SS WILSON ASSOCIATES
Consulting Engineers

REPORT NO. WA22-019

NOISE CONTROL FEASIBILITY STUDY
PROPOSED MIXED-USE CONDO DEVELOPMENT
875 KINGSTON ROAD,
CITY OF PICKERING

SUBMITTED TO:
SPHERE DEVELOPMENTS (KINGSTON) LP
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1.0 INTRODUCTION

1.1 The services of SS Wilson Associates (SSWA) were retained by The Biglieri Group on behalf of Sphere Developments (Kingston) LP to prepare a Noise Control Feasibility Study for the proposed residential 875 Kingston Road in the City of Pickering.

The objective of this report is to support an application for an amendment to the Official Plan containing the proposed development, and rezoning of the land containing the proposed development.

1.2 The site is bounded by the following land uses:

- to the north by Kingston Road/Highway 2, and by a Church, commercial operations, and the CN Railway Line
- to the south by Highway 401
- to the east by vacant lands
- to the west by the Bayfair Baptist Church

The location of the site is shown in Figure 1.

1.3 Major features of the development are defined by the set of architectural drawings prepared by ICON Architects, project No. 21124, dated September 19, 2022, as well as the updated Site Plan drawing dated September 23, 2022.

Figure 2 illustrates the general layout of the proposed development.

1.4 Major surface transportation noise sources (current and future) of concern to the development are:

1. Highway 401
2. Kingston Road/Highway 2
3. CN Railway Line
4. Metrolinx Railway Line

1.5 Major stationary noise sources (current and future) of concern to the development are:

1. Air conditioning units associated with the Church to the west
2. Auto repair shop to the north
3. Automobile dealership to the north-east (HVAC and service bays)

1.6 The proposed development is located outside the 25 NEF/NEP contour lines prepared by Transport Canada; therefore, aircraft noise is not considered a problem.

1.7 The scope of this report is to define the minimum noise attenuation requirements for the control of outdoor and indoor environmental sound levels.

2.0 SUMMARY AND RECOMMENDATIONS

2.1 SUMMARY

Based on the analysis conducted in this investigation it is concluded that:

1. The unattenuated daytime sound levels in the Common Outdoor Living Area (Common OLA)[1] for the proposed development will exceed the recommended objective sound level. For this area, outdoor noise control measures are required along with relevant warning clauses.

2. The unattenuated sound levels at the outside walls of the proposed buildings will exceed the recommended objective sound levels. Indoor noise controls are required for these buildings along with relevant warning clauses.

3. Although the projected sound levels are predicted to be above the sound level criteria outlined in Section 3, it is feasible to control sound levels within the outdoor and indoor areas of the proposed development to meet the stated criteria.

4. The unattenuated sound levels due to external stationary sources of noise at the worst-case Points of Reception within the nearby future residential buildings will not exceed the recommended objective sound levels, therefore noise controls are not required.

5. The results of the investigation of the internal stationary sources of noise that are likely to be required as part of the proposed building indicate that the unattenuated sound levels at the Points of Reception of concern are predicted to exceed the applicable sound level criteria for stationary sources. Accordingly, noise control measures are warranted for these Points of Reception. The following is a summary of the recommended mitigation measures/actions to be taken prior to submission of the building drawings for a Building Permit as per the following procedures:
   a. Acoustic baffles and acoustic liner to be implemented for the garage exhaust shaft;
   b. The cooling tower, Make-Up-Air (MUA) units, and associated HVAC equipment are to be designed as part of the future mechanical drawings and should incorporate silencers and acoustic louvres;
   c. The emergency backup generator will require acoustic design controls.

[1] At times, it may also be referred to as Outdoor Amenity Areas. The size of an OLA is subject to municipal standards and other project requirements (except when classified as a balcony along with other applicable MECP rules).

2.2 RECOMMENDATIONS

A summary of the minimum noise attenuation requirements is presented in Table 1. The detailed description is as follows:

1. Outdoor Noise Control Measures

Common OLA - 6th Floor:

An acoustical barrier should be constructed to shield the Outdoor Living Area with the following details:

(i) The barrier should be constructed along the alignment shown schematically in Figure 3.
(ii) The required barrier height as shown in Figure 3 could be as high as 4.5m.
(iii) The acoustic parapet barrier may consist of transparent material to OBC requirements, to be constructed of a durable material having approximately 20kg/m^2 (Ξ 4lb/ft^2) of surface area and be in a continuous line without openings or gaps.
(iv) The Builder/Contractor should be required to seek approval, including shop drawing approvals of the detailed construction of the proposed barrier prior to its installation and the approval of the Engineer shall cover: material/wood species, construction details, support details, arrangements of the panels and exact locations on a development/ building plan.

2. Air Conditioning

Both Condo Buildings (All units):

The above-noted properties should be equipped with central air conditioning. The air conditioning system may be central to the entire building or may be central to each dwelling unit (for example using packaged incremental units (PTAC), internal Heat Pumps or Fan Coil Units (FCU) connected to a central cooling/heating system with suitable ductwork to all rooms[2]). The *Ministry of the Environment*, *Conservation and Parks* does not accept window-type air conditioning units in lieu of a central system. In all cases, serious attention should be given by the proponent, the Mechanical Engineer, and the Contractor to the noise potential of the air conditioning system as it may affect the outdoor and indoor receivers within or outside of the proposed development. It is important that the Builder, the Mechanical Engineer, and the Contractor achieve the MECP objectives (the maximum sound level L_{AS} of

[2] The use of split system A/C units in apartment buildings is seldom used.

50 dBA[3] at the closest internal/external point(s) of reception, i.e. at their outdoor areas as well as at the closest window on any floor level) included in Publication NPC-300.

The following warning clause should be registered in all Development Agreement(s) and Offers of Sale and Purchase or Lease of these properties:

"*In order to achieve a suitable indoor noise environment, windows may have to remain closed; therefore, this dwelling unit has been equipped with a central air conditioning system*".

It is also our recommendation that the necessary detailed technical analysis be performed prior to the certification process for the Building Permit to address the specific requirements for the control of the selected air conditioning system to meet the sound level criteria at the point(s) of reception and to include same in the applicable permit drawings/ specifications.

3. Warning Clause*[4]

Both Buildings (All units):

The following warning clause should be registered in all Development Agreement(s) and Offers of Sale and Purchase or Lease of these properties:

Purchasers/tenants are advised that despite the inclusion of noise control features within this development area and within the dwellings, sound levels from increasing road and/or rail traffic may continue to be of concern, occasionally interfering with some activities of the dwelling occupants as the sound level exceeds the Municipality's and the Ministry of the Environment, Conservation and Parks noise criteria."

All Units with Balcony:

The following Warning Clause should be registered in all Development Agreements and Offers of Sale and Purchase or Lease of these properties having a balcony:

"*Purchasers/tenants are advised that despite the inclusion of noise control features within this development and within the dwellings, sound levels from*

[3] Or the lowest hourly ambient Leq due to road traffic projected at the receptor location(s). It should be noted that L_{AS} of 55 dBA is acceptable only for cases where the A/C unit is placed in a high ambient location (i.e., with a direct line of sight to a major roadway).

*4 Reference should be made to Bulletin No. 91003, Environmental Warnings/Restrictions, Ontario Ministry of Consumer and Commercial Relations.

increasing road and/or rail traffic will continue to be of concern as the levels in the balcony exceed the Ministry of the Environment, Conservation and Parks criteria", and that a protected Common Outdoor Living Area meeting the Ministry sound level criteria has been provided within the development".

The following clause should be included in all offers of purchase Agreement(s) of sale and purchase or lease and in the title deed or lease of each dwelling:

"*Warning: The Metrolinx Kingston Subdivision and its assigns and successors in interest has or have right-of-way within 300 m from the subject land hereof. There may be alterations to or expansions of the rail facilities on such right-of-way in the future, including the possibility that they or any railway company entering into an agreement with this railway company to use the right-of-way or their assigns or successors as aforesaid may expand their operations. The expansion may affect the living environment of the residents in the vicinity notwithstanding the inclusion of any noise and vibration attenuating measures in the design of the development and individual dwelling(s). The Metrolinx Kingston Subdivision will not be responsible for any complaints or claims arising from the use of such facilities and/or operations on, over or under the aforesaid right-of-way*."

"*Warning: CN York Subdivision and its assigns and successors in interest has or have right-of-way within 300 m from the subject land hereof. There may be alterations to or expansions of the rail facilities on such right-of-way in the future, including the possibility that they or any railway company entering into an agreement with this railway company to use the right-of-way or their assigns or successors as aforesaid may expand their operations. The expansion may affect the living environment of the residents in the vicinity notwithstanding the inclusion of any noise and vibration attenuating measures in the design of the development and individual dwelling(s). CN York Subdivision will not be responsible for any complaints or claims arising from the use of such facilities and/or operations on, over or under the aforesaid right-of-way*."

4. Building Acoustic Insulation

Both Buildings (All units):

All exterior building components (walls, windows and doors) should meet the minimum Acoustic Insulation Factors (AIF) shown in Tables 3 and 4. All windows should be well fitted and weather-stripped.

It is also the responsibility of the developer/builder responsible for the final design and construction of the subject dwellings to ensure that the correct windows, walls and doors acoustic specifications are secured by the

Acoustical Engineer prior to planning and construction of the noted dwellings.

Typical Acoustic Insulation Factors (AIF) are shown in Tables 3 and 4.

The Detailed Noise Control Study should provide complete and specific tabulations of AIFs for all properties affected.

It is also the responsibility of the developer/builder responsible for the final design and construction of the subject dwellings to ensure that the correct windows, walls and doors acoustic specifications are secured by the Acoustical Engineer prior to planning and construction of the noted buildings.

5. Implementation Procedures

The following is a summary of the generally recommended procedures for implementation as per the MECP requirements:

a) Prior to final approval of this development, a Detailed Noise Control Study, or an upgraded noise study should be required to take into consideration the following:
   - Possible proposed building locations;
   - The exact distances to all sources of concern;
   - Final/approved sound barrier locations as well as barrier height-sound level alternatives;
   - Other relevant conditions to noise in the Development Agreement.

b) The Development Agreement(s) should include the details of all the necessary noise control measures and procedures as outlined herein in this noise study to the satisfaction of all concerned parties.

c) Prior to submission of the project plans for the Building Permit, the Builder's plans, with respect to the units requiring noise control measures as referred to earlier, should be certified by an Acoustical Engineer as being in conformance with the recommendations of the Detailed Noise Control Study as approved and/or amended by the authorities having jurisdiction.

   The barrier certification should include approval of the sound barrier shop drawings (showing the barrier material/wood species, construction details, support details, arrangements of the panels and exact locations on a development plan, height, and material composition) if applicable.

d) Prior to their final inspection and release for occupancy, these dwellings should be certified by an Acoustical Engineer as being in compliance with the recommendations of the Detailed Noise Control Study.

In view of the fact that municipal implementation procedures of the noise control measures recommended herein may differ, it is the responsibility of the developer/builder responsible for the final design and construction of the subject structures/dwellings to ensure that the correct details related to the noise control measures referred in this report, such as sound barriers, building shell component specifications (windows, walls, doors, and others), air conditioning noise control technical requirements, etc. are secured from the Acoustical Engineer prior to planning and construction of the noted buildings.

3.0 SOUND AND VIBRATION LEVEL CRITERIA

3.1 SURFACE TRANSPORTATION CRITERIA[5]

The surface transportation noise is based on the objective sound levels recommended by the Ministry of the Environment, Conservation and Parks (Ref: MECP Publication NPC-300 "Environmental Noise Guideline, Noise Assessment Criteria for Stationary Sources and for Land Use Planning, 2013") and applicable Regional/Municipal sound level standards and procedures for different land uses and spaces.

The following is a summary of the applicable sound level criteria for surface transportation sources for the shown time periods (day=d & night=n):

Sound Level Limits for Outdoor Living Areas (OLAs)

AREA & TIME PERIOD	$L_{Aeq(day)}$ ROAD AND RAIL (dBA)
Designated (Individual or common) Outdoor Living Areas (16 hr day, 07:00 - 23:00)	$L_{Aeq(day)}$ 55

Indoor Sound Level Limits

Type of Space	L_{Aeq} (Time Period) (dBA)	
	Road	Rail
Living/dining, den areas of residences, hospitals, nursing homes, schools, daycare centres, etc. (Time period-day: 16 hr, 07:00 - 23:00)	$L_{Aeq(day)}$ 45	$L_{Aeq(day)}$ 40
Living/dining, den areas of residences, hospitals. nursing homes, etc. (except schools or daycare centres) (Time period-night: 8 hr, 23:00 - 07:00)	$L_{Aeq(night)}$ 45	$L_{Aeq(night)}$ 40
Sleeping quarters (Time period-day: 16 hr, 07:00 - 23:00)	$L_{Aeq(day)}$ 45	$L_{Aeq(day)}$ 40
Sleeping quarters (Time period-night: 8 hr, 23:00 - 07:00)	$L_{Aeq(night)}$ 40	$L_{Aeq(night)}$ 35

[5] Road, rail and rolling stock traffic.

Additional Supplementary (Best Management Practices) Sound Level Criteria Recommended for Other Uses

Type of Space	L_{Aeq} (Time Period) (dBA)	
	Road	Rail
General offices, reception areas, retail stores, etc. (Time period-day: 16 hr, 07:00 - 23:00)	$L_{Aeq(day)}$ 50	$L_{Aeq(day)}$ 45
Living/dining areas of residences, hospitals, schools, nursing/retirement homes, daycare centres, theatres, places of worship, libraries, individual or semiprivate offices, conference rooms, reading rooms, etc. (Time period-day: 16 hr, 23:00 - 07:00)	$L_{Aeq(day)}$ 45	$L_{Aeq(day)}$ 40
Sleeping quarters of hotels/motels (Time period-night: 8 hr, 23:00 - 07:00)	$L_{Aeq(night)}$ 45	$L_{Aeq(night)}$ 40
Sleeping quarters of residences, hospitals, nursing/retirement homes, etc. (Time period-night: 8 hr, 23:00 - 07:00)	$L_{Aeq(night)}$ 40	$L_{Aeq(night)}$ 35

The criteria for acceptable outdoor and indoor sound levels are based on "free-field" predicted and/or measured sound levels at the applicable receiver locations, thus the effects of sound reflections and reverberant sound fields are not considered.

If the sound level is less than or equal to the sound level criteria, no control measures will be required.

The outdoor sound levels ***may*** exceed the outdoor sound level criterion by up to 5 decibels, provided that it can be demonstrated that it is not technically, economically or administratively feasible to achieve the criterion and that the occupants are informed of a potential disturbance due to the excess noise by means of a warning clause or cautionary note to be registered in all Development Agreement(s) and Offers of Sale and Purchase or Lease.

Central air conditioning is required when the daytime sound level at the outside wall of any habitable room containing windows exceeds an $L_{Aeq(day)}$ 16 hrs of 65 dBA or when the nighttime sound level at the outside wall of any habitable room containing windows exceeds an $L_{Aeq(night)}$ 8hrs of 60 dBA.

Forced air ventilation (with provision for future installation of a central air conditioning system) is required when the daytime sound level at the outside wall of any habitable room containing windows an exceeds $L_{Aeq(day)}$ 16 hrs of 55 dBA

but is less than or equal to 65 dBA or when the nighttime sound level at the outside wall of any habitable room containing windows exceeds an $L_{Aeq(night)}$ 8hrs of 50 dBA but is less than or equal to 60 dBA.

Application of Criteria

The following table summarizes the requirements for noise control measures for the various sound level ranges:

SOURCE OF NOISE	DAYTIME SOUND LEVEL $L_{Aeq(day)}$	NIGHTTIME SOUND LEVEL $L_{Aeq(night)}$	AIR CONDITIONING	FORCED AIR VENTILATION WITH PROVISION FOR FUTURE AIR COND.	WARNING CLAUSE	ACOUSTIC INSULATION
ROAD	<=55	<=50	-	-	-	-
	>55 & <=65	>50 & <=60	-	Yes	Yes "Type C"	-
	>65	>60	Yes	-	Yes "Type D"	Yes
RAIL	<=55	<=50	-	-	-	-
	>55 & <=60	>50 & <=55	-	Yes	Yes "Type C"	-
	>60 & <=65	>55 & <=60	-	Yes	Yes "Type C"	Yes
	>65	>60	Yes	-	Yes "Type D"	Yes

3.2 CRITERIA FOR STATIONARY NOISE SOURCES

The following criteria apply to the impact of Stationary Sources of noise as defined by the MECP to include industrial and commercial facilities. The criteria apply to the impact of Stationary Sources external to the development on the proposed development or to the impact of any proposed Stationary Sources internal to the development on the development itself.

The criteria used in this study are based on the objective sound levels recommended by the Ministry of the Environment, Conservation and Parks (Ref.: MECP Publication NPC-300 “Environmental Noise Guideline, Noise Assessment Criteria for Stationary Sources and for Land Use Planning, 2013) and other relevant publications.

For sound from a stationary source, including Quasi-Steady Impulsive Sound but not including other impulsive sound, the predicted and/or measured “predictable worst case” 1-hour equivalent sound levels (L_{Aeq1hr}) of the stationary source(s) at a point of reception is the higher of the applicable exclusion limit value (given in the following tables) or the background sound level for that point of reception. The outdoor sound level limits for stationary sources apply only to daytime and evening (07:00 – 23:00 hours).

Exclusion[6] Limit Values of One-Hour Equivalent Sound Level (L_{Aeq}, dBA) Outdoor Points of Reception

Time of Day	Class 1 Area	Class 2 Area	Class 3 Area	Class 4 Area
07:00 – 19:00	50	50	45	55
19:00 – 23:00	50	45	40	55

Exclusion Limit Values of One-Hour Equivalent Sound Level (L_{Aeq}, dBA) Plane of Window of Noise Sensitive Spaces

Time of Day	Class 1 Area	Class 2 Area	Class 3 Area	Class 4 Area
07:00 – 19:00	50	50	45	60
19:00 – 23:00	50	50	40	60
23:00 – 07:00	45	45	40	55

[6] or the minimum hourly background (ambient) sound level $LAeq_{1hr}$, whichever is higher

4.0 ANALYSIS

4.1 TRANSPORTATION SOURCES OF NOISE

The relevant road and traffic data were obtained from the Ministry of Transportation (MTO) and the Regional Municipality of Durham and are summarized below:

- Kingston Road/Highway 2

Current No. of Lanes	4
Future No. of Lanes	4
Posted Speed Limit	60km/hr.
Future Speed Limit	60km/hr.
Ultimate AADT	35,000vpd
Total Truck Percentage – Medium Truck Split – Heavy Truck Split	8% 5.6% 2.4%
Day (16 hrs.)/Night (8 hrs.) Split (assumed)	92%/8%
Directional Traffic Split (assumed)	50%/50%
Road Gradient (assumed)	2%

- Highway 401

Current No. of Lanes	12
Future No. of Lanes	12
Posted Speed Limit	100km/hr.
Future Speed Limit (assumed)	100km/hr.
AADT (Year 2016)	230,000vpd
Future AADT (Year 2031) – Annual Growth Rate (assumed) – Number of Years of Growth (assumed)	333,108 vpd 2.5% 15 years
Total Truck Percentage (assumed) – Medium Truck Split (assumed) – Heavy Truck Split (assumed)	15% 11.25% 3.75%
Day(16 hrs.)/Night(8 hrs.) Split (assumed)	66.6%/33.3%
Directional Traffic Split (assumed)	50%/50%
Road Gradient (assumed)	2%

Appendix A contains the relevant road traffic data used in this study.

