SS WILSON ASSOCIATES
Consulting Engineers

REPORT NO. WA21-053A

NOISE CONTROL FEASIBILITY STUDY
PROPOSED RESIDENTIAL SUBDIVISION
NW CORNER OF MOORE DRIVE AND
PETERBOROUGH ROAD 28
FRASERVILLE, ON

SUBMITTED TO:

RIC (HIGHWAY 28) INC., AND
RIC (MOORE DRIVE) INC.

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1.0 INTRODUCTION

1.1 The services of SS Wilson Associates (SSWA) were retained by Romspen, d.b.a. RIC (Highway 28) Inc. and RIC (Moore Drive) Inc., to prepare a Noise Control Feasibility Study for the proposed residential development located at the North West corner of Moore Drive and Peterborough Road 28 in Fraserville, Ontario.

The objective of this report is to support an application for Draft Plan Approval of the proposed development.

1.2 The site is bounded by the following land uses:
- to the north by Moore Drive, and further by Highway 115
- to the south by the Kawartha Downs
- to the east by Peterborough County Road 28
- to the west by natural and agricultural land uses

The location of the site is shown in Figure 1.

1.3 Major features of the development are defined by the Draft Plan drawing prepared by D.G. Biddle & Associates Limited, Drawing DP-1, dated April 29, 2022.

Figure 2 illustrates the general layout of the proposed development. Figure 3 illustrates the proximity of the proposed layout to the proposed Kawartha Downs facility

1.4 Major surface transportation noise sources (current and future) of concern to the development are:
1. Peterborough Road 28
2. Highway 115

1.5 The major stationary noise source (current and future) of concern to the development is the Kawartha Downs, particularly the buildings and associated equipment, to the south of the development. The noise impact from the proposed theatre at Kawartha Downs due to occasional entertainment events has not been considered as part of this assessment, and an assessment will be prepared at a later date to comply with applicable zoning and local and municipal guidelines.

1.6 The proposed development is located outside any 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

Transportation Noise

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

1. The unattenuated daytime sound levels in the Outdoor Living Areas (OLAs)[1] of some of the residential dwellings will exceed the recommended objective sound level. For these dwellings, outdoor noise control measures are required along with relevant warning clauses. All other dwellings on the development will have acceptable outdoor sound levels in their OLAs and, therefore, no outdoor noise control measures need to be considered.

2. The unattenuated sound levels at the outside walls of some of the dwellings will exceed the recommended objective sound levels. Indoor noise controls are required for these dwellings along with relevant warning clauses. All other dwellings on the development will have acceptable indoor sound levels. Therefore, noise control measures are not required.

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.

Stationary Noise

This stationary noise assessment considered all of the rooftop and ground-based climate control equipment associated with the existing and future development upon the Kawartha Downs site. This includes the rooftop equipment for the existing grandstand and casino, the future multi-purpose building and hotel, and the rooftop of the future outdoor amphitheatre, as well as the existing harness racing activities which take place on the existing gravel track to remain.

The design of the proposed outdoor amphitheatre is still underway, including the type of building structure and general arrangement of the outdoor speakers. In addition, while the Township of Cavan Monaghan has enacted noise by-law exception 4(c) of By-law No. 2018-11 for Council-approved outdoor concerts, there are no specific allowances for permanent outdoor entertainment noise sources such as the proposed amphitheatre. The proponent and the Acoustical

[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).

Consultant are proposing to work with the Township to amend the local noise by-law if necessary to include an exception designed specifically for occasional outdoor performances at Kawartha Downs. A detailed noise impact study will be performed in the future once the sound system design has progressed further to assess the noise impact of the proposed amphitheatre to comply with the requirements of the zoning restrictions and the local noise by-law.

It is important to note the fact that the sound system can certainly be designed in such a manner to provide the required theatrical performance as well as to meet the environmental noise requirements at the closest neighbours where the presence of the sound system can be expected to create an unacceptable noise. It should be noted that sound system design can certainly be performed by the sound system consultant in close coordination with the Acoustical/Noise Consultant in order to ensure that the system functions in the required manner i.e., to meet the performance expectations and to meet the noise criteria at the closest receptors.

The following is a summary of some of the tools available to the future consulting team (the architect, the acoustics/noise engineers and the sound system consultant) to be retained by the proponent during the detailed design stage:

a. The types, numbers, and sound power level of the required speakers;
b. The speaker “directivity factors”;
c. Mounting locations and heights of the speakers;
d. Locations of any potential billboards that may reflect/deflect the sound from the speaker system;
e. Other incidental design factors are to be studied during the detailed design process.

