1: lrt (day/night)
----
1 - Custom (76.0 dBA):
Traffic volume : 294/46 veh/TimePeriod
Speed : 50 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
Surface : 2 (Reflective ground surface)
Receiver source distance : 15.00 / 15.00 m
Receiver height : 1.50 / 1.50 m
Topography : 0 (Define your own alpha.)
Barrier angle1 : -90.00 deg Angle2 : 90.00 deg
Barrier height : 0.00 m

```
Barrier receiver distance :  10.00 / 10.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Alpha                     :   0.00
Reference angle           :   0.00

Results segment # 1: lrt (day)
------------------------------
Source height = 0.50 m
RT/Custom (0.00 + 58.41 + 0.00) = 58.41 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
   -90     90   0.00  58.41   0.00   0.00   0.00   0.00   0.00  58.41
----------------------------------------------------------------------
Segment Leq : 58.41 dBA
Total Leq All Segments: 58.41 dBA

Results segment # 1: lrt (night)
--------------------------------
Source height = 0.50 m
RT/Custom (0.00 + 53.37 + 0.00) = 53.37 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
----------------------------------------------------------------------
   -90     90   0.00  53.37   0.00   0.00   0.00   0.00   0.00  53.37
----------------------------------------------------------------------
Segment Leq : 53.37 dBA
Total Leq All Segments: 53.37 dBA
TOTAL Leq FROM ALL SOURCES (DAY): 58.41
                         (NIGHT): 53.37
```