RAIL TRAFFIC DATA (CN LINE KNOWN AS THE "YORK SUBDIVISION")

DAYTIME (0700-2300)

TYPE OF TRAIN	MAX. NO. OF TRAINS	MAX. NO. OF CARS	MAX. OPER SPEED (KM/H)	MAX. NO. OF LOCOMOTIVES
Freight	13	140	80	4
Way Freight	0	25	80	4
Passenger	0	10	80	2

NIGHTTIME (2300-0700)

TYPE OF TRAIN	MAX. NO. OF TRAINS	MAX. NO. OF CARS	MAX. OPER SPEED (KM/H)	MAX. NO. OF LOCOMOTIVES
Freight	5	140	80	4
Way Freight	0	25	80	4
Passenger	0	10	80	2

ADDITIONAL COMMENTS

1. The above traffic is for present-day conditions. To allow for future increases in rail traffic volumes we have increased the above data by 2.5% per year for 10 years.
2. The measures recommended in this report are strictly related to environmental noise due to train pass-bys. Reference to other measures for safety including distance setbacks, berming, and specific warning clauses can be found in the relevant policies published by the railway company.

SOURCE OF INFORMATION:

Appendix A contains the relevant rail traffic data used in this study.

RAIL TRAFFIC DATA (METROLINX LINE KNOWN AS THE "KINGSTON SUBDIVISION")

DAYTIME (0700-2300)

TYPE OF TRAIN	MAX. NO. OF TRAINS	MAX. NO. OF CARS	MAX. OPER SPEED (KM/H)	MAX. NO. OF LOCOMOTIVES
1 Diesel	35	12	150	1
2 Diesel	35	12	150	2

NIGHTTIME (2300-0700)

TYPE OF TRAIN	MAX. NO. OF TRAINS	MAX. NO. OF CARS	MAX. OPER SPEED (KM/H)	MAX. NO. OF LOCOMOTIVES
1 Diesel	8	12	150	1
2 Diesel	2	12	150	2

ADDITIONAL COMMENTS

1. The above traffic is for present-day conditions. To allow for future increases in rail traffic volumes we have increased the above data by 2.5% per year for 10 years.
2. The measures recommended in this report are strictly related to environmental noise due to train pass-bys. Reference to other measures for safety including distance setbacks and berming as well as specific warning clauses could be found in the relevant policies published by the railway company.

4.2 OUTDOOR NOISE ENVIRONMENT

Sound level predictions were carried out based on MECP's ORNAMENT and STEAM sound level prediction modelling procedures[7] (Ontario Road Noise Analysis Method for Environment and Transportation, Technical Document, 1989 and STEAM, Sound from Trains Environmental Analysis Method, 1990).

Overall sound levels at the OLAs of the selected representative receptor locations are shown in Tables 3 and 4. Sample sound level calculations at representative receptor locations are presented in Appendix B.

[7] The MECP's noise prediction models ORNAMENT and STEAM have a limitation as to the minimum AADT value for 24 hour traffic volume (calculated for the daytime and nighttime hourly volume). When the AADT value is less than 40 vph, there is a neutral mathematical manipulation that can be used as long as the hourly traffic volume is not very low. The manipulation is implemented by multiplying the traffic volume by any reasonable factor (for example a factor of 10) and then by deducting 10 x log "factor" from the results (in this case, 10 x log 10=10).

In consideration of the calculations, it is concluded that for the Common OLA located on the 6th floor, the unattenuated daytime sound levels in the designated COLA will exceed 60 dBA, the maximum criteria levels allowed. Therefore, outdoor noise control measures are required for this area.

The conventional approach by which excess noise in the Common OLA may be mitigated is through the construction of acoustical barriers. Barrier height calculations for the receptors of concern are included in Appendix B. The barrier alignment is shown in Figure 3.

It should be noted that it is not feasible to attenuate the sound level at the Common OLA to 55 dBA as per the Ministry Guidelines.

Based on the MECP guidelines, the balconies for the proposed development are not considered as OLAs due to the fact that the depth of the balconies/terraces are less than 4m. Therefore, no physical mitigation measures are required and a warning clause registered in the Development Agreement(s) will suffice.

4.3 INDOOR NOISE ENVIRONMENT

The criteria for indoor L_{Aeq} sound levels are based on projected L_{Aeq} levels at the outside face of the dwellings with appropriate assumptions for the differences between the outdoor and indoor sound levels. If the outside L_{Aeq} levels do not exceed the recommended objective sound levels, then the indoor L_{Aeq} levels will not be exceeded, assuming standard building construction and operable windows.

Overall daytime sound levels at the building facades are shown in Table 3 and the overall nighttime sound levels at the building facades are shown in Table 4.

In consideration of the estimated sound levels and by comparison to the acceptable indoor sound level criteria (Section 3) it is concluded that the sound levels at the outside walls of both of the buildings (within any habitable room on any floor) is predicted to exceed $L_{Aeq(day)}$ 65 dBA and/or $L_{Aeq(night)}$ 60 dBA respectively. Therefore, central air conditioning is required for both buildings.

Typical Acoustic Insulation Factors (A.I.F.) are summarized in Tables 3 and 4.

Additional Notes Regarding Air Conditioning Systems in Apartment Buildings

Based on the Sound Level Criteria and the established future sound levels, it was concluded that some of the dwelling units in the apartment buildings within the proposed development may require air conditioning and/or provision for future installation of air conditioning.

There are several techniques available to air condition apartment units using either a system central to the entire building or alternatively each apartment unit would have its own central system including the indoor fan and the outdoor condensing unit.

As it is not the subject of this report to discuss the specifics of all systems that may be used, the following comments are offered, to assist the proponent, the Mechanical Engineer and the Contractor in appreciating the acoustical problems and concerns associated with some of the commonly available commercial air conditioning systems:

1. The location and the design of the central system (cooling tower, condensing unit, openings in mechanical rooms, etc.) are important elements that must be checked by the Mechanical Engineer in order to achieve the stated outdoor and indoor sound level criteria.
2. Air conditioning units central to each individual apartment unit must also be designed by the Mechanical Engineer to meet the objective sound levels. If split-systems are used, then the sound power level of the outdoor units should be selected to avoid impacting the outdoor living areas and the windows of habitable spaces. Other noise control measures available include quieter makes, the use of other forms of sound barriers, etc. If through-the-wall incremental units are used, then the selected incremental units should have the following features in order to reduce the transmission of high outside noise levels into the suites:
   a) The partition in the heating/cooling chassis should be of the acoustically sealed type (this partition separates the outdoor and indoor components).
   b) The unit should preferably be of the insulated “double casing design”.
   c) The interior of the unit should be acoustically lined.
   d) The perimeter of the sleeve should be caulked all around with acoustical sealant.
   e) The unit may be placed through the living room wall and acoustically lined ducts extended to the adjoining bedroom or dining room in accordance with manufacturers recommendations.

4.4 TYPICAL WINDOW / WALL CONSTRUCTION

As the detailed architectural plans for Building Permit submission are not available at this time, it is not possible to specify the window and wall details to meet the AIF requirements presented in Tables 3 and 4. A further detailed analysis should be undertaken based on the data presented in this Report to take into consideration the final room location, floor area, window type (operable or fixed), window size and orientation, etc. Such analysis is required by the MECP and the municipality prior to submission for building permits as part of their Certification process.

It must be pointed out that there are several factors affecting the final glass

selection including:

1. Size of window.
2. Room dimensions.
3. Floor level and direction room faces.
4. Fixed or operable glass.
5. The number of building components.
6. Type of wall to be used.
7. Projected sound levels outside the window
8. The choice of “laminated” window glazing in one or two of the window panes.

For a typical south-facing unit with a daytime outdoor sound level of 81 dBA and a nighttime outdoor sound level of 80 dBA, the predicted STC rating is 46. For all windows facing east/west, the predicted STC rating is 43 and an STC rating of 41 is predicted for all windows facing north. The preceding STC ratings are typical examples only and are subject to further refinements and improvements prior to the submission of the building plans for the Building Permit. Therefore, the detailed architectural drawings of the subject building facades requiring noise control measures shall be examined by an Acoustical Engineer in order to advise the design consultant on the ***specific*** building components for noise control to suit the actual room sizes and window construction details.

4.5 CONTROL OF AIR CONDITIONING UNITS NOISE

The resulting sound levels due to large central air conditioners associated with the apartment and other buildings should not exceed the Ministry of the Environment, Conservation and Parks sound level criteria included in their Publications NPC-300 and NPC-233. Noise control measures for large central air conditioning systems include any or a combination of the following:

a. Directing the air intake and discharge openings away from the noise-sensitive receptors.
b. The use of partial and/or full enclosures.
c. Using parts of the building as sound barrier.
d. The use of silencers and/or acoustic louvers on air discharge and intake openings.
e. Distance setback.

It is also important that the necessary detailed technical analysis be performed prior to submission of the Building Permit plans or the certification process for the Building Permit to address the specific requirements for the control of the selected air conditioning system to meet the sound level criteria at the point(s) of reception and to include same in the applicable permit drawings/ specifications.

Indoor Sound Levels

While the control of the indoor noise created by the air conditioning equipment is not the direct subject of this study, it is important that the selected and designed air conditioning systems achieve indoor sound levels that meet the OBC/ASHRAE criteria and be at least 5dB lower than the Ministry of the Environment, Conservation and Parks recommended indoor sound level criteria included in Section 3.0 of this study.

4.6 STATIONARY SOURCES OF NOISE EXTERNAL TO THE PROPOSED DEVELOPMENT

1. Introduction and Methodology

The preparation of this noise impact assessment is primarily concerned with the documentation and assessment of the changes in noise by the following main procedures:

1. Describe the existing and future noise environment.
2. Predict the future noise environment of the project
3. Assess the noise impact and recommend noise control measures, if required.

The standard practice for impact assessment of stationary sources of noise is to consider the noise potential at the nearest noise-sensitive points of reception at the outside face of a building. This is done to assist in determining the degree of impact on indoor noise-sensitive spaces.

The points of reception have been selected such that should it be concluded that the MECP sound level criteria are met at these locations then by extension all other receptors are also compliant.

The primary objective of stationary noise analysis is to obtain a combined 1-hour L_{eq} (equivalent sound level) for all stationary sources of concern to the development. This sound level is compared to the higher of either the MECP exclusion limits or the lowest hourly ambient sound level due to the nearby road to establishing compliance. This total stationary noise level is calculated at each point of reception for each of the three time periods; day/eve/night.

The individual sound emission levels produced by each noise-producing source were determined based on the manufacturer's sound data to predict the sound levels at the points of reception.

2. Description of the Sources of Stationary Noise

The nearby stationary noise source of concern are the two automotive dealerships to the north of the proposed development, the auto repair shop to the

north of the proposed development, and the church to the west of the proposed development. The location of the stationary sources of noise external to the proposed development is shown in Figures 4A and 4B.

The noted stationary source contains several potential sources of noise, namely:

- The roof-top mechanical equipment (HVAC)
- Delivery truck activities; movements, idling, delivering, etc.
- Vehicular traffic movements along its internal routes
- Garage overhead doors

3. Points Of Reception

To determine the level of noise impact, the nearest and most exposed outdoor areas and building facades to the sources of noise are selected to represent the worst-case scenarios.

The following is a brief description of the selected points of reception:

- POR-1: The east side of the east tower on the top-storey window
- POR-2: The north side of the east on the top storey window
- POR-3: The east side of the west tower on the top-storey window
- POR-4: The west side of the west tower on the 3rd floor

Figure 5 illustrates the locations of the selected points of reception relative to the study area.

4. Ambient Sound Levels and Sound Level Criteria

Figure 5 shows the relative location of the points of reception to the sources of ambient noise. Appendix A contains the relevant traffic data of the roads and other sources of noise which establish the ambient noise in the subject area.

Ambient sound level calculations have been carried out based on the Ministry of the Environment, Conservation and Parks (MECP) traffic noise prediction model; ORNAMENT. Sample ambient sound level calculations are included in Appendix A.

The land use and character of the areas near the subject site is essentially urban. This is due to its proximity to Kingston Road and Highway 401, which qualify the area as a Class 1 Area (Urban) based on the MECP definition.

The ambient road traffic noise will emit higher sound levels on all sides of the proposed development. As such, the MECP exclusion limits will not be the applicable sound level criteria for this assessment. Rather, the ambient noise as a result of traffic volume will be used as the governing criteria. This considered the MECP exclusion limits can still feasibly be met with the use of acoustic

mitigation measures for the elements discussed in this section of the report.

The following are the minimum hourly ambient sound levels due to vehicular traffic after making the necessary adjustments for the MECP minimum values for hourly levels during the day (7 am to 7 pm), evening (7 pm to 11 pm), and night (11 pm to 7 am). These sound level values will be used as a performance limit in determining the acceptability of the sound levels due to stationary sources of noise:

Receptor POR-1: Leq (1h) 62 dBA day, 57 dBA evening and 49 dBA night
Receptor POR-2: Leq (1h) 62 dBA day, 57 dBA evening and 49 dBA night
Receptor POR-3: Leq (1h) 67 dBA day, 62 dBA evening and 55 dBA night
Receptor POR-4: Leq (1h) 67 dBA day, 62 dBA evening and 55 dBA night

5. Stationary Source of Noise- Introduction and Methodology

A single number, the hourly Leq (equivalent sound level) has been used to arrive at an objective and quantitative definition of the noise impact.

The preparation of this noise impact assessment is primarily concerned with the documentation and assessment of the changes in noise in accordance with the following main procedures:

1. Describe the existing and future noise environment.
2. Predict the future noise environment of the project
3. Assess the noise impact and recommend noise control measures, if required.

The standard practice for impact assessment of stationary sources of noise such as with the subject development is to consider the noise potential at outside of the nearest noise-sensitive points of reception to assist in determining the degree of impact on the indoor noise-sensitive spaces.

If we examine the site plan layout of the stationary sources, it is concluded that if the MECP sound level criteria are met at the selected points of reception, then other receptors will also be acoustically protected.

6. Source Details and Assumptions

The following information describes the sources of noise of concern and the assumptions made for the evaluation of the expected sound levels at the points of reception.

Rooftop Equipment

Rooftop equipment at the surrounding land uses was taken into consideration for the acoustic assessment. Namely, 3-to-25-ton rooftop AC units servicing the

Ford/Lincoln dealership to the north, the Chrysler dealership to the north, and the church to the west.

Truck Routes and Truck Data

Truck routes and truck data were analyzed in regards to the automotive dealerships to the north of the proposed development,

The operational average speed of the trucks is taken to be 20km/h moving forward and 10km/h moving backward. The assumed path the trucks will take is as follows:

- Trucks will enter the dealership lot from the east or west.
- Trucks will drive along the path as indicated in the site drawing (See Figure 4A)
- Trucks will come to a stop and then reverse into the loading bay referenced as OHD_3 in Figure 4A
- Regular trucks will idle engines for 2 minutes each per hour during loading/unloading
- Trucks will then leave along the path as indicated on the site drawing

Truck movement and idling emission data was taken from data previously collected by this firm for past projects and is summarized as follows:

- A moving regular truck emits noise levels of 75 dBA at a distance of 15m with a source height of 3m
- An idling regular truck emits noise levels of 73 dBA at 15m with a source height of 3m

7. Sound Level Prediction Model

A 3-D computer program for multiple point and line sources and multiple receivers developed by SS Wilson Associates was used to calculate the sound levels. The program takes into account:

- Reference sound levels and reference distances for the equipment working in each area of the subject development, i.e. sound emission levels.
- The Cartesian coordinates (x, y & z) of all sources and receivers.
- The number of events or occurrences of the noise in a given time period and the time period of each event.
- Spherical divergence factor.
- Additional attenuation due to sound barriers; natural or man-made types.
- Additional attenuation due to ground (as modified by sources/receiver elevations, the presence of intervening barriers and the type of ground).
- Atmospheric attenuation due to air molecular absorption.

8. Impact Assessment

The following is a summary of the resulting sound level impact, with no mitigation, at each of the selected receptors:

Point of Reception ID	Point of Reception Description	Sound Level at Point of Reception Leq(1h)	Applicable MECP Criteria (Performance limit as a result of ambient traffic noise)	Compliance with MECP Criteria
POR-1	The east side of the east tower on the top-storey window	51 dBA Day 45 dBA Evening 43 dBA Night	62 dBA Day 57 dBA Evening 49 dBA Night	Yes Yes Yes
POR-2	The north side of the east on the top storey window	53 dBA Day 44 dBA Evening 42 dBA Night	62 dBA Day 57 dBA Evening 49 dBA Night	Yes Yes Yes
POR-3	The east side of the west tower on the top-storey window	53 dBA Day 53 dBA Evening 53 dBA Night	67 dBA Day 62 dBA Evening 55 dBA Night	Yes Yes Yes
POR-4	The west side of the west tower on the 3rd floor	50 dBA Day 49 dBA Evening 47 dBA Night	67 dBA Day 62 dBA Evening 55 dBA Night	Yes Yes Yes

Figure 6 illustrates the resulting sound level impact on the proposed development as a result of external stationary sources of noise. The established sound levels at the selected points of reception POR- 1, POR- 2, POR- 3 and POR-4 are predicted to meet the determined performance limits and remain below the ambient noise levels at the selected points of reception. Therefore, the proposed development is within the applicable sound level criteria during the daytime, evening and night.

Appendix C includes sample calculation sheets of impact assessment.

4.7 STATIONARY SOURCES OF NOISE INTERNAL TO THE PROPOSED DEVELOPMENT

1. Introduction

This section of the report addresses the potential noise impact of the proposed building on the internal and external noise-sensitive land-use areas. Typically, a residential building contains stationary sources such as rooftop Heating Ventilation and Air Conditioning (HVAC) equipment, underground garage exhaust fans leading to the outside to expel the exhaust fumes from the underground parking levels through a shaft to the outside, emergency backup generator, and a transformer located either on the rooftop or ground.

At this preliminary stage of the planning process, the detailed specifications and locations of such equipment are seldom available, however, to ensure that future consideration will be given to their potential impact, the following subsections provide typical and realistic sound levels predictions of such equipment.

2. Air Conditioning and Ventilation

Typically, for a residential building complex such as the one being proposed, three types of suite A/C units may be used:

1. The use of a central A/C system that is central to the entire building whereby a large chiller, condenser (or fluid cooler/air-cooled condenser), pumps, etc. are used. The general location of such system is commonly on the roof of the subject building. Noise control of the referenced equipment is a straightforward design exercise whereby the engineers can make use of several standard provisions for noise control. The provisions include the use of silencers, acoustic louvers, acoustic shielding by the structure, low noise emission levels equipment, etc. All of such measures are fairly straightforward as far as selection, design, and specifications. Accordingly, the details of such measures can be specified in due course suitable for this land use application.