The results of the investigation of the stationary sources of noise from the Kawartha downs and all of its affiliated equipment sources, as well as the harness racing activities, indicate that the unattenuated sound levels at the Points of Reception of concern are predicted to be below the applicable sound level criteria for stationary sources. Accordingly, no stationary noise control measures are warranted for these Points of Reception.

2.2 RECOMMENDATIONS

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

1. Outdoor Noise Control Measures

Lots: 327, 328, 360, and 361

Acoustical berm/noise fence sound barriers should be constructed to shield the

Outdoor Living Areas for the above-noted locations with the following details:

(i) Barriers should be constructed along the alignments shown schematically in Figure 4.
(ii) The required barrier heights as shown in Figure 4 could be as high as 3.2 m, the total height of which may be a combination of berm and barrier (i.e., 1m berm, 2.2m high acoustic fence).
(iii) During the planning of Blocks 391 and 392, the use of berm features may reduce traffic noise impacts and reduce the necessary barrier requirements.

Since final grading plans are not available at this stage, the barrier heights are based on the existing grade elevations. Accordingly, a Detailed Noise Control Study should be undertaken prior to final approval of these properties requiring a barrier to define specific barrier alignments and heights based on the final grading plans.

It is also the responsibility of the developer/builder responsible for the final design and construction of the sound barriers to ensure that the correct barrier elevation details are secured from the Acoustical Engineer prior to planning and construction of the specified barriers.

The results of the investigation of the stationary sources of noise indicate that the unattenuated sound levels at the Points of Reception of concern are predicted to comply with the applicable sound level criteria for stationary sources. Accordingly, no noise control measures are warranted for these Points of Reception.

2. Air Conditioning

Lots: 309 to 319, 327, 360 and 361

The above-noted properties should be equipped with central air conditioning systems with their condensing units to be located in noise insensitive locations. The following warning clause should be registered in all Development Agreement(s) and Offers of Sale and Purchase or Lease of these properties:

"*This dwelling unit has been supplied with a central air conditioning system which will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment*, *Conservation and Parks*".

It is also our **strong** recommendation that the necessary detailed technical analysis be performed prior to submitting an application for Building Permit to optimize the required air conditioning unit noise rating /specification and their acceptable placements in order to meet the Provincial sound level standards

at the closest receptors (i.e., a maximum sound level L_{AS} of 50 dBA[2] at the neighbour's closest point(s) of reception within their ground-based outdoor areas as well as at the closest window on any floor level), after taking into consideration the specific property design and proposed A/C unit location. Other A/C noise/vibration control measures, where required to meet the sound level criteria at the point(s) of reception, should also be identified and shown on the applicable permit drawings /specifications. Where the condensing units are bracket-mounted on walls or come in direct contact with the building structure, they should be mounted on neoprene/rubber isolation supports or pads that are rated to provide a minimum of 0.2" static deflection**.**

The Analysis Section in this study provides additional important details on the application of air conditioners.

3. Provision for Air Conditioning

Lots: 320 to 326, and 328 to 359

The above-noted properties should be equipped with a ducted forced-air heating system, comprising the furnace/fan, supply air plenum, and ductwork. The components are to be appropriately situated and sized to accommodate the future installation of central air conditioning systems. The provision for future air conditioning should also include the installation of the necessary rough-in work such as a floor drain for the condensate, appropriate electrical power supply, thermostat control wiring and a capped sleeve in the exterior wall for future refrigeration tubing in an approved location (Installation cost of the air conditioning system is an option to the developer/builder as they see fit).

Where the air conditioning units are bracket-mounted on walls or come in direct contact with the building structure, they should be mounted on neoprene/rubber isolation supports or pads that are rated to provide a minimum of 0.2" static deflection.

If the purchaser/occupant does not take the central air conditioning option, the following clause should be registered in all Development Agreement(s) and Offers of Sale and Purchase or Lease of these properties:

"*This dwelling unit has been fitted with provisions, which include a fan forced heating system, suitably sized ducts, plenum, electrical power wiring, thermostatic control wiring, a nearby floor drain, etc. sized to accommodate the future addition of central air conditioning by the occupant at their expense and discretion. Installation of central air conditioning by the occupant will allow*

[2] 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).

windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment, Conservation and Parks*. Future installation of the air conditioning system should meet the Ministry of the Environment*, Conservation and Parks *criteria in Publication NPC-216 (a maximum sound level* L_{AS} *of 50 dBA at the neighbour's closest point(s) of reception, i.e., at their ground-based outdoor areas as well as at the closest window on any floor level) and other applicable levels specified by the municipality.*"

4. <u>Warning Clause *[3]</u>

Lots: 309 to 361

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 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 Residential Lots in the Proposed Development

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 significant noise control features within this development and this dwelling (including the use building acoustic insulation), activities within the nearby outdoor amphitheatre from occasional musical or theatrical performances, festivals, and like events may at times be audible, potentially interfering with some activities of the dwelling occupants. The sound levels will occasionally exceed the Municipality's and the Ministry of the Environment, Conservation and Parks noise criteria, to the satisfaction of the local noise by-law authority applicable for such special events."