2. For many types of buildings and for the purposes of independent energy metering for individual suites, a packaged HVAC unit that is considered central to each suite is installed within each suite in a small closet with access to the outside for heat exchange and for gas heating vents. Each closet serving one suite contains a louver to the outside for condenser intake and discharge, as well as for natural gas exhaust vents. Of concern is the potential cumulative noise impact when several of such A/C units operate simultaneously during the day and night in the hot season, thus affecting the adjoining neighbours.

3. The other alternate means for central air conditioning of apartment units is to use split-system heating/cooling units where the condenser is located on the roof of the building along with other condensing units serving the other neighbours in the same building or on each balcony in the suite. The evaporative coils are located in a small enclosure within the suite with access to the outside for combustion exhaust release (not usually of concern). The multiple condensing unit installations on the roof or the cumulative balcony noise potential is the source of environmental noise affecting the neighbours and other nearby residential dwellings.

At the present time, there is no information available on the type of Heating, Ventilation, and Air Conditioning system to be used. Therefore, the cumulative noise impact of the Apartment Building is determined using a noise prediction model based on reasonable technical assumptions and based on information

extracted from the building plan and elevation drawings. The following is a summary of the predictions/assumptions made regarding the potential noise sources:

Cooling Tower

The cooling towers were assumed to be located within the Mechanical Penthouse of each tower respectively. Due to the absence of the manufacturer's detailed sound emission data, the following was assumed for the stationary sound model, based on the square footage of the proposed building's living space:

Overall Sound Power Level: 89 dBA

Make-Up Air Units

The Make-Up Air units (MAU) typically provide fresh air to the common amenity areas. It was assumed that the proposed building will require two MAUs, one serving each of the proposed towers. Each MAU was assumed to possess the following sound power rating:

Overall Sound Power Level for Each MAU: 90 dBA

Garage Exhaust Shaft

Assumptions for the garage exhaust fan were made based on the size of the proposed towers, as well as the respective parking garage(s).

Garage Exhaust Shaft Sound Power Level of 110 dBA

Transformer

Based on the SSWA database, the following is a reasonable and conservative sound level rating for the transformer:

Transformer Sound Power Level of 81 dBA

4. Points of Reception

For the subject building, the nearby noise-sensitive receptors may be affected by the predicted sound levels summarized below:

Internal Points of Reception

Ra: 3rd Floor South Façade of Proposed East Tower
Rb: 2nd Floor East Façade of Proposed East Tower
Rc: Top floor West Façade of Proposed East Tower
Rd: Top Floor East Façade of Proposed West Tower

Figure 7 illustrates the locations of the internal points of reception.

5. Established Ambient Sound Levels

The land use and character of the areas near the subject site is essentially urban, which qualifies the area as a Class 1 Area (Urban) based on the MECP definition. For the assessment of the internal stationary sources, the MECP exclusion limits were used to be on the conservative side since the actual locations of the internal stationary sources associated with the building are unknown. The following MECP exclusion limits were used as the applicable criteria:

Ra to Rd: Day 50dBA / Eve 50dBA / Night 45 dBA

6. Sound Level Calculations Model

A 3-D computer program[8] for multiple point and line sources and multiple receivers developed by SS Wilson Associates was used to calculate the sound levels. The program takes into account:

- Reference sound levels and reference distances for the equipment working in each area of the subject development, i.e. sound emission levels.
- The Cartesian coordinates (x, y & z) of all sources and receivers.
- The number of events or occurrences of the noise in a given time period and the time period of each event.
- Spherical divergence factor.
- Additional attenuation due to sound barriers; natural or man-made types.
- Additional attenuation due to ground (as modified by sources/receiver elevations, the presence of intervening barriers and the type of ground).
- Atmospheric attenuation due to air molecular absorption.

For this study, tonal sound level adjustments +5db were applied to the measured transformer sound emission levels In accordance with the MECP procedures in the overall analysis of the Leq.

7. Predicted Stationary Source Sound Levels

The following is a summary of the resulting sound level assessment, without mitigation at each of the selected receptors:

[8] The model used by SSWA to predict the sound levels due to Stationary Sources in this report is a proprietary prediction spreadsheet program developed by SSWA and is primarily based on the ISO 9613-2 publication recognized by the MECP as an acceptable method for sound level predictions.

Point of Reception ID	Point of Reception Description	Predicted Sound Level at Point of Reception Leq(1h)	Applicable MECP Criteria	Compliance with MECP Criteria
Ra	3rd Floor South Façade of Proposed East Tower	82 dBA Day 81 dBA Evening 80 dBA Night	50dBA Day 50dBA Evening 45dBA Night	No No No
Rb	2nd Floor East Façade of Proposed East Tower	65 dBA Day 64 dBA Evening 63 dBA Night	50dBA Day 50dBA Evening 45dBA Night	No No No
Rc	Top floor West Façade of Proposed East Tower	62 dBA Day 62 dBA Evening 62 dBA Night	50dBA Day 50dBA Evening 45dBA Night	No No No
Rd	Top Floor East Façade of Proposed West Tower	62 dBA Day 61 dBA Evening 60 dBA Night	50dBA Day 50dBA Evening 45dBA Night	No No No

In conclusion, the unattenuated sound levels are predicted to exceed the MECP criteria for the selected receptors. Therefore, outdoor noise control measures will be required unless consideration is given by the project consultants to these issues during the detailed design stage.

Figure 8 illustrates the predicted unmitigated sound levels.

8. Impact Assessment and Findings

For this assumed scenario, typical recommendations include implementing a silencer and louvres onto the rooftop cooling tower or installing a quieter cooling tower, and acoustic baffles and liner for the garage exhaust fan shaft. In reviewing the stationary sound levels, it was concluded the excess noise stems from the garage exhaust fan, in which acoustic baffles and liner will likely be recommended. The cooling tower's sound rating, MAU, and transformer should not exceed the assumed emission levels discussed in Section 4.7.2 of the report. The following sound levels are the sound levels predicted assuming these noise control measures are implemented:

Point of Reception ID	Point of Reception Description	Sound Level at Point of Reception Leq(1h)	Applicable MECP Criteria	Compliance with MECP Criteria
Ra	3rd Floor South Façade of Proposed East Tower	45 dBA Day 43 dBA Evening 43 dBA Night	50dBA Day 50dBA Evening 45dBA Night	Yes Yes Yes
Rb	2nd Floor East Façade of Proposed East Tower	38 dBA Day 37 dBA Evening 37 dBA Night	50dBA Day 50dBA Evening 45dBA Night	Yes Yes Yes
Rc	Top floor West Façade of Proposed East Tower	45 dBA Day 45 dBA Evening 45 dBA Night	50dBA Day 50dBA Evening 45dBA Night	Yes Yes Yes
Rd	Top Floor East Façade of Proposed West Tower	44 dBA Day 43 dBA Evening 42 dBA Night	50dBA Day 50dBA Evening 45dBA Night	Yes Yes Yes

Figure 9 illustrates the sound level contours with the inclusion of typical noise control mitigation measures.

9. Emergency Backup Generator

The location of the emergency generators is shown in Figure 10. The sound power level of the emergency generators is not to exceed 90dBA, to meet the applicable MECP guidelines (i.e. 55 dBA at the receptor as a result of the emergency backup generator)

10. Conclusions and Recommendations

Apartment residential buildings such as the one under scrutiny will certainly require the installation of HVAC equipment, which is predicted to exceed the applicable MECP sound level criteria without the application of noise control measures to suit. Accordingly, this issue should be addressed in more detail during the issuance of the Building Permit stage, at which time more information would become available regarding the details of the proposed building construction and the type of mechanical systems to be used in such building. In reviewing the sound levels predicted at the nearest receptors as well as the type of noise emitted from the source, it is our professional opinion that it is technically feasible to attenuate the stationary noise sources to meet the specified criteria, with the following typical noise mitigation measures:

1. Incorporate acoustic baffles and acoustic liner within the garage exhaust fan shaft.
2. Cooling Tower and MAUs should incorporate silencer and acoustic louvres.

Therefore, it is recommended that detailed considerations be given by the project professionals to this issue prior to the issuance of the Building Permit.

4.8 Important Notes for the Residential Builder Regarding Windows

The results in this report provide information on the calculated Acoustic Insulation Factors (AIF) for windows based on typical assumed window and room dimensions.

To assist the Builder in appreciating the fact of whether the results presented herein require typical commercially available residential type windows, or special type windows, the following table[9] provides reasonably accurate information on whether such window(s) are standard industry window or not:

[9] Based on a typical commercially available glazing: 3mm inside pane, 16mm inter-pane air space & 3mm exterior pane.

Acoustic Insulation Factor (AIF) in this report	35	34	33	32	31	30	29	28	27	26
Window to room floor area percentage NOT to be exceeded	10%	13%	16%	20%	25%	32%	40%	50%	63%	80%

If the above ratios are exceeded, several options are available to the builder including one or more of: reducing the size of the window, increasing the inter-pane air spacing, the use of thicker glazing, the use of "laminated" glazing (1 or 2 panes), etc.

WORKED EXAMPLE 1:

- AIF shown in this study: 31
- Actual room floor area: 250 sq.ft.
- You selected a window area of: 45 sq.ft
- Your window/floor ratio: (45 divided by 250, then times 100) =18%
- Your result is less than above table value 25%; i.e. standard glazing unit

WORKED EXAMPLE 2:

- AIF shown in this study: 34
- Actual room floor area: 200 sq.ft.
- You selected a window area of: 50 sq.ft
- Your window/floor ratio: (50 divided by 200, then times 100) =25%
- Your result is more than above table value 13%; i.e. Non-standard (special) glazing unit

4.9 Abbreviations

Basic Descriptor	Measurement Weighting	Time Weighting Characteristics **F**(Fast). **S**(Slow). **I**(Impulse).
L_p Sound pressure level	A-Weighted sound pressure level	L_{AF}, L_{AS}, L_{AI}
	C-Weighted sound pressure level	L_{CF}, L_{CS}, L_{CI}
	Z-Weighted sound pressure level(Flat)	L_{ZF}, L_{ZS}, L_{ZI}
L_{eq} Equivalent continuous sound level	Equivalent continuous A-weighted sound level	L_{Aeq}, L_{AIeq}
	Equivalent continuous C-weighted sound level	L_{Ceq}, L_{CIeq}
	Equivalent continuous Z-weighted(Flat) sound level	L_{Zeq}, L_{ZIeq}
L_E Sound Exposure Level	A-Weighted sound exposure Level	L_{AE}, L_{AIE}
	C-Weighted sound exposure Level	L_{CE}, L_{CIE}
	Z-Weighted sound exposure Level(Flat)	L_{ZE}, L_{ZIE}
L_{max}, L_{min} Maximum Sound Level	Maximum A-weighted sound level	L_{AFmax}, L_{ASmax}, L_{AImax}
	Maximum C-weighted sound level	L_{CFmax}, L_{CSmax}, L_{CImax}
	Maximum Z- weighted sound level(Flat)	L_{ZFmax}, L_{ZSmax}, L_{ZImax}
L_N Percentile Sound Level	Percentile A-weighted sound level	L_{AFNn}, L_{ASN}, L_{AIN}
	Percentile C-weighted sound level	L_{CFNn}, L_{CSN}, L_{CIN}
	Percentile Z-weighted sound level(Flat)	L_{ZFNn}, L_{ZSN}, L_{ZIN}
L_{peak} Peak Sound Level	A-Weighted peak sound level	L_{Apeak}
	C-Weighted peak sound level	L_{Cpeak}
	Z-Weighted peak sound level(Flat)	L_{Zpeak}

TABLES

TABLE 1

SUMMARY OF MINIMUM REQUIRED NOISE CONTROL MEASURES

RECEPTOR	SOUND BARRIER	CENTRAL AIR CONDITIONING	PROVISION FOR CENTRAL AIR CONDITIONING	WARNING CLAUSE	Brick veneer or acoustically equivalent masonry wall construction[10] (FOR RAILWAY NOISE
Common OLA Terrace 6th Floor	Yes	- -	- -	- -	- -
Both Buildings (All Units)	No	Yes	- -	Yes	No

[10] An acoustically equivalent wall construction must provide minimum sound Transmission Loss (TL) values of 35+dB from 63Hz and upward as designed by an Acoustic Engineer.

N6 Leq-AIF Master- 2019-05-16

SS WILSON ASSOCIATES

2022

2022-08-02 0:00

SUMMARY- OUTDOOR SOUND LEVEL CALCULATIONS

File Number : WA22-019

Project Name : 875 Kingston

Description : Pickering

Description :

OUTDOORS

Table 2

(Using NRC/MOE Pocedures)

Any Heavy Rail Line ? Yes

Appropriate adjustment will be applied to the Acoustic Insulation Factor to account for their

Record Number	1	2	3	4	5	6	7	8	9	10	11	12
Consider Record	Y	N	N	N	N	N	N	N	N	N	N	N
LOCATION	6th Floor											
FACE/DIRECTION	Centre											
DESCRIPTION:	Common OLA											
Source 1: Roads	**Road Traffic**		OUTDOOR DAYTIME LEVELS			OUTDOOR DAY TIME LEVELS			OUTDOOR DAY TIME LEVELS			
Leq Outdoors	70.00											
Partial angle of exposure, degrees	180											
Partial exposure adjust., dB												
Barrier Adjustment, dB	-19.00											
Additional Adjustment, dB												
Sub-Total Leq, dBA	**51.00**											
Source 2: Rail	**Rail Traffic**		OUTDOOR DAYTIME LEVELS			OUTDOOR DAY TIME LEVELS			OUTDOOR DAY TIME LEVELS			
Leq Daytime	77.00											
Partial angle of exposure, degrees	180											
Partial exposure adjust., dB												
Barrier Adjustment, dB	-19.00											
Additional Adjustment, dB												
Sub-Total Leq, dBA	**58.00**											
Source 3: Rail	**Rail Traffic**		OUTDOOR DAYTIME LEVELS			OUTDOOR DAY TIME LEVELS			OUTDOOR DAY TIME LEVELS			
Leq Daytime	70.00											
Partial angle of exposure, degrees	180											
Partial exposure adjust., dB												
Barrier Adjustment, dB	-19.00											
Additional Adjustment, dB												
Sub-Total Leq, dBA	**51.00**											
Source 4:	**Road Traffic**		OUTDOOR DAYTIME LEVELS			OUTDOOR DAY TIME LEVELS			OUTDOOR DAY TIME LEVELS			
Leq Daytime												
Partial angle of exposure, degrees	180											
Partial exposure adjust., dB												
Barrier Adjustment, dB												
Additional Adjustment, dB												
Sub-Total Leq, dBA												
Sub-Tot. 4 Sources Leq, dBA	**59.46**											
Aircraft noise NEF/NEP												
Adjust.1												
Adjust.2												
Adjusted NEF/NEP												
Approx. Overall Combined Leq	*59*											
Overall Road and/or Rail and/or Stationary Sources, Leq (dBA)	***59***											
Aircraft Noise Only, NEF												
Additional Requirements	4.5m high acoustic barrier on south side, 1.5m high acoustic barrier on north side											

	N6 Leq-AIF Master- 2019-05-16			SS WILSON ASSOCIATES				(Using NRC/MOE Pocedures)				
2022-08-02 10:32	Leq- AIF CALCULATIONS AND TYPICAL WINDOW GLAZING REQUIREMENTS											
File Number :	WA22-019				DAYTIME				NOTES			
Project Name :	875 Kingston				Table 3							
Description :	Pickering											
Description :								Caution: , the AIF Reported for heavy Rail Noise is the Higher of day and night				
Record Number	1	2	3	4	5	6	7	8	9	10	11	12
Consider Record	Y	N	N	N	N	N	N	N	N	N	N	N
BUILDING	South Building Façade											
FACE/ DIRECTION	South											
LOCATION	Building Façade											
ROOM CLASSIFICATION	Living / Dining											
Manual Adjust. to Criterion,												
MOE Transportation Sources Daytime Leq Indoor Criteria, dBA	45											
Aircraft Indoor Criteria, NEF	5											
Source 1: Roads	**Road Traffic**		DAYTIME LEVELS				DAYTIME LEVELS			DAYTIME LEVELS		
Leq Daytime	80.00											
Partial angle of exposure, 1-180°	180											
Partial exposure adjust., dB												
Additional Adjustment, dB												
Sub-Total Leq, dBA	**80.00**											
Angular range of incidence Case(0,1,2,3)												
Adjusted AIF	42	-38	-38	-38	-38	-38	-38	-38	-38	-38	-38	-38
Source 2: Rail	**Rail Traffic**		DAYTIME LEVELS				DAYTIME LEVELS			DAYTIME LEVELS		
Leq Daytime	72.00											
Partial angle of exposure, 1-180°	180											
Partial exposure adjust., dB												
Additional Adjustment, dB												
Sub-Total Leq, dBA	**72.00**											
Angular range of incidence Case(0,1,2,3)												
Adjusted AIF	39	-28	-28	-28	-28	-28	-28	-28	-28	-28	-28	-28
Source 3: Rail	**Rail Traffic**		DAYTIME LEVELS				DAYTIME LEVELS			DAYTIME LEVELS		
Leq Daytime												
Partial angle of exposure, 1-180°	180											
Partial exposure adjust., dB												
Additional Adjustment, dB												
Sub-Total Leq, dBA												
Angular range of incidence Case(0,1,2,3)												
Adjusted AIF	-28	-28	-28	-28	-28	-28	-28	-28	-28	-28	-28	-28
Source 4:	**Road Traffic**		DAYTIME LEVELS				DAYTIME LEVELS			DAYTIME LEVELS		
Leq Daytime												
Partial angle of exposure, 1-180°	180											
Partial exposure adjust., dB												
Additional Adjustment, dB												
Sub-Total Leq, dBA												
Angular range of incidence Case(0,1,2,3)												
Adjusted AIF	-38	-38	-38	-38	-38	-38	-38	-38	-38	-38	-38	-38
Sub-Tot. 4 Sources Leq, dBA	**80.64**											
Aircraft noise NEF/NEP												
Adjust.1												
Adjust.2												
Adjusted NEF/NEP												
Approx. Overall Combined Leq	*81*											
Assume 32% W/F ratio for Living/Dining rooms in the absence of specific data	32.0											
Assumed Total # of Components (Road, Rail, and Other Sources)	3											
Assumed Total # of Components Aircraft ONLY	3											
AIF of 4 Sources	*44*											
Aircraft AIF												
Combined AIF	44											
Openable or Fixed windows ?	Openable											
Adjustment, dB/ AIF												
Regular or Laminated Glass	Laminated											
Other Adjustment (dB,AIF), Specify												
Final Adjusted AIF	38											
Minimum STC (Approx)	***45***											
NOTES	....											