5. <u>Building Acoustic Insulation</u>

Lots: 309 to 361

All exterior building components (walls, windows, and doors) should meet the

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

minimum Acoustic Insulation Factors (AIF) shown in Tables 3 and 4. All windows should be well fitted and weather-stripped.

The Detailed Noise Control Study should provide complete and specific tabulations of AIF's 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 from the Acoustical Engineer prior to planning and construction of the noted dwelling(s).

6. Required Sections and Details

Typical cross-sections should be prepared and submitted in due course by the Consulting Engineers responsible for the preparation of the site grading and drainage plans based on the final approved elevations. The sections should typically include existing and proposed future building grade elevations, source, receiver and barrier/berm ground elevations, berm slopes, drainage provisions, etc.

7. 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:
   - The proposed detailed grading plans
   - Final lot layout, lot/block numbers, etc.
   - 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 submission of the project plans for 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 dwellings.

3.0 SOUND AND VIBRATION LEVEL CRITERIA

3.1 SURFACE TRANSPORTATION CRITERIA[4]

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

[4] 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.

3.2 AIRCRAFT NOISE CRITERIA

Aircraft noise impact assessment is based on the higher value of the Noise Exposure Forecast (NEF) and the Noise Exposure Projection (NEP) contours determined by methods approved by Transport Canada. The MECP requires the preparation of a noise study for noise-sensitive land-use proposals that are located at or above NEF/NEP 25.

Outdoor Areas

The planning criterion for land uses containing noise-sensitive outdoor areas including Outdoor Living Areas is as follows:

MECP Sound Level Limits for Outdoor Areas

Area & Time Period	Higher Value of **NEF/NEP**
Outdoor Areas including Outdoor Living Areas (24 hours)	30*****

* Policy 1.6.7.2 of the 2005 Provincial Policy Statement, establishes the applicable development criterion. With the exception of a redevelopment or infilling, Section 1.6.7.2 of the 2005 Provincial Policy Statement, prohibits new residential development in aircraft noise zones above the NEF/NEP 30 contour.

Indoor Areas

The technical criteria for acoustical design of buildings in land uses containing noise-sensitive indoor areas are as follows:

Type of Space	Indoor NEF/NEP*
Living/dining/den areas of residences, hospitals, schools, nursing/retirement homes, daycare centres, etc.	5
Sleeping quarters	0

* The indoor NEF/NEP values are used to determine acoustical insulation requirements based on the NEF/NEP contour maps.

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

Type of space	Indoor NEF/NEP
General offices, reception areas, retail stores, etc.	15
Individual or semi-private offices, conference rooms, etc.	10
Living/dining areas of residences, sleeping quarters of hotels/motels, theatres, libraries, schools, day-care centres, places of worship etc.	5
Sleeping quarters of residences, hospitals, nursing/ retirement homes, etc.	0

Application of Criteria

The following table summarizes the requirements for noise control measures for the various NEF/NEP ranges:

LAND USE	NEF/ NEP	AIR COND.	FORCED AIR VENTILATION WITH PROVISION FOR FUTURE AIR COND.	WARNING CLAUSE	ACOUSTIC INSULATION
Residential	<25	-	-	-	-
	25-29	-	Yes	Yes	Yes
	30-35	Yes	-	Yes	Yes
	>35	---------- Not Permitted ----------			
Hotels/Offices	25-29	-	Yes	Yes	Yes
	30-40	Yes	-	Yes	Yes
	>40	---------- Not Generally Permitted ----------			

3.3 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[5] 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

3.4 CRITERIA FOR TRUCK TRAFFIC NOISE IMPACT DUE TO A PROPOSED DEVELOPMENT ON AN EXISTING NEAR-BY NOISE-SENSITIVE LAND USE

The following criteria apply to the sound levels of vehicular truck traffic generated by a proposed development when travelling on public roadways in the vicinity of existing noise-sensitive land use.