	N6 Leq-AIF Master- 2019-05-16				SS WILSON ASSOCIATES			(Using NRC/MOE Pocedures)				
2022-08-02 9:14					Leq- AIF CALCULATIONS AND TYPICAL WINDOW GLAZING REQUIREMENTS							
File Number :	WA22-019				NIGHT TIME			NOTES				
Project Name :	875 Kingston				Table 4							
Description :	Pickering											
Description :								Caution: , the AIF Reported for heavy Rail Noise is the Higher of day and night				
Record Number	1	2	3	4	5	6	7	8	9	10	11	12
Consider Record	Y	N	N	N	N	N	N	N	N	N	N	N
BUILDING	South Building Façade											
FACE/ DIRECTION	South											
.....	Building Façade											
ROOM CLASSIFICATION	Bedroom											
Manual Adjust. to Criterion,												
MOE Transportation Sources Night Leq Indoor Criteria, dBA	40											
Aircraft Indoor Criteria, NEF												
Source 1: Roads	**Road Traffic**		NIGHT TIME LEVELS			NIGHT TIME LEVELS			NIGHT TIME LEVELS			
Leq Night Time	80.00											
Partial angle of exposure, degrees	180											
Partial exposure adjust., dB												
Additional Adjustment, dB												
Sub-Total Leq, dBA	**80.00**											
Angular range of incidence (0,1,2,3)												
Adjusted AIF	47	37	37	37	37	37	37	37	37	37	37	37
Source 2: Rail	**Rail Traffic**		NIGHT TIME LEVELS			NIGHT TIME LEVELS			NIGHT TIME LEVELS			
Leq Night Time	67.00											
Partial angle of exposure, degrees	180											
Partial exposure adjust., dB												
Additional Adjustment, dB												
Sub-Total Leq, dBA	**67.00**											
Angular range of incidence (0,1,2,3)												
Adjusted AIF	39	-28	-28	-28	-28	-28	-28	-28	-28	-28	-28	-28
Source 3: Rail	**Rail Traffic**		NIGHT TIME LEVELS			NIGHT TIME LEVELS			NIGHT TIME LEVELS			
Leq Night Time												
Partial angle of exposure, degrees	180											
Partial exposure adjust., dB												
Additional Adjustment, dB												
Sub-Total Leq, dBA												
Angular range of incidence (0,1,2,3)												
Adjusted AIF	-28	-28	-28	-28	-28	-28	-28	-28	-28	-28	-28	-28
Source 4:	**Road Traffic**		NIGHT TIME LEVELS			NIGHT TIME LEVELS			NIGHT TIME LEVELS			
Leq Night Time												
Partial angle of exposure, degrees	180											
Partial exposure adjust., dB												
Additional Adjustment, dB												
Sub-Total Leq, dBA												
Angular range of incidence (0,1,2,3)												
Adjusted AIF	-33	-33	-33	-33	-33	-33	-33	-33	-33	-33	-33	-33
Sub-Tot. 4 Sources Leq, dBA	**80.21**											
Aircraft noise NEF/NEP												
Adjust.1												
Adjust.2												
Adjusted NEF/NEP												
Approx. Overall Combined Leq	*80*											
Assume 20% W/F ratio for Living/Dining rooms in the absence of specific data	20.0											
Assumed Total # of Components (Road, Rail, and Other Sources)	3											
Assumed Total # of Components Aircraft ONLY	3											
AIF of 4 Sources	*47*											
Aircraft AIF												
Combined AIF	47											
Openable or Fixed windows ?	Openable											
Adjustment, dB/ AIF												
Regular or Laminated Glass	Double Laminate											
Other Adjustment												
Final Adjusted AIF	41											
Minimum STC (Approx)	*46*											
NOTES	....											