The following table shows the general acoustic criteria relating the significance of potential vehicular truck noise impact to the increase in sound levels due to the traffic associated with the proposed development:

IMPACT ASSESSMENT TABLE	
EXCESS/CHANGE	**IMPACT RATING**
0 to < 3	Insignificant
≥ 3 to < 5 dBA	Noticeable
≥ 5 to < 10 dBA	Significant
≥ 10	Very Significant

If the addition of the proposed development traffic increases the ambient noise at the receptors by more than 5 dB, then mitigation should be considered based on the Ministry of Environment, Conservation and Parks MOE/MTO Protocol (1986) criteria for traffic noise control.

[5] 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 County of Peterborough and are summarized below:

- Peterborough Road 28

Current No. of Lanes	2
Future No. of Lanes (Assumed)	2
Posted Speed Limit	80 km/hr.
Future Speed Limit (Assumed)	80 km/hr.
AADT (Year 2018)	10,350 vpd
Future AADT (Year 2032) – Annual Growth Rate (Assumed) – Number of Years of Growth (Assumed)	14,624 vpd 2.5 % 14 years
Total Truck Percentage – Medium Truck Split – Heavy Truck Split	10% 1% 8%
Day(16 hrs.)/Night(8 hrs.) Split (Assumed)	92%/8%
Directional Traffic Split (Assumed)	50%/50%
Road Gradient	2%

- Highway #15

Current No. of Lanes	4
Future No. of Lanes (Assumed)	4
Posted Speed Limit	100 km/hr.
Future Speed Limit (Assumed)	100 km/hr.
AADT (Year 2020)	20,905 vpd
Future/Ultimate AADT (Year 2033) – Annual Growth Rate (Assumed) – Number of Years of Growth (Assumed)	29,538 vpd 2.5% 14 years
Total Truck Percentage – Medium Truck Split – Heavy Truck Split	20% 5% 15%
Day(16 hrs.)/Night(8 hrs.) Split	90%/10%
Directional Traffic Split (WB/EB)	59%/41%
Road Gradient	2%

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

4.2 OUTDOOR NOISE ENVIRONMENT

Sound level predictions were carried out based on MECP's ORNAMENT sound

level prediction modelling procedures[6] (Ontario Road Noise Analysis Method for Environment and Transportation, Technical Document, 1989).

Overall sound levels at the OLAs of the selected representative receptor locations are shown in Table 2. Sample sound level calculations at representative receptor locations are presented in Appendix B.

In consideration of the calculations, it is concluded that for Lots: 327, 360 and 361, the unattenuated daytime sound levels in the designated OLAs will exceed 60 dBA, the maximum criteria level allowed. Therefore, outdoor noise control measures are required for these properties.

For Lots: 328, 329, 358, and 359, the unattenuated daytime sound levels in the designated OLAs are predicted to be in the range of L_{Aeq} 55dBA to 60dBA, therefore, outdoor noise control measures are recommended. Construction of sound barriers (berm/fence combination) to protect the above-noted Lots 327, 360 and 361 will provide adequate protection without the need for significant additional barriers.

In consideration of the calculations, it is concluded that for all other receptor locations, the unattenuated daytime sound levels in the designated OLAs will not exceed the objective level of L_{Aeq} 55dBA (in particular, when noise control is implemented at the above-noted properties), therefore outdoor noise control measures are not required for these properties.

It must be noted that the above noise control measures are notwithstanding the results generated from the acoustic model related to the amphitheatre noise generation, and are to be superseded by any recommendations as a result of such a noise source.

Furthermore, the use of a berm and/or barrier upon Blocks 391 (“Landscape Strip” according to the draft plan) and 392 (stormwater management) will provide significant benefit to reduce noise impact at all nearby properties, and may reduce barrier height requirements. This will be evaluated in further detail during the detailed design stage based on the proposed grading plan.

The conventional approach by which excess noise in the rear yard OLAs may be mitigated is through the construction of acoustical barriers.

Barrier height calculations for the receptors of concern are included in Appendix B. Barrier alignments are as shown in Figure 4.

[6] 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).

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) the following is concluded:

- The sound levels at the outside walls of the following receptors (within any habitable room on any floor) is predicted to exceed $L_{Aeq(day)}$ 65 dBA and/or $L_{Aeq(night)}$ 60 dBA respectively:

  Lots: 309 to 319, 327, 360 and 361

  Therefore, central air conditioning is required.

- The daytime/nighttime noise environment at the outside walls of the following receptors (within any habitable room on any floor) is predicted to be in the range of $L_{Aeq\ day}$ 56-65 dBA and/or $L_{Aeq