FIGURES

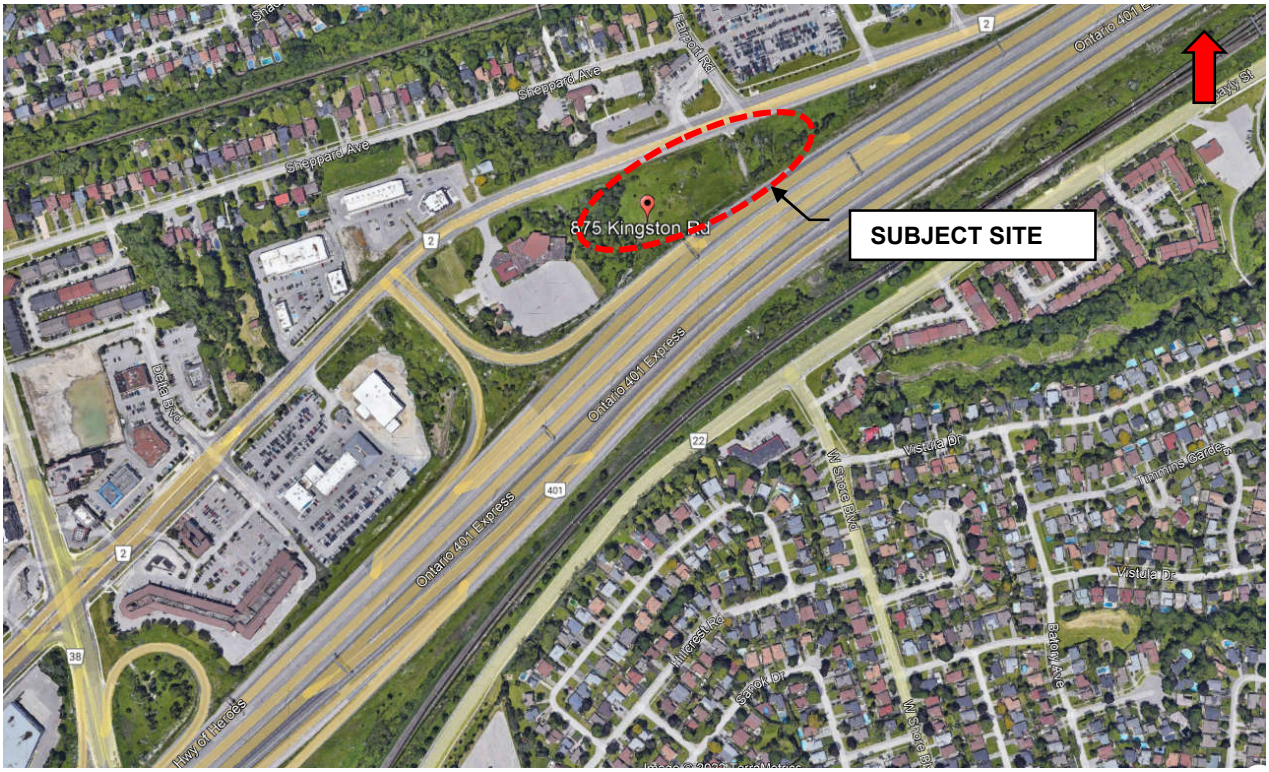

FIGURE 1
KEY PLAN

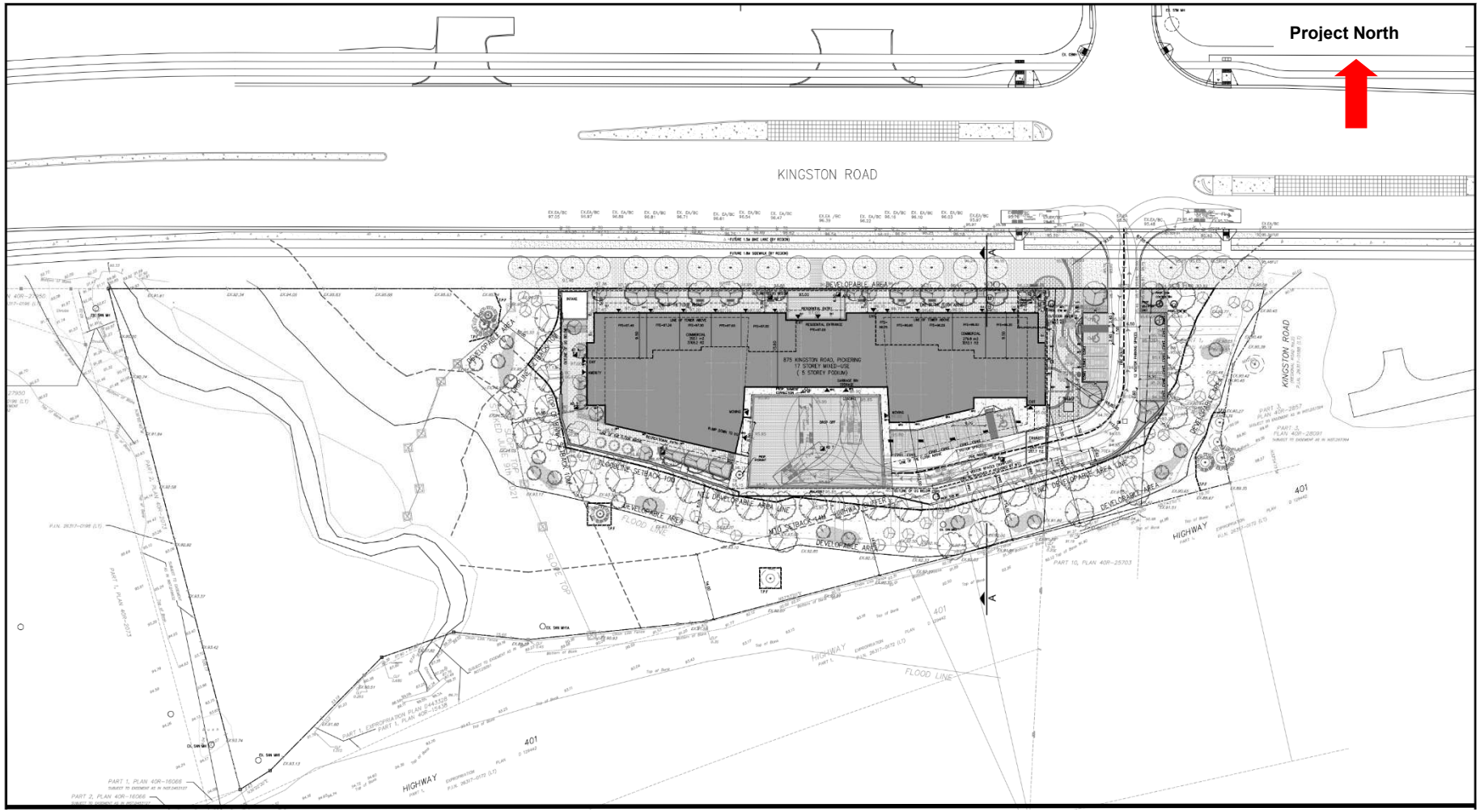

FIGURE 2
SITE PLAN

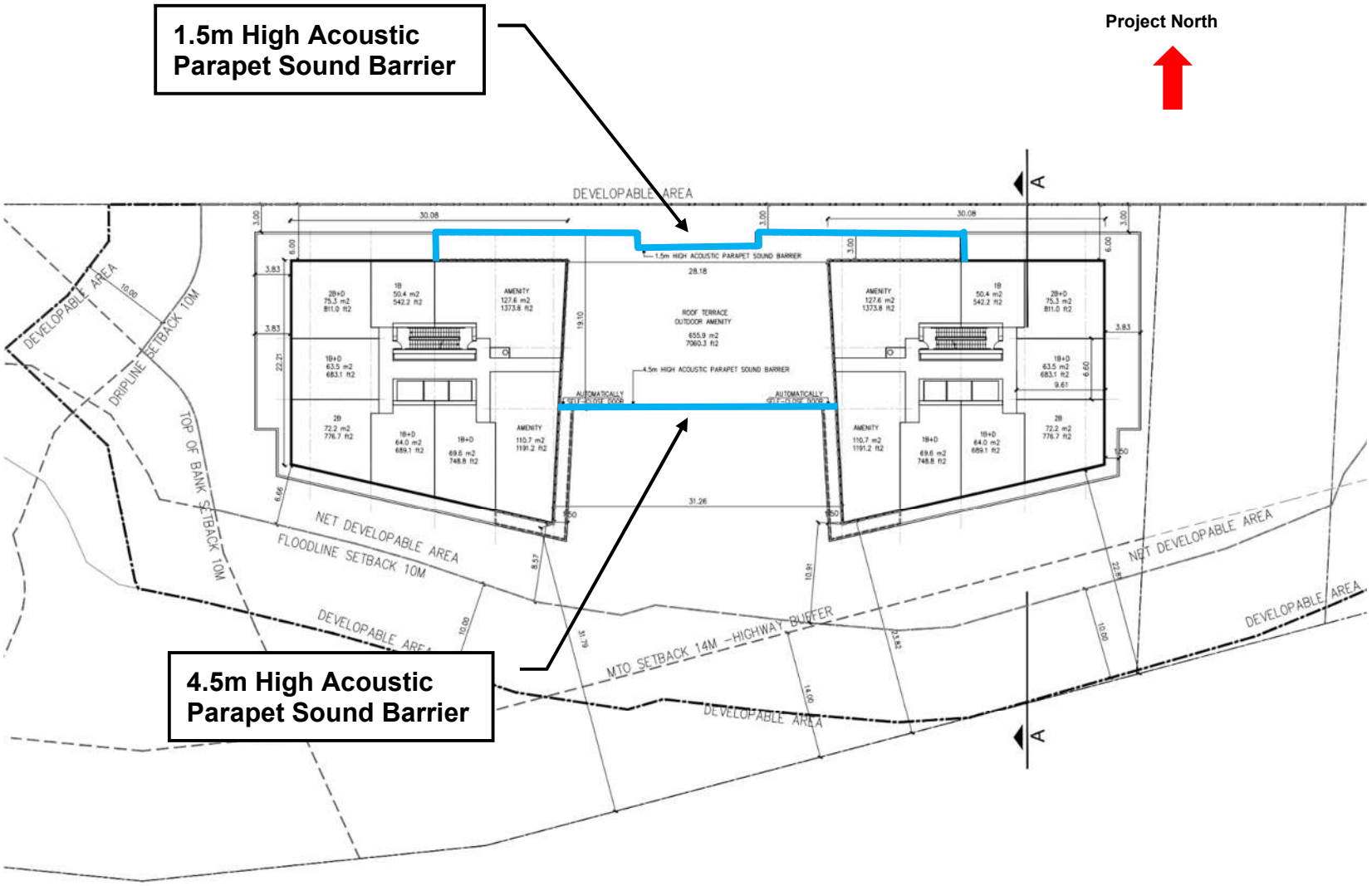

FIGURE 3
SCHEMATIC SOUND BARRIER ALIGNMENTS
6th FLOOR TERRACE

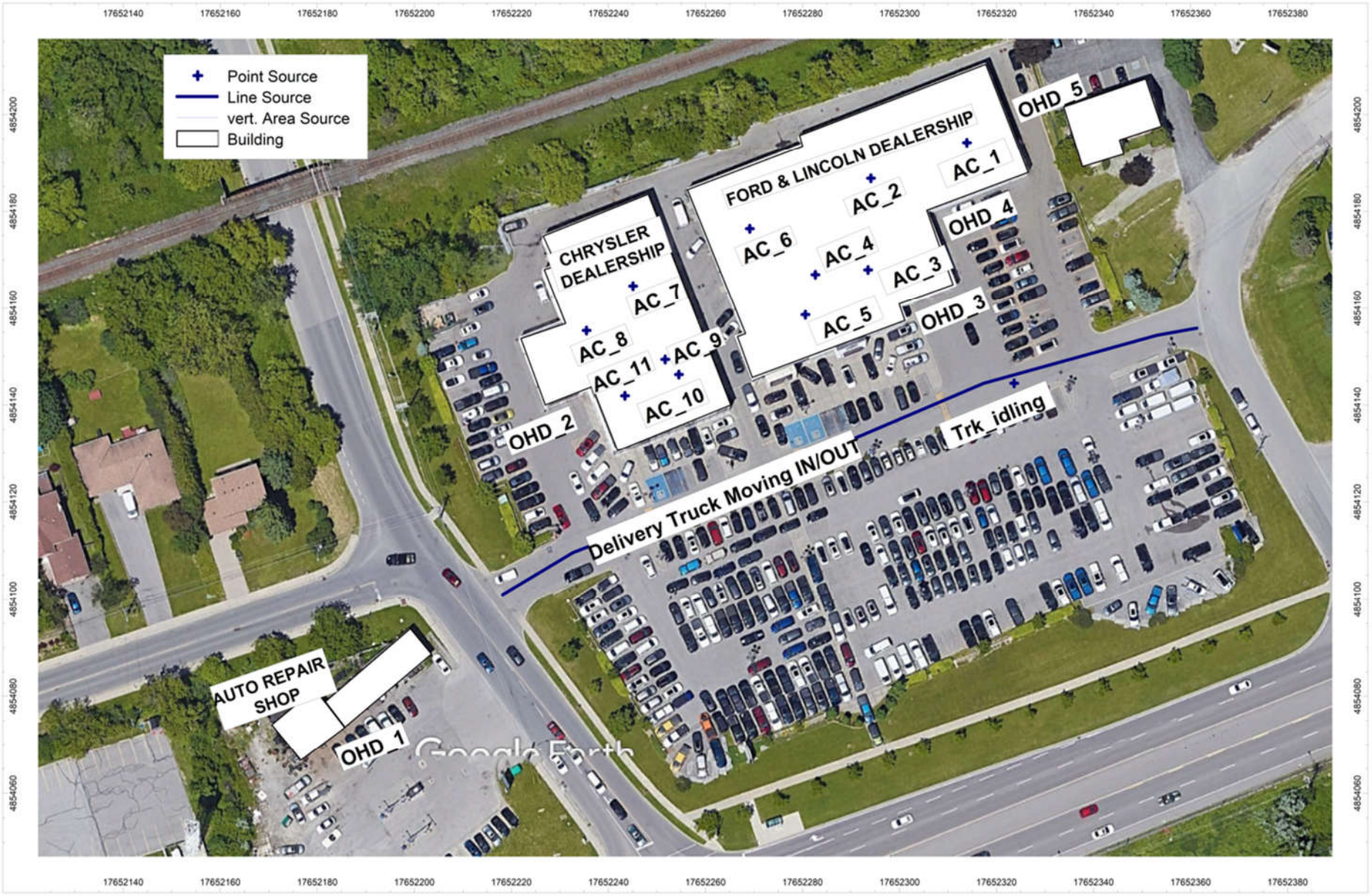

FIGURE 4A
LOCATION OF THE STATIONARY SOURCES OF NOISE EXTERNAL TO THE PROPOSED DEVELOPMENT

FIGURE 4B
LOCATION OF THE STATIONARY SOURCES OF NOISE EXTERNAL TO THE PROPOSED DEVELOPMENT

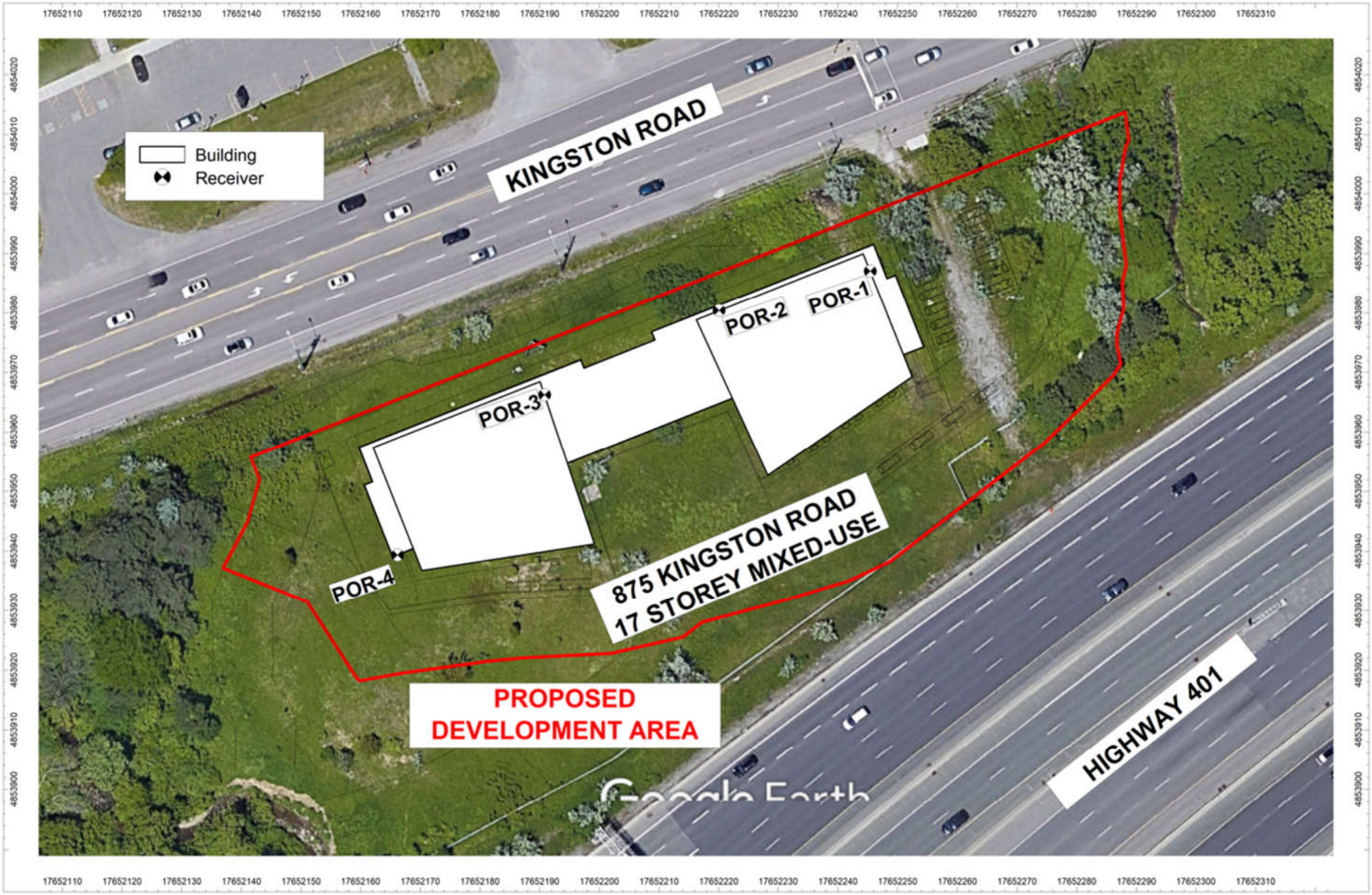

FIGURE 5
LOCATION OF THE SELECTED POINTS OF RECEPTION
RELATIVE TO THE SUBJECT AREA

FIGURE 6
RESULTING SOUND LEVEL IMPACT ONTO THE PROPOSED DEVELOPMENT AS A RESULT OF EXTERNAL STATIONARY SOURCES OF NOISE

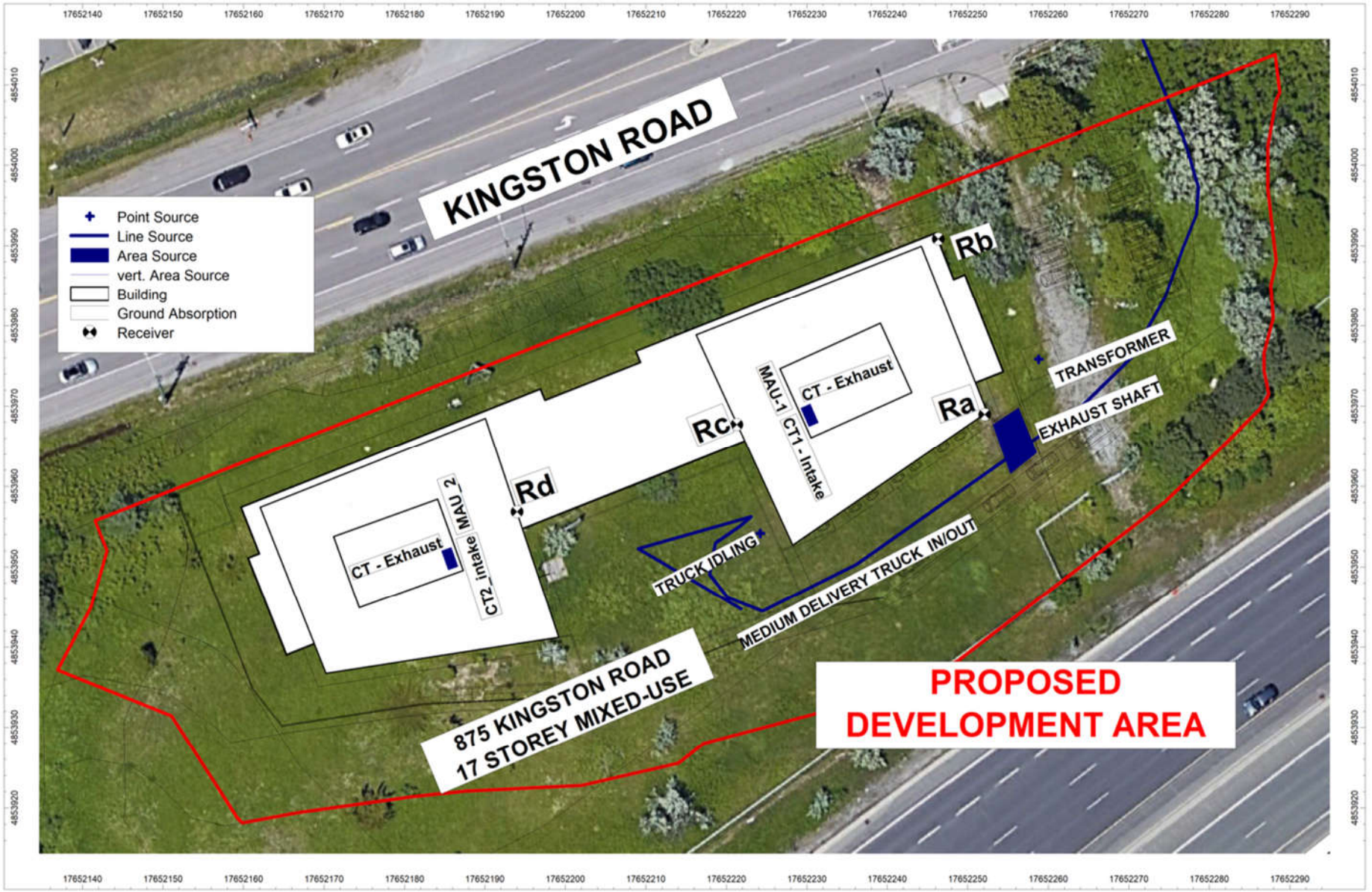

FIGURE 7
LOCATIONS OF INTERNAL POINTS OF RECEPTION

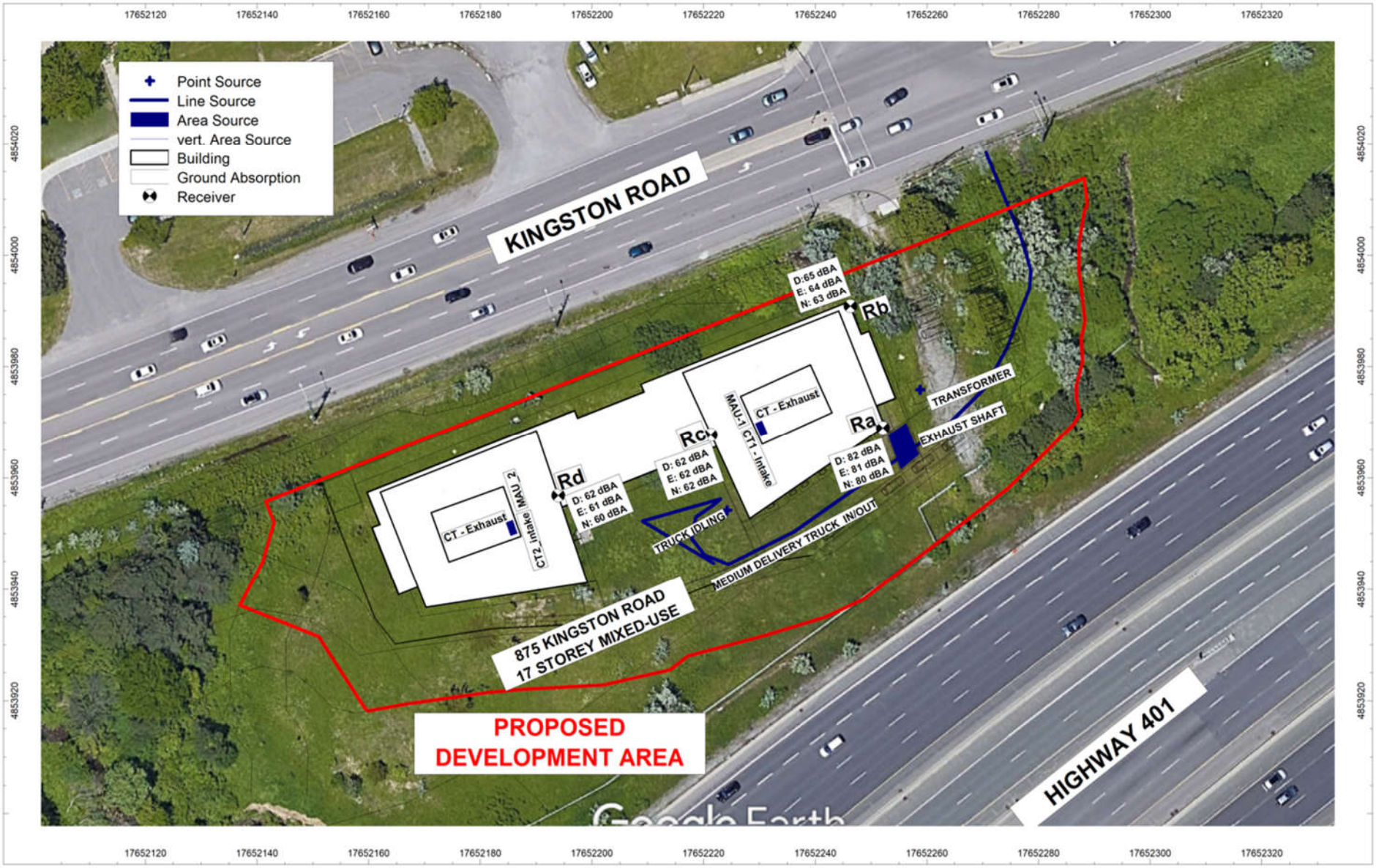

FIGURE 8
PREDICTED UNMITIAGTED SOUND LEVELS RESULTING FROM INTERNAL STATIONARY SOURCES

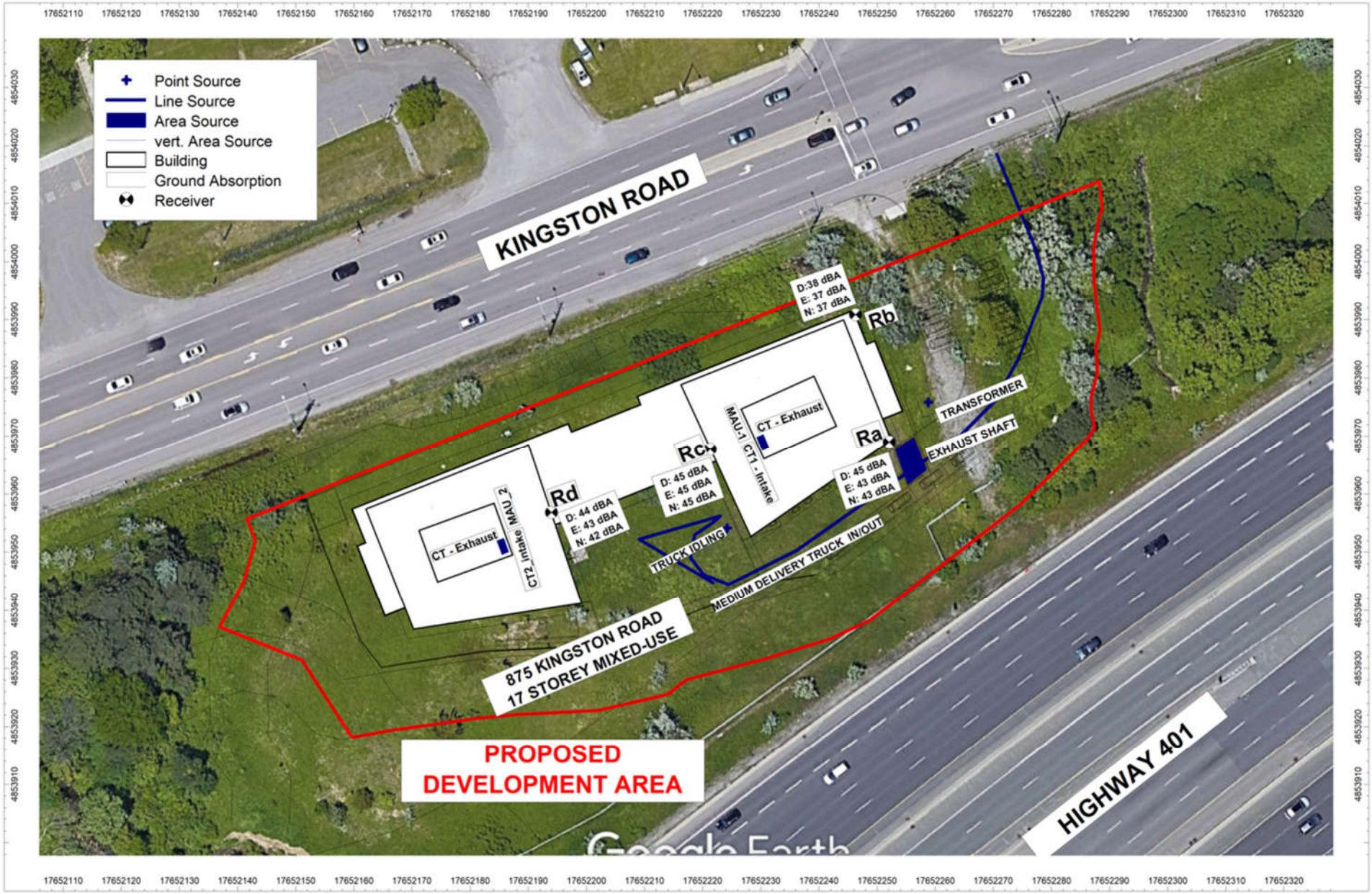

FIGURE 9
PREDICTED MITIAGTED SOUND LEVELS RESULTING FROM INTERNAL STATIONARY SOURCES

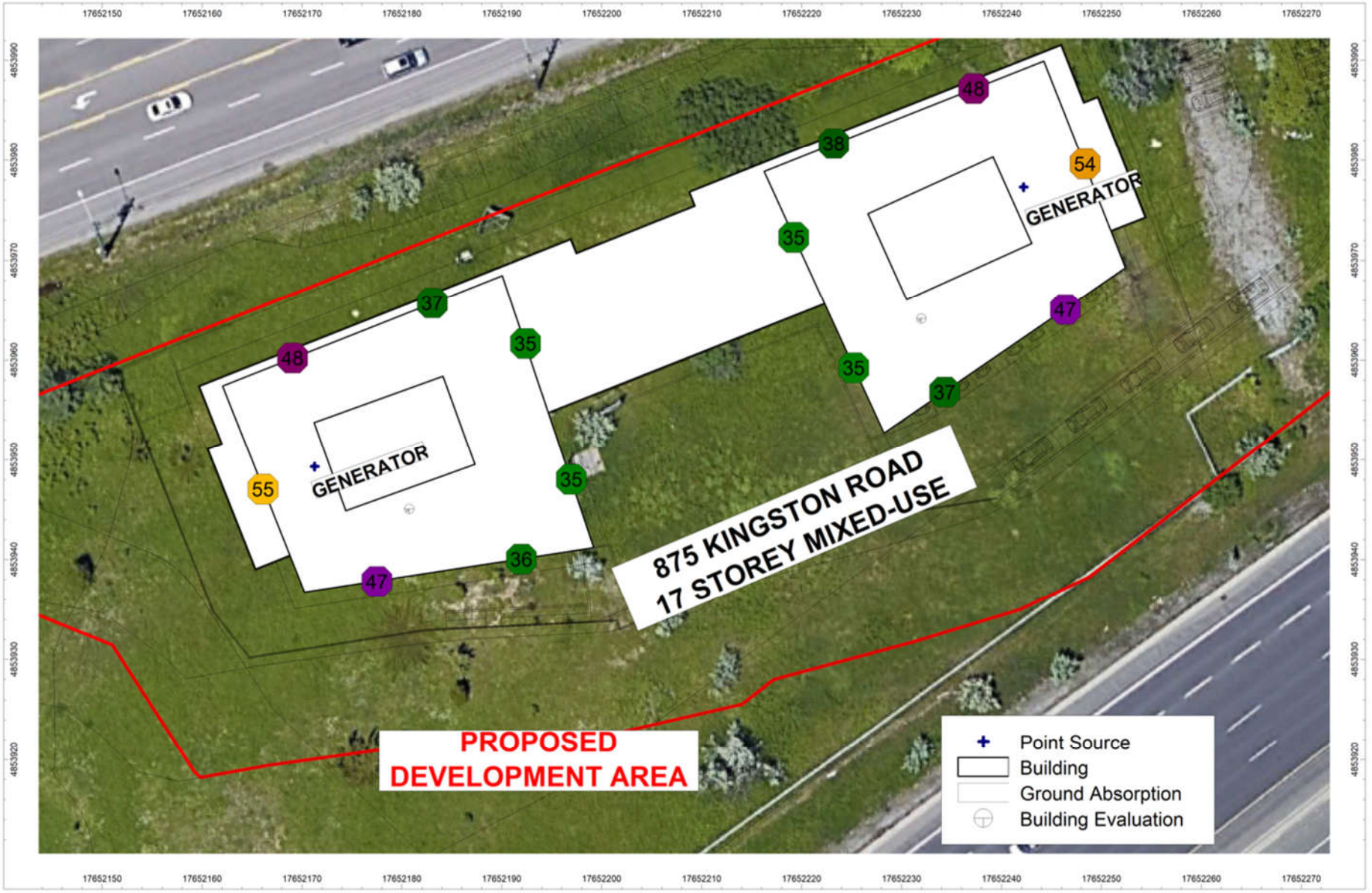

FIGURE 10
PREDICTED SOUND LEVELS RESULTING FROM TWO EMERGENCY GENERATORS

APPENDIX A

ROAD AND RAIL TRAFFIC DATA

Planning and Economic
Development Department

Planning Division

605 ROSSLAND RD. E.
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P.O. BOX 623
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Brian Bridgeman, MCIP, RPP
Commissioner of Planning and
Economic Development

The Regional Municipality of Durham

ROAD SEGMENT TRAFFIC FORECASTS FOR NOISE ANALYSES

This information is to be used as the basis for assessing the potential impacts of noise, generated by traffic on Provincial Highways and arterial roads, on proposed land uses that are sensitive (e.g., residential subdivisions). Arterial roads include existing and future Type A, B and C, as designated in the Durham Regional Official Plan.

Noise assessment reports recommend specific measures to be integrated into the design of sensitive developments to reduce road noise impacts to acceptable levels.

Provided For:

Name / Name of Firm: Cheryl McMurter, SS Wilson Associates

Address: 15 Wertheim Court, Suite 211, Richmond Hill

Telephone: (905) 707-5800 Fax:

Location of Proposal:

Hwy 2 (between Whites Road & Fairport Road) in Pickering

Municipality: Pickering Lot(s): Concession:

Durham Region File No. (if available):

Name of Property Owner (if available):

Date Request Received: April 6, 2022 Received By: Victor Copetti

Date Forecast Sent: April 8, 2022

Name of Road Segment	Forecasted AADT*	No. of Lanes	% of Trucks	Heavy : Medium Truck Ratio		Speed (km/h)
Hwy 2 (Whites Rd to Fairport Rd)	35,000	4	8	30	70	60
	0	0	0	0	0	0
	0	0	0	0	0	0
	0	0	0	0	0	0

* Average Annual Daily Traffic. Forecast based on ultimate development according to the Durham Regional Official Plan.

Highway	Location Description From	Location Description To	Dist. (KM)	2016 AADT
401	BENNETT RD IC-435-NEWCASTLE	LIBERTY ST IC 432-REG RD 14-BOWMANVILLE	2.5	82,400
401	LIBERTY ST IC 432-REG RD 14-BOWMANVILLE	WAVERLEY RD IC-431-NEWCASTLE	1.2	85,600
401	WAVERLEY RD IC-431-NEWCASTLE	HOLT RD IC-428-NEWCASTLE	2.9	89,600
401	HOLT RD IC-428-NEWCASTLE	COURTICE RD IC-425-REG RD 34-NEWCASTLE	3.2	98,000
401	COURTICE RD IC-425-REG RD 34-NEWCASTLE	BLOOR ST/HARMONY RD IC-419-REG RD 33	5.5	98,500
401	BLOOR ST/HARMONY RD IC-419-REG RD 33	RITSON RD IC-418-REG RD 16-OSHAWA	1.4	124,200
401	RITSON RD IC-418-REG RD 16-OSHAWA	SIMCOE ST IC-417-REG RD 2-OSHAWA	0.8	128,700
401	SIMCOE ST IC-417-REG RD 2-OSHAWA	STEVENSON RD IC-415-OSHAWA	1.6	134,200
401	STEVENSON RD IC-415-OSHAWA	THICKSON RD IC-412-REG RD 26-WHITBY	2.4	129,100
401	THICKSON RD IC-412-REG RD 26-WHITBY	HWY 12 IC-410-BROCK ST-WHITBY	2.5	151,200
401	HWY 12 IC-410-BROCK ST-WHITBY	SALEM RD IC 404	6.2	166,900
401	SALEM RD IC 404	WESTNEY RD IC 401	2.2	202,800
401	WESTNEY RD IC 401	BROCK RD IC-399-REG RD 1-PICKERING	2.6	210,000
401	BROCK RD IC-399-REG RD 1-PICKERING	LIVERPOOL RD IC-397-REG RD 29-PICKERING	1.7	223,000
401	LIVERPOOL RD IC-397-REG RD 29-PICKERING	WHITES RD IC-394-REG RD 38-PICKERING	2.5	230,000
401	WHITES RD IC-394-REG RD 38-PICKERING	401-HWY 2 KINGSTON RD IC 392	3.7	226,000
401	401-HWY 2 KINGSTON RD IC 392	MEADOWVALE RD IC-389-SCARBOROUGH	1.3	230,000
401	MEADOWVALE RD IC-389-SCARBOROUGH	MORNINGSIDE AV IC-387-SCARBOROUGH	2.4	230,000
401	MORNINGSIDE AV IC-387-SCARBOROUGH	NEILSON RD IC-385	1.5	260,000
401	NEILSON RD IC-385	HWY 48 IC-383-MARKHAM RD-SCARBOROUGH	1.7	280,000
401	HWY 48 IC-383-MARKHAM RD-SCARBOROUGH	MCCOWAN RD IC-381-SCARBOROUGH	1.6	291,200
401	MCCOWAN RD IC-381-SCARBOROUGH	BRIMLEY RD IC-380	0.8	329,800
401	BRIMLEY RD IC-380	KENNEDY RD IC-379-SCARBOROUGH	1.6	330,000
401	KENNEDY RD IC-379-SCARBOROUGH	WARDEN AV IC-378-SCARBOROUGH	1.6	355,000
401	WARDEN AV IC-378-SCARBOROUGH	VICTORIA PARK AV IC-376-SCARBOROUGH	1.2	334,000
401	VICTORIA PARK AV IC-376-SCARBOROUGH	HWY 404 IC-375-DON VALLEY PKWY-NORTH YORK	1.4	333,000
401	HWY 404 IC-375-DON VALLEY PKWY-NORTH YORK	LESLIE ST IC-373-NORTH YORK	2.0	348,000
401	LESLIE ST IC-373-NORTH YORK	BAYVIEW AV IC-371-NORTH YORK	1.9	332,000
401	BAYVIEW AV IC-371-NORTH YORK	HWY 11 IC-369-YONGE ST-NORTH YORK	2.0	341,500
401	HWY 11 IC-369-YONGE ST-NORTH YORK	AVENUE RD IC-367-NORTH YORK	1.7	332,000
401	AVENUE RD IC-367-NORTH YORK	BATHURST ST IC-366-NORTH YORK	1.0	343,000
401	BATHURST ST IC-366-NORTH YORK	ALLEN RD IC-365-NORTH YORK	1.4	350,000
401	ALLEN RD IC-365-NORTH YORK	DUFFERIN ST IC-364-NORTH YORK	0.7	368,000
401	DUFFERIN ST IC-364-NORTH YORK	KEELE ST IC-362-NORTH YORK	1.9	387,700
401	KEELE ST IC-362-NORTH YORK	HWY 400 IC-359-NORTH YORK	3.0	397,100
401	HWY 400 IC-359-NORTH YORK	WESTON RD IC-357-NORTH YORK	1.4	416,500
401	WESTON RD IC-357-NORTH YORK	ISLINGTON AV IC-356-ETOBICOKE	1.3	411,600
401	ISLINGTON AV IC-356-ETOBICOKE	DIXON RD IC-354-ETOBICOKE	2.4	390,700
401	DIXON RD IC-354-ETOBICOKE	HWY 427 IC 352	2.4	275,000
401	HWY 427 IC 352	RENFORTH DR IC 349	0.7	385,000
401	RENFORTH DR IC 349	DIXIE RD IC 346	4.3	352,000
401	DIXIE RD IC 346	HWYS 410 & 403 IC-344 END OF COMPLEX FRWY	1.4	340,000
401	HWYS 410 & 403 IC-344 END OF COMPLEX FRWY	HWY 10 IC-342-HURONTARIO ST-MISSISSAUGA	2.7	210,500
401	HWY 10 IC-342-HURONTARIO ST-MISSISSAUGA	MAVIS ROAD IC	2.1	216,500

SS Wilson Associates

From: Rail Data Requests <RailDataRequests@metrolinx.com>
Sent: Thursday, April 14, 2022 11:19 AM
To: SS Wilson Associates
Subject: RE: Metrolinx Rail Data Request - SSWA File No. WA22-019

Good morning Cheryl,

Further to your request dated April 6, 2022, the subject lands (875 Kingston Road, Pickering) are located within 300 metres of the Metrolinx Kingston Subdivision (which carries Lakeshore East 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 236 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)	35	35	88	42	Night (2300-0700)	8	2	18	8

The current track design speed near the subject lands is 100 mph (161 km/h).

There are no *anti-whistling by-laws* in affect near the subject lands

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 have submitted their bids to Infrastructure Ontario and Metrolinx for evaluation and contract award. GO Expansion construction will get underway in late 2022 or 2023

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.

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.

Best regards,

Date: 2022/03/18 Project Number: YRK – 2.47– Fairport Rd, Pickering ON

Dear Cheryl:

Re: Train Traffic Data – CN York Subdivision near Fairport Rd in Pickering, ON

The following is provided in response to Cheryl's 2022/04/06 request for information regarding rail traffic in the vicinity of Fairport Rd in Pickering at approximately Mile 2.47 on CN's York 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. For the purpose of noise and vibration reports, train volumes must be escalated by 2.5% per annum for a 10-year period.

Typical daily traffic volumes at this site location are as follows:

***Maximum train speed is given in Miles per Hour**

	0700-2300			
Type of Train	Volumes	Max.Consist	Max. Speed	Max. Power
Freight	13	140	50	4
Way Freight	0	25	50	4
Passenger	0	10	50	2

	2300-0700			
Type of Train	Volumes	Max.Consist	Max. Speed	Max. Power
Freight	5	140	50	4
Way Freight	0	25	50	4
Passenger	0	10	50	2

The volumes recorded reflect westbound and eastbound freight and passenger operations on CN's York Subdivision.

Except where anti-whistling bylaws are in effect, engine-warning whistles and bells are normally sounded at all at-grade crossings. There is zero (0) at-grade crossing in the immediate vicinity of the study area. 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.

APPENDIX B

SAMPLE SOUND LEVEL CALCULATIONS

STAMSON 5.0 SUMMARY REPORT Date: 02-08-2022 10:03:53
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 6thcola.te Time Period: Day/Night 16/8 hours
Description: 6th Floor-Sound Levels at Common Outdoor Living Area

```
Road data, segment # 1: Hwy 2/Whites (day/night)
-----------------------------------------------
Car traffic volume  : 29624/2576  veh/TimePeriod  *
Medium truck volume :  1803/157   veh/TimePeriod  *
Heavy truck volume  :   773/67    veh/TimePeriod  *
Posted speed limit  :    60 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):  35000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   5.60
    Heavy Truck  % of Total Volume     :   2.40
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 1: Hwy 2/Whites (day/night)
-----------------------------------------------
Angle1   Angle2           : -50.00 deg   50.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  85.00 / 85.00  m
Receiver height           :   1.50 / 16.00  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -50.00 deg   Angle2 : 50.00 deg
Barrier height            :   0.00 m
Barrier receiver distance :  15.00 / 15.00  m
Source elevation          :   0.00 m
Receiver elevation        :  16.00 m
Barrier elevation         :  16.00 m
Reference angle           :   0.00

Road data, segment # 2: Hwy 401 WB (day/night)
-----------------------------------------------
Car traffic volume  : 94385/47186 veh/TimePeriod  *
Medium truck volume : 12492/6245  veh/TimePeriod  *
Heavy truck volume  :  4164/2082  veh/TimePeriod  *
Posted speed limit  :   100 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): 115000
```

```
    Percentage of Annual Growth        :   2.50
    Number of Years of Growth          :  15.00
    Medium Truck % of Total Volume     :  11.25
    Heavy Truck  % of Total Volume     :   3.75
    Day (16 hrs) % of Total Volume     :  66.67

Data for Segment # 2: Hwy 401 WB (day/night)
--------------------------------------------
Angle1   Angle2           : -50.00 deg   50.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  65.00 / 65.00  m
Receiver height           :   1.50 / 16.00  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -50.00 deg   Angle2 : 50.00 deg
Barrier height            :   0.00 m
Barrier receiver distance :   1.00 / 1.00   m
Source elevation          :   0.00 m
Receiver elevation        :  16.00 m
Barrier elevation         :  16.00 m
Reference angle           :   0.00

Road data, segment # 3: Hwy 401 EB (day/night)
----------------------------------------------
Car traffic volume  : 94385/47186 veh/TimePeriod  *
Medium truck volume : 12492/6245  veh/TimePeriod  *
Heavy truck volume  :  4164/2082  veh/TimePeriod  *
Posted speed limit  :   100 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): 115000
    Percentage of Annual Growth        :   2.50
    Number of Years of Growth          :  15.00
    Medium Truck % of Total Volume     :  11.25
    Heavy Truck  % of Total Volume     :   3.75
    Day (16 hrs) % of Total Volume     :  66.67

Data for Segment # 3: Hwy 401 EB (day/night)
--------------------------------------------
Angle1   Angle2           : -50.00 deg   50.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 115.00 / 115.00 m
Receiver height           :   1.50 / 16.00  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -50.00 deg   Angle2 : 50.00 deg
Barrier height            :   0.00 m
Barrier receiver distance :   1.00 / 1.00   m
Source elevation          :   0.00 m
```

Receiver elevation : 16.00 m
Barrier elevation : 16.00 m
Reference angle : 0.00

Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)	
1.Hwy 2/Whites	1.24	54.59	54.59	
2.Hwy 401 WB	1.39	75.15	75.15	*
3.Hwy 401 EB	1.39	72.67	72.67	*
Total			77.12 dBA	

* Bright Zone !

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)	
1.Hwy 2/Whites	1.24	54.66	54.66	*
2.Hwy 401 WB	1.39	75.15	75.15	*
3.Hwy 401 EB	1.39	72.67	72.67	*
Total			77.12 dBA	

* Bright Zone !

TOTAL Leq FROM ALL SOURCES (DAY): 77.12
(NIGHT): 77.12

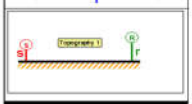
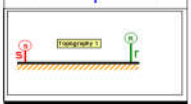
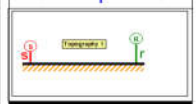
SS WILSON ASSOCIATES -*Consulting Engineers*, Richmond Hill, Ontario
RAIL TRAFFIC NOISE PREDICTION MODEL
BASED ON MOE STEAM/ORNAMENT
PROJECT NAME: 875 Kingston Rd

Revised June 8 2015

This area is free to insert any text

Name(s) of Rail Lines:	Metrolinx, CN
Receptor Name:	6th Floor Terrace
SSWA Project Number:	WA22-019
Comments	Text
Purpose of Calculation	Bldg.Facade
	Whistle Noise??

DO NOT COPY AND PASTE CELLS UNLESS YOU PASTE "VALUES" ONLY

Include the following Segments ? (No=0 or Yes=1)	1			1			1			1			1		
Rail Name & Direction	CN-FREIGHT			CN-WAY FREIGHT			CN-PASSENGER			METROLINX 1 DIESEL/ELECTRIC			METROLINX 2 DIESEL/ELECTRIC		
Rail/Segment Number or Other Data	1			1			1			1			1		
Segment Source of Noise	Locomo	Whistle	Wheels	Locomo	Whistle	Wheels	Locomo	Whistle	Wheels	Locomo	Whistle	Wheels	Locomo	Whistle	Wheels
Whistle Noise??	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes
	1			1			1			1			1		
MOE Topographic Case (1-11)-See Instructions															
	S and R on flat ground			S and R on flat ground			S and R on flat ground			S and R on flat ground			S and R on flat ground		
Traffic Data Calculation Period (24Hrs or 16/8 d/n or 1 Hr)	Day/Night			Day/Night			Day/Night			Day/Night			Day/Night		
Intermediate Surface; Absorptive or Reflective	Reflective			Reflective			Reflective			Reflective			Reflective		
Absorptive Alpha Override; Manual or Auto	Automatic			Automatic			Automatic			Automatic			Automatic		
Manual Alpha (if Cell is Blank, do not change, otherwise, input your choice for α)															
Measured Angle Case Number	1			1			1			1			1		
Angle description	-θ1 Left & +θ2 Right			-θ1 Left & +θ2 Right			-θ1 Left & +θ2 Right			-θ1 Left & +θ2 Right			-θ1 Left & +θ2 Right		
Angle Theta θ1	-50			-50			-50			-50			-50		
Angle Theta θ2	50			50			50			50			50		
Angle Theta Error Detection Flag															
Subtended Angle (Angle of Exposure), °	100			100			100			100			100		
Number of Locomotives per train	4			4			2			1			2		
Number of cars per train	140			25			10			12			12		
Number of Trains in 24 Hrs.															
Hourly Number of Trains in 1 Hour															
Number of Daytime Trains 07:00 to 23:00.	13			0			0			123			77		
Number of Night Trains 23:00 to 07:00	5			0			0			26			10		
% increase / year	2.50%			2.50%			2.50%			2.50%			2.50%		
Number of years	10			10			10			10			10		
Future Number of Trains in 24 Hrs.															
Future Hourly Number of Trains in 1 Hour															
Future Number of Daytime Trains 07:00 to 23:0	17			0			0			157			99		
Future Number of Nighttime Trains 23:00 to 07:	6			0			0			33			13		
Posted Speed (Km/Hr) [S]	80			80			80			150			150		
Wood Depth (m)	0						0			0			0		
Day time Receiver Height,m [RH] (For 24 Hrs. & Hourly also)	1.5			1.5			1.5			1.5			1.5		
Nighttime Reciever Height (m) [NRH]	1.5			1.5			1.5			1.5			1.5		
Source-Receiver Distance [SRD]	250			250			250			175			175		
Nighttime Source-Receiver Distance [NSRD]	250			250			250			175			175		
Barrier Height (m) [BH]	0			0			0			0			0		
Barrier-Receiver Distance (m)	15			15			15			1			1		
Barrier Receiver Distance Error Flag															
Ground Elevation Difference (m) [e]	0			0			0			0			0		
Source Ground Elevation (m)	0			0			0			0			0		
Receiver Ground Elevation (m)	16.3			16.3			16.3			16.3			16.3		
Barrier Ground Elevation (m)	16.3			16.3			16.3			16.3			16.3		
Include Effect of Dense Woods?	No			No			No			No			No		
Number of Rows of Houses	0			0			0			0			0		
Nighttime Number of Rows of Houses	0			0			0			0			0		
Percentage of Row Occupied by Houses (??%)	80%			80%			80%			80%			80%		
Height of Row of House [HH]	7			7			7			7			7		
Do you want to change the model frequency?	N			N			N			N			N		
Input your Choice of frequency															
Dominant Octave Frequency Band (Hz) [F]	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500

For Wheel noise ONLY: Enter a factor of -5 dB for Continously Welded Rail (CWR) and +5 dB for Trestles as applicable

Day Time [16 hours] Additional dBA Correction Factor Specify	0	0	-5	0	0	0	0	0	-5	0	1	-5	0	1	-5
	Text	Text	CWR	Text	Text	Text	Text	Text	CWR	Text	Text	CWR	Text	Text	CWR
Night Time [8 hours] Additional dBA Correction Factor- Specify	0	0	-5	0	0	0	0	0	-5	0	1	-5	0	1	-5
	Text	Text	CWR	Text	Text	Text	Text	Text	CWR	Text	Text	CWR	Text	Text	CWR
Additional Train Speed (above)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Text	Text	Text	Text	Text	Text	Text	Text	Text	Text	Text	Text	Text	Text	Text
N/A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Text	Text	Text	Text	Text	Text	Text	Text	Text	Text	Text	Text	Text	Text	Text

RESULTS FOR SEGMENTS

Daytime [16 hours] Segment Leq_{16}	60.9	0.0	0.0	66.4	66.3
Nighttime [8 hours] Segment Leq_{8}	59.8	0.0	0.0	62.7	60.5
24 Hour Daily Segment Leq_{24}	63.4	57.8	56.4	68.5	69.2
1 Hour Segment Leq_{1}	63.4	57.8	56.4	68.5	69.2

Note The predicted values may slightly differe than the MOE values

Day Time Leq (16 Hrs.)	70
Night Time Leq (8 Hrs.)	66
24 Hour Daily Leq	
1 Hour Leq	

STAMSON 5.0 SUMMARY REPORT Date: 02-08-2022 10:04:21
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 6thcolab.te Time Period: Day/Night 16/8 hours
Description: 6th Floor-Sound Levels at COLA with Barrier

Road data, segment # 1: Hwy 2/Whites (day/night)

Car traffic volume : 29624/2576 veh/TimePeriod *
Medium truck volume : 1803/157 veh/TimePeriod *
Heavy truck volume : 773/67 veh/TimePeriod *
Posted speed limit : 60 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): 35000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 5.60
Heavy Truck % of Total Volume : 2.40
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: Hwy 2/Whites (day/night)

Angle1 Angle2 : -50.00 deg 50.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 85.00 / 85.00 m
Receiver height : 1.50 / 16.00 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -50.00 deg Angle2 : 50.00 deg
Barrier height : 1.50 m
Barrier receiver distance : 15.00 / 15.00 m
Source elevation : 0.00 m
Receiver elevation : 16.00 m
Barrier elevation : 16.00 m
Reference angle : 0.00

Road data, segment # 2: Hwy 401 WB (day/night)

Car traffic volume : 94385/47186 veh/TimePeriod *
Medium truck volume : 12492/6245 veh/TimePeriod *
Heavy truck volume : 4164/2082 veh/TimePeriod *
Posted speed limit : 100 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): 115000
Percentage of Annual Growth : 2.50

```
    Number of Years of Growth          :  15.00
    Medium Truck % of Total Volume     :  11.25
    Heavy Truck  % of Total Volume     :   3.75
    Day (16 hrs) % of Total Volume     :  66.67

Data for Segment # 2: Hwy 401 WB (day/night)
--------------------------------------------
Angle1   Angle2           : -50.00 deg   50.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  65.00 / 65.00  m
Receiver height           :   1.50 / 16.00  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -50.00 deg   Angle2 : 50.00 deg
Barrier height            :   4.50 m
Barrier receiver distance :   1.00 / 1.00   m
Source elevation          :   0.00 m
Receiver elevation        :  16.00 m
Barrier elevation         :  16.00 m
Reference angle           :   0.00

Road data, segment # 3: Hwy 401 EB (day/night)
----------------------------------------------
Car traffic volume  : 94385/47186 veh/TimePeriod  *
Medium truck volume : 12492/6245  veh/TimePeriod  *
Heavy truck volume  :  4164/2082  veh/TimePeriod  *
Posted speed limit  :   100 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): 115000
    Percentage of Annual Growth        :   2.50
    Number of Years of Growth          :  15.00
    Medium Truck % of Total Volume     :  11.25
    Heavy Truck  % of Total Volume     :   3.75
    Day (16 hrs) % of Total Volume     :  66.67

Data for Segment # 3: Hwy 401 EB (day/night)
--------------------------------------------
Angle1   Angle2           : -50.00 deg   50.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  : 115.00 / 115.00 m
Receiver height           :   1.50 / 16.00  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -50.00 deg   Angle2 : 50.00 deg
Barrier height            :   4.50 m
Barrier receiver distance :   1.00 / 1.00   m
Source elevation          :   0.00 m
Receiver elevation        :  16.00 m
```

Barrier elevation : 16.00 m
Reference angle : 0.00

Result summary (day)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Hwy 2/Whites	1.24	49.99	49.99
2.Hwy 401 WB	1.39	55.15	55.15
3.Hwy 401 EB	1.39	52.67	52.67
Total			57.87 dBA

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Hwy 2/Whites	1.24	54.66	54.66 *
2.Hwy 401 WB	1.39	75.15	75.15 *
3.Hwy 401 EB	1.39	72.67	72.67 *
Total			77.12 dBA

* Bright Zone !

TOTAL Leq FROM ALL SOURCES (DAY): 57.87
(NIGHT): 77.12

SS WILSON ASSOCIATES -*Consulting Engineers*, Richmond Hill, Ontario Revised June 8 2015

RAIL TRAFFIC NOISE PREDICTION MODEL

BASED ON MOE STEAM/ORNAMENT

PROJECT NAME: 875 Kingston Rd

This area is free to insert any text

Name(s) of Rail Lines:	Metrolinx, CN
Receptor Name:	6th Floor Terrace with Barrier
SSWA Project Number:	WA22-019 Comments Text
Purpose of Calculation	Bldg.Facade Whistle Noise??

DO NOT COPY AND PASTE CELLS UNLESS YOU PASTE "VALUES" ONLY

Include the following Segments ? (No=0 or Yes=1)	CN-FREIGHT			CN-WAY FREIGHT			CN-PASSENGER			METROLINX 1 DIESEL/ELECTRIC			METROLINX 2 DIESEL/ELECTRIC		
	1			1			1			1			1		
Rail Name & Direction	CN-FREIGHT			CN-WAY FREIGHT			CN-PASSENGER			METROLINX 1 DIESEL/ELECTRIC			METROLINX 2 DIESEL/ELECTRIC		
Rail/Segment Number or Other Data	1			1			1			1			1		
Segment Source of Noise	Locomo	Whistle	Wheels	Locomo	Whistle	Wheels	Locomo	Whistle	Wheels	Locomo	Whistle	Wheels	Locomo	Whistle	Wheels
Whistle Noise??	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes
MOE Topographic Case (1-11)-See Instructions	1			1			1			1			1		
	S and R on flat ground			S and R on flat ground			S and R on flat ground			S and R on flat ground			S and R on flat ground		
Traffic Data Calculation Period *(24Hrs or 16/8 d/n or 1 Hr)*	Day/Night			Day/Night			Day/Night			Day/Night			Day/Night		
Intermediate Surface; Absorptive or Reflective	Reflective			Reflective			Reflective			Reflective			Reflective		
Absorptive Alpha Override; Manual or Auto	Automatic			Automatic			Automatic			Automatic			Automatic		
Manual Alpha (If Cell is Blank, do not change, otherwise, input your choice for α)															
Measured Angle Case Number	1			1			1			1			1		
Angle description	-θ1 Left & +θ2 Right			-θ1 Left & +θ2 Right			-θ1 Left & +θ2 Right			-θ1 Left & +θ2 Right			-θ1 Left & +θ2 Right		
Angle Theta θ1	-50			-50			-50			-50			-50		
Angle Theta θ2	50			50			50			50			50		
Angle Theta Error Detection Flag															
Subtended Angle (Angle of Exposure) °	100			100			100			100			100		
Number of Locomotives per train	4			4			2			1			2		
Number of cars per train	140			25			10			12			12		
Number of Trains in 24 Hrs.															
Hourly Number of Trains in 1 Hour															
Number of Daytime Trains 07:00 to 23:00.	13			0			0			123			77		
Number of Night Trains 23:00 to 07:00	5			0			0			26			10		
% Increase / year	2.50%			2.50%			2.50%			2.50%			2.50%		
Number of years	10			10			10			10			10		
Future Number of Trains in 24 Hrs.															
Future Hourly Number of Trains in 1 Hour															
Future Number of Daytime Trains 07:00 to 23:0	17			0			0			157			99		
Future Number of Nighttime Trains 23:00 to 07:	6			0			0			33			13		
Posted Speed (Km/Hr) [S]	80			80			80			150			150		
Wood Depth (m)	0						0			0			0		
Day time Receiver Height,m [RH] (For 24 Hrs. & Hourly alike)	1.5			1.5			1.5			1.5			1.5		
Nighttime Reciever Height (m) [NRH]	1.5			1.5			1.5			1.5			1.5		
Source-Receiver Distance [SRD]	250			250			250			175			175		
Nighttime Source-Receiver Distance [NSRD]	250			250			250			175			175		
Barrier Height (m) [BH]	4.5			4.5			4.5			4.5			4.5		
Barrier-Receiver Distance (m)	15			15			15			1			1		
Barrier Receiver Distance Error Flag															
Ground Elevation Difference (m) [e]	0			0			0			0			0		
Source Ground Elevation (m)	0			0			0			0			0		
Receiver Ground Elevation (m)	16.3			16.3			16.3			16.3			16.3		
Barrier Ground Elevation (m)	16.3			16.3			16.3			16.3			16.3		
Include Effect of Dense Woods?	No			No			No			No			No		
Number of Rows of Houses	0			0			0			0			0		
Nighttime Number of Rows of Houses	0			0			0			0			0		
Percentage of Row Occupied by Houses (??%)	80%			80%			80%			80%			80%		
Height of Row of House [HH]	7			7			7			7			7		
Do you want to change the model frequency?	N			N			N			N			N		
Input your Choice of frequency															
Dominant Octave Frequency Band (Hz) [F]	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500

For Wheel noise ONLY: Enter a factor of -5 dB for Continously Welded Rail (CWR) and +5 dB for Trestles as applicable

Day Time [16 hours] Additional dBA Correction Factor Specify	0	0	-5	0	0	0	0	0	-5	0	1	-5	0	1	-5
	Text	Text	CWR	Text	Text	Text	Text	Text	CWR	Text	Text	CWR	Text	Text	CWR
Night Time [8 hours] Additional dBA Correction Factor- Specify	0	0	-5	0	0	0	0	0	-5	0	1	-5	0	1	-5
	Text	Text	CWR	Text	Text	Text	Text	Text	CWR	Text	Text	CWR	Text	Text	CWR
Additional Train Speed (above)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Text	Text	Text	Text	Text	Text	Text	Text	Text	Text	Text	Text	Text	Text	Text
N/A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Text	Text	Text	Text	Text	Text	Text	Text	Text	Text	Text	Text	Text	Text	Text

RESULTS FOR SEGMENTS

Daytime [16 hours] Segment Leq_{16}	46.7	0.0	0.0	46.4	46.3
Nighttime [8 hours] Segment Leq_8	45.6	0.0	0.0	42.7	40.5
24 Hour Daily Segment Leq_{24}	48.5	0.0	0.0	46.5	46.3
1 Hour Segment Leq_1	48.5	0.0	0.0	46.5	46.3

Note: The predicted values may slightly differ than the MOE values

Day Time Leq (16 Hrs.)	51
Night Time Leq (8 Hrs.)	48
24 Hour Daily Leq	
1 Hour Leq	

```
STAMSON 5.0        SUMMARY REPORT        Date: 02-08-2022 10:05:00
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: southdn.te           Time Period: Day/Night 16/8 hours
Description: South-Sound Level at South Building Facade

Road data, segment # 1: Hwy 2/Whites (day/night)
----------------------------------------------
Car traffic volume  : 29624/2576  veh/TimePeriod  *
Medium truck volume :  1803/157   veh/TimePeriod  *
Heavy truck volume  :   773/67    veh/TimePeriod  *
Posted speed limit  :    60 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):  35000
    Percentage of Annual Growth        :   0.00
    Number of Years of Growth          :   0.00
    Medium Truck % of Total Volume     :   5.60
    Heavy Truck  % of Total Volume     :   2.40
    Day (16 hrs) % of Total Volume     :  92.00

Data for Segment # 1: Hwy 2/Whites (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  :  85.00 / 85.00  m
Receiver height           :  67.00 / 16.00  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 2: Hwy 401 WB (day/night)
----------------------------------------------
Car traffic volume  : 94385/47186 veh/TimePeriod  *
Medium truck volume : 12492/6245  veh/TimePeriod  *
Heavy truck volume  :  4164/2082  veh/TimePeriod  *
Posted speed limit  :   100 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): 115000
    Percentage of Annual Growth        :   2.50
    Number of Years of Growth          :  15.00
    Medium Truck % of Total Volume     :  11.25
    Heavy Truck  % of Total Volume     :   3.75
    Day (16 hrs) % of Total Volume     :  66.67

Data for Segment # 2: Hwy 401 WB (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  :  65.00 / 65.00  m
Receiver height           :  67.00 / 16.00  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 3: Hwy 401 EB (day/night)
-----------------------------------------------
Car traffic volume  : 94385/47186 veh/TimePeriod  *
Medium truck volume : 12492/6245  veh/TimePeriod  *
Heavy truck volume  :  4164/2082  veh/TimePeriod  *
Posted speed limit  :   100 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): 115000
    Percentage of Annual Growth        :   2.50
    Number of Years of Growth          :  15.00
    Medium Truck % of Total Volume     :  11.25
    Heavy Truck  % of Total Volume     :   3.75
    Day (16 hrs) % of Total Volume     :  66.67

Data for Segment # 3: Hwy 401 EB (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  : 115.00 / 115.00 m
Receiver height           :  67.00 / 16.00  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Result summary (day)
--------------------

                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !    (m)   !  (dBA)   !  (dBA)
--------------------+---------+---------+---------
 1.Hwy 2/Whites     !     1.24 !    64.81 !    64.81
 2.Hwy 401 WB       !     1.39 !    77.70 !    77.70
 3.Hwy 401 EB       !     1.39 !    75.23 !    75.23
--------------------+---------+---------+---------
                      Total                  79.79 dBA
```

Result summary (night)

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Hwy 2/Whites	1.24	57.21	57.21
2.Hwy 401 WB	1.39	77.70	77.70
3.Hwy 401 EB	1.39	75.23	75.23
Total			79.67 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 79.79
(NIGHT): 79.67

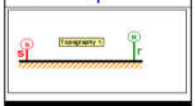
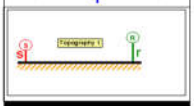
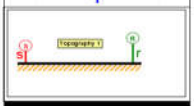
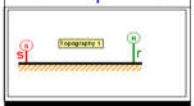
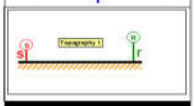
SS WILSON ASSOCIATES -*Consulting Engineers*, Richmond Hill, Ontario
RAIL TRAFFIC NOISE PREDICTION MODEL
BASED ON MOE STEAM/ORNAMENT
PROJECT NAME: 875 Kingston Rd

Revised June 8 2015

This area is free to insert any text

Name(s) of Rail Lines:	Metrolinx, CN
Receptor Name:	South Building Façade
SSWA Project Number:	WA22-019
Comments	Text
Purpose of Calculation	Bldg.Facade
	Whistle Noise??

DO NOT COPY AND PASTE CELLS UNLESS YOU PASTE "VALUES" ONLY

Include the following Segments ? (No=0 or Yes=1)	0			0			0			1			1		
Rail Name & Direction	CN-FREIGHT			CN-WAY FREIGHT			CN-PASSENGER			METROLINX 1 DIESEL/ELECTRIC			METROLINX 2 DIESEL/ELECTRIC		
Rail/Segment Number or Other Data	1			1			1			1			1		
Segment Source of Noise	Locomo	Whistle	Wheels	Locomo	Whistle	Wheels	Locomo	Whistle	Wheels	Locomo	Whistle	Wheels	Locomo	Whistle	Wheels
Whistle Noise??	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes
	1			1			1			1			1		
MOE Topographic Case (1-11)-See Instructions															
	S and R on flat ground			S and R on flat ground			S and R on flat ground			S and R on flat ground			S and R on flat ground		
Traffic Data Calculation Period *(24Hrs or 16/8 d/n or 1 Hr)*	Day/Night			Day/Night			Day/Night			Day/Night			Day/Night		
Intermediate Surface; Absorptive or Reflective	Reflective			Reflective			Reflective			Reflective			Reflective		
Absorptive Alpha Override; Manual or Auto	Automatic			Automatic			Automatic			Automatic			Automatic		
Manual Alpha (if Cell is Blank, do not change, otherwise, input your choice for α)															
Measured Angle Case Number	1			1			1			1			1		
Angle description	-θ1 Left & +θ2 Right			-θ1 Left & +θ2 Right			-θ1 Left & +θ2 Right			-θ1 Left & +θ2 Right			-θ1 Left & +θ2 Right		
Angle Theta θ1	-50			-50			-50			-90			-90		
Angle Theta θ2	50			50			50			90			90		
Angle Theta Error Detection Flag															
Subtended Angle (Angle of Exposure). °	100			100			100			180			180		
Number of Locomotives per train	4			4			2			1			2		
Number of cars per train	140			25			10			12			12		
Number of Trains in 24 Hrs.															
Hourly Number of Trains in 1 Hour															
Number of Daytime Trains 07:00 to 23:00.	13			0			0			123			77		
Number of Night Trains 23:00 to 07:00	5			0			0			26			10		
% increase / year	2.50%			2.50%			2.50%			2.50%			2.50%		
Number of years	10			10			10			10			10		
Future Number of Trains in 24 Hrs.															
Future Hourly Number of Trains in 1 Hour															
Future Number of Daytime Trains 07:00 to 23:0	17			0			0			157			99		
Future Number of Nighttime Trains 23:00 to 07	6			0			0			33			13		
Posted Speed (Km/Hr) [S]	80			80			80			150			150		
Wood Depth (m)	0						0			0			0		
Day time Receiver Height,m [RH] (For 24 Hrs. & Hourly also)	1.5			1.5			1.5			67			67		
Nighttime Reciever Height (m) [NRH]	1.5			1.5			1.5			67			67		
Source-Receiver Distance [SRD]	250			250			250			175			175		
Nighttime Source-Receiver Distance [NSRD]	250			250			250			175			175		
Barrier Height (m) [BH]	0			0			0			0			0		
Barrier-Receiver Distance (m)	1			1			1			1			1		
Barrier Receiver Distance Error Flag															
Ground Elevation Difference (m) [e]	0			0			0			0			0		
Source Ground Elevation (m)	0			0			0			0			0		
Receiver Ground Elevation (m)	16.3			16.3			16.3			0			0		
Barrier Ground Elevation (m)	16.3			16.3			16.3			0			0		
Include Effect of Dense Woods?	No			No			No			No			No		
Number of Rows of Houses	0			0			0			0			0		
Nighttime Number of Rows of Houses	0			0			0			0			0		
Percentage of Row Occupied by Houses (??%)	80%			80%			80%			80%			80%		
Height of Row of House [HH]	7			7			7			7			7		
Do you want to change the model frequency?	N			N			N			N			N		
Input your Choice of frequency															
Dominant Octave Frequency Band (Hz) [F]	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500
For Wheel noise ONLY: Enter a factor of -5 dB for Continously Welded Rail (CWR) and +5 dB for Trestles as applicable															
Day Time [16 hours] Additional dBA Correction Factor Specify	0 Text	0 Text	-5 CWR	0 Text	0 Text	0 Text	0 Text	0 Text	-5 CWR	0 Text	1 Text	-5 CWR	0 Text	1 Text	-5 CWR
Night Time [8 hours] Additional dBA Correction Factor- Specify	0 Text	0 Text	-5 CWR	0 Text	0 Text	0 Text	0 Text	0 Text	-5 CWR	0 Text	1 Text	-5 CWR	0 Text	1 Text	-5 CWR
Additional Train Speed (above)	0 Text	0 Text	0 Text	0 Text	0 Text	0 Text	0 Text	0 Text	0 Text	0 Text	0 Text	0 Text	0 Text	0 Text	0 Text
N/A	0 Text	0 Text	0 Text	0 Text	0 Text	0 Text	0 Text	0 Text	0 Text	0 Text	0 Text	0 Text	0 Text	0 Text	0 Text

RESULTS FOR SEGMENTS

Daytime [16 hours] Segment Leq_{16}	0.0	0.0	0.0	69.0	68.9
Nighttime [8 hours] Segment Leq_{8}	0.0	0.0	0.0	65.2	63.0
24 Hour Daily Segment Leq_{24}	0.0	0.0	0.0	67.8	67.3
1 Hour Segment Leq_{1}	0.0	0.0	0.0	67.8	67.3

Note: The predicted values may slightly differe than the MOE values

Day Time Leq (16 Hrs.)	72
Night Time Leq (8 Hrs.)	67
24 Hour Daily Leq	70
1 Hour Leq	70

APPENDIX C

SAMPLE STATIONARY CALCULATIONS

POR-1 External Stationary Source Calculations

Configuration	
Parameter	Value
General	
Country	(user defined)
Max. Error (dB)	0.00
Max. Search Radius (m)	2000.00
Min. Dist Src to Rcvr	0.00
Partition	
Raster Factor	0.50
Max. Length of Section (m)	1000.00
Min. Length of Section (m)	1.00
Min. Length of Section (%)	0.00
Proj. Line Sources	On
Proj. Area Sources	On
Ref. Time	
Reference Time Day (min)	960.00
Reference Time Night (min)	480.00
Daytime Penalty (dB)	0.00
Recr. Time Penalty (dB)	6.00
Night-time Penalty (dB)	10.00
DTM	
Standard Height (m)	0.00
Model of Terrain	Triangulation
Reflection	
max. Order of Reflection	2
Search Radius Src	100.00
Search Radius Rcvr	100.00
Max. Distance Source - Rcvr	1000.00 1000.00
Min. Distance Rvcr - Reflector	1.00 1.00
Min. Distance Source - Reflector	0.10
Industrial (ISO 9613)	
Lateral Diffraction	some Obj
Obst. within Area Src do not shield	On
Screening	Excl. Ground Att. over Barrier
Dz with limit (20/25)	
Barrier Coefficients C1,2,3	3.0 20.0 0.0
Temperature (°C)	10
rel. Humidity (%)	70
Ground Absorption G	0.00
Wind Speed for Dir. (m/s)	3.0
Roads (TNM)	
Railways (Schall 03 (1990))	
Strictly acc. to Schall 03 / Schall-Transrapid	
Aircraft (???)	
Strictly acc. to AzB	

Receiver
Name: POR-1
ID: POR_1
X: 17652245.41
Y: 4853987.07
Z: 46.00

Point Source, ISO 9613, Name: "AC-7 - 25 Ton", ID: "AC_7"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I⁄a	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
1	17652245.08	4854164.61	9.00	0	D	A	94.0	0.0	0.0	0.0	56.2	0.7	-2.8	0.0	0.0	0.0	0.0	0.0	40.0

Point Source, ISO 9613, Name: "AC-2 - 25 Ton", ID: "AC_2"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I⁄a	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
2	17652294.11	4854186.80	9.00	0	D	A	94.0	0.0	0.0	0.0	57.4	0.8	-2.9	0.0	0.0	0.0	0.0	0.0	38.7

Point Source, ISO 9613, Name: "AC-12 - 25 Ton", ID: "AC_12"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I⁄a	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
3	17652067.74	4853882.54	11.00	0	D	A	94.0	0.0	0.0	0.0	57.4	0.8	-1.9	0.0	0.0	23.5	0.0	0.0	14.2

Point Source, ISO 9613, Name: "AC-1 - 25 Ton", ID: "AC_1"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I⁄a	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
5	17652313.89	4854194.21	9.00	0	D	A	94.0	0.0	0.0	0.0	57.9	0.8	-2.7	0.0	0.0	0.0	0.0	0.0	38.0

Point Source, ISO 9613, Name: "AC-16 - 25 Ton", ID: "AC_16"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I⁄a	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
7	17652052.38	4853870.96	11.00	0	D	A	94.0	0.0	0.0	0.0	58.2	0.8	-2.0	0.0	0.0	23.5	0.0	0.0	13.5

Point Source, ISO 9613, Name: "AC-18 - 25 Ton", ID: "AC_18"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I⁄a	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
9	17652034.65	4853869.90	11.00	0	D	A	94.0	0.0	0.0	0.0	58.7	0.9	-2.1	0.0	0.0	23.3	0.0	0.0	13.1

Point Source, ISO 9613, Name: "AC-21 - 25 Ton", ID: "AC_25"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I⁄a	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
11	17652023.66	4853857.39	11.00	0	D	A	94.0	0.0	0.0	0.0	59.3	0.9	-2.1	0.0	0.0	23.4	0.0	0.0	12.5

Point Source, ISO 9613, Name: "AC-11 - 10 Ton", ID: "AC_11"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I⁄a	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
13	17652243.43	4854141.91	9.00	0	D	A	88.0	0.0	0.0	0.0	55.0	0.6	-2.8	0.0	0.0	0.0	0.0	0.0	35.1

Point Source, ISO 9613, Name: "AC-10 - 10 Ton", ID: "AC_10"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I⁄a	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
27	17652254.54	4854146.28	9.00	0	D	A	88.0	0.0	0.0	0.0	55.3	0.6	-2.9	0.0	0.0	0.0	0.0	0.0	35.0

Point Source, ISO 9613, Name: "AC-5 - 10Ton", ID: "AC_5"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I⁄a	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
31	17652280.61	4854158.61	9.00	0	D	A	88.0	0.0	0.0	0.0	56.1	0.7	-2.9	0.0	0.0	0.0	0.0	0.0	34.2

Point Source, ISO 9613, Name: "AC-6 - 10 Ton", ID: "AC_6"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I⁄a	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
33	17652269.16	4854176.41	9.00	0	D	A	88.0	0.0	0.0	0.0	56.8	0.7	-2.9	0.0	0.0	0.0	0.0	0.0	33.4

POR-1 External Stationary Source Calculations

Point Source, ISO 9613, Name: "AC-15 - 10 Tons", ID: "AC_15"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	Wa	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
39	17652060.79	4853886.58	11.00	0	D	A	88.0	0.0	0.0	0.0	57.6	0.8	-2.0	0.0	0.0	23.3	0.0	0.0	8.3

Point Source, ISO 9613, Name: "AC-9 - 5 Ton", ID: "AC_9"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	Wa	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
43	17652251.70	4854149.39	8.50	0	D	A	84.3	0.0	0.0	0.0	55.4	0.3	-2.8	0.0	0.0	0.0	0.0	0.0	31.4

Point Source, ISO 9613, Name: "AC-8 - 5 Ton", ID: "AC_8"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	Wa	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
45	17652235.48	4854155.35	8.50	0	D	A	84.3	0.0	0.0	0.0	55.7	0.3	-2.7	0.0	0.0	0.0	0.0	0.0	31.0

Point Source, ISO 9613, Name: "AC-4 - 5 Ton", ID: "AC_4"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	Wa	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
77	17652282.66	4854166.95	8.50	0	D	A	84.3	0.0	0.0	0.0	56.5	0.3	-2.9	0.0	0.0	0.0	0.0	0.0	30.4

Point Source, ISO 9613, Name: "AC-3 - 5 Ton", ID: "AC_3"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	Wa	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
81	17652293.51	4854167.94	8.50	0	D	A	84.3	0.0	0.0	0.0	56.6	0.3	-2.8	0.0	0.0	0.0	0.0	0.0	30.1

vert. Area Source, ISO 9613, Name: "JK Tire & Auto Overhead Door 1", ID: "OHD_1"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	Wa	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
15	17652180.60	4854069.65	1.06	0	D	A	85.7	8.5	0.0	0.0	52.2	1.1	-2.8	0.0	0.0	8.3	0.0	0.0	35.4
21	17652180.60	4854069.65	3.06	0	D	A	85.7	8.5	0.0	0.0	52.1	1.1	-2.5	0.0	0.0	8.4	0.0	0.0	35.1
25	17652180.60	4854069.65	2.06	0	D	A	85.7	8.5	0.0	0.0	52.1	1.1	-2.1	0.0	0.0	8.4	0.0	0.0	34.7
127	17652180.60	4854069.65	0.46	0	D	A	85.7	1.5	0.0	0.0	52.2	1.1	-2.8	0.0	0.0	8.3	0.0	0.0	28.4

Point Source, ISO 9613, Name: "AC-20 - 5 Ton", ID: "AC_20"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	Wa	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
130	17652021.68	4853878.97	10.80	0	D	A	84.3	0.0	0.0	0.0	59.0	0.4	-2.0	0.0	0.0	18.5	0.0	0.0	8.5

Point Source, ISO 9613, Name: "AC-26 - 5 Ton", ID: "AC_26"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	Wa	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
165	17652020.03	4853862.10	10.80	0	D	A	84.3	0.0	0.0	0.0	59.3	0.4	-2.1	0.0	0.0	18.8	0.0	0.0	7.9

Point Source, ISO 9613, Name: "AC-27 - 5 Ton", ID: "AC_27"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	Wa	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
167	17652005.53	4853867.59	10.80	0	D	A	84.3	0.0	0.0	0.0	59.6	0.4	-2.1	0.0	0.0	18.5	0.0	0.0	7.9

vert. Area Source, ISO 9613, Name: "Chrysler Dealership Overhead Door 1", ID: "OHD_2"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	Wa	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
48	17652231.73	4854141.81	3.00	0	D	A	84.5	8.5	0.0	0.0	55.1	1.3	-2.5	0.0	0.0	0.0	0.0	0.0	39.0
53	17652233.40	4854142.46	3.00	1	D	A	84.5	5.3	0.0	0.0	55.3	1.3	-2.6	0.0	0.0	0.0	0.0	1.8	34.0
56	17652231.73	4854141.81	2.00	0	D	A	84.5	8.5	0.0	0.0	55.2	1.3	-2.2	0.0	0.0	0.0	0.0	0.0	38.7
59	17652233.40	4854142.46	2.00	1	D	A	84.5	5.3	0.0	0.0	55.3	1.3	-2.9	0.0	0.0	0.0	0.0	1.9	34.2
64	17652231.73	4854141.81	1.00	0	D	A	84.5	8.5	0.0	0.0	55.2	1.3	-2.8	0.0	0.0	0.0	0.0	0.0	39.3
66	17652233.40	4854142.46	1.00	1	D	A	84.5	5.3	0.0	0.0	55.3	1.3	-2.9	0.0	0.0	0.0	0.0	1.9	34.2
69	17652231.73	4854141.81	4.00	0	D	A	84.5	8.5	0.0	0.0	55.1	1.3	-2.6	0.0	0.0	0.0	0.0	0.0	39.1
73	17652233.40	4854142.46	4.00	1	D	A	84.5	5.3	0.0	0.0	55.3	1.3	-2.7	0.0	0.0	0.0	0.0	1.9	34.1
170	17652231.73	4854141.81	0.40	0	D	A	84.5	1.5	0.0	0.0	55.2	1.3	-2.8	0.0	0.0	0.0	0.0	0.0	32.3
173	17652233.40	4854142.46	0.40	1	D	A	84.5	-1.6	0.0	0.0	55.3	1.3	-2.9	0.0	0.0	0.0	0.0	1.9	27.2

Point Source, ISO 9613, Name: "Delivery Truck Idling", ID: "Trk_idling"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	Wa	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
177	17652323.62	4854144.49	3.00	0	D	A	86.7	0.0	0.0	0.0	56.2	0.7	-2.6	0.0	0.0	0.0	0.0	0.0	32.5

vert. Area Source, ISO 9613, Name: "Ford Dealership Overhead Door 1", ID: "OHD_3"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
88	17652304.92	4854162.61	1.95	0	D	A	84.5	8.5	0.0	0.0	56.6	1.5	-2.8	0.0	0.0	0.0	0.0	0.0	37.8
96	17652304.92	4854162.61	0.95	0	D	A	84.5	8.5	0.0	0.0	56.6	1.5	-2.8	0.0	0.0	0.0	0.0	0.0	37.7
100	17652304.92	4854162.61	3.95	0	D	A	84.5	8.5	0.0	0.0	56.6	1.5	-2.5	0.0	0.0	0.0	0.0	0.0	37.5
104	17652304.92	4854162.61	2.95	0	D	A	84.5	8.5	0.0	0.0	56.6	1.5	-2.8	0.0	0.0	0.0	0.0	0.0	37.8
180	17652304.92	4854162.61	0.35	0	D	A	84.5	1.5	0.0	0.0	56.6	1.5	-2.8	0.0	0.0	0.0	0.0	0.0	30.7

vert. Area Source, ISO 9613, Name: "Ford Dealership Overhead Door 2", ID: "OHD_4"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
108	17652306.70	4854177.27	2.92	0	D	A	86.6	5.9	0.0	0.0	57.2	1.5	-2.8	0.0	0.0	15.8	0.0	0.0	20.8
112	17652305.98	4854179.32	2.95	0	D	A	86.6	-3.7	0.0	0.0	57.3	1.5	-2.9	0.0	0.0	16.1	0.0	0.0	10.9
116	17652306.63	4854177.47	3.92	0	D	A	86.6	6.4	0.0	0.0	57.2	1.5	-2.8	0.0	0.0	15.4	0.0	0.0	21.7
120	17652306.63	4854177.47	0.92	0	D	A	86.6	6.4	0.0	0.0	57.2	1.5	-2.8	0.0	0.0	16.2	0.0	0.0	20.9
123	17652306.63	4854177.47	1.92	0	D	A	86.6	6.4	0.0	0.0	57.2	1.5	-2.8	0.0	0.0	16.1	0.0	0.0	21.0
184	17652306.63	4854177.47	0.32	0	D	A	86.6	-0.6	0.0	0.0	57.2	1.5	-2.8	0.0	0.0	16.3	0.0	0.0	13.8

vert. Area Source, ISO 9613, Name: "Ford Dealership Overhead Door 3", ID: "OHD_5"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
133	17652323.03	4854197.09	3.88	0	D	A	86.9	6.1	0.0	0.0	58.2	1.6	-2.9	0.0	0.0	15.1	0.0	0.0	20.9
138	17652322.45	4854198.57	3.88	1	D	A	86.9	-0.4	0.0	0.0	58.7	1.7	-2.8	0.0	0.0	0.0	0.0	1.2	27.7
143	17652323.03	4854197.09	2.88	0	D	A	86.9	6.1	0.0	0.0	58.2	1.6	-2.9	0.0	0.0	15.6	0.0	0.0	20.5
146	17652322.45	4854198.57	2.88	1	D	A	86.9	-0.4	0.0	0.0	58.7	1.7	-2.8	0.0	0.0	0.0	0.0	1.2	27.7
148	17652323.03	4854197.09	0.88	0	D	A	86.9	6.1	0.0	0.0	58.2	1.6	-2.9	0.0	0.0	15.9	0.0	0.0	20.2
153	17652322.45	4854198.57	0.88	1	D	A	86.9	-0.4	0.0	0.0	58.8	1.7	-2.8	0.0	0.0	0.0	0.0	1.2	27.7
158	17652323.03	4854197.09	1.88	0	D	A	86.9	6.1	0.0	0.0	58.2	1.6	-2.9	0.0	0.0	15.8	0.0	0.0	20.3
162	17652322.45	4854198.57	1.88	1	D	A	86.9	-0.4	0.0	0.0	58.8	1.7	-2.8	0.0	0.0	0.0	0.0	1.2	27.7
190	17652323.03	4854197.09	0.28	0	D	A	86.9	-0.9	0.0	0.0	58.2	1.6	-2.9	0.0	0.0	15.9	0.0	0.0	13.1
194	17652322.45	4854198.57	0.28	1	D	A	86.9	-7.4	0.0	0.0	58.8	1.7	-2.8	0.0	0.0	0.0	0.0	1.2	20.7

Point Source, ISO 9613, Name: "AC-14 - 3 Ton", ID: "AC_14"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
203	17652060.92	4853888.63	10.20	0	D	A	75.0	0.0	0.0	0.0	57.5	0.8	-2.0	0.0	0.0	23.3	0.0	0.0	-4.7

Point Source, ISO 9613, Name: "AC-13 - 3 Ton", ID: "AC_13"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
207	17652067.21	4853873.21	10.20	0	D	A	75.0	0.0	0.0	0.0	57.6	0.8	-1.9	0.0	0.0	23.6	0.0	0.0	-5.2

Point Source, ISO 9613, Name: "AC-17 - 3 Ton", ID: "AC_17"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
214	17652045.90	4853866.46	10.20	0	D	A	75.0	0.0	0.0	0.0	58.5	0.9	-2.0	0.0	0.0	23.5	0.0	0.0	-5.8

Point Source, ISO 9613, Name: "AC-19 - 3 Ton", ID: "AC_19"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
225	17652029.82	4853872.29	10.20	0	D	A	75.0	0.0	0.0	0.0	58.8	0.9	-2.1	0.0	0.0	23.2	0.0	0.0	-5.9

Line Source, ISO 9613, Name: "Delivery Truck Moving", ID: "DT_Moving"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
186	17652245.72	4854114.65	3.00	0	D	A	66.5	14.5	0.0	0.0	53.6	0.5	-2.7	0.0	0.0	0.0	0.0	0.0	29.6
196	17652260.05	4854120.24	3.00	0	D	A	66.5	4.5	0.0	0.0	54.0	0.5	-2.9	0.0	0.0	0.0	0.0	0.0	19.4
200	17652273.81	4854126.02	3.00	0	D	A	66.5	14.3	0.0	0.0	54.4	0.5	-2.8	0.0	0.0	0.0	0.0	0.0	28.7
210	17652301.82	4854137.87	3.00	0	D	A	66.5	15.3	0.0	0.0	55.4	0.6	-2.5	0.0	0.0	0.0	0.0	0.0	28.2
216	17652335.23	4854149.42	3.00	0	D	A	66.5	15.7	0.0	0.0	56.6	0.7	-2.7	0.0	0.0	0.0	0.0	0.0	27.6
220	17652225.44	4854105.30	3.00	0	D	A	66.5	12.3	0.0	0.0	53.1	0.5	-2.3	0.0	0.0	0.0	0.0	0.0	27.5
226	17652357.19	4854155.10	3.00	0	D	A	66.5	9.2	0.0	0.0	57.3	0.8	-2.6	0.0	0.0	0.0	0.0	0.0	20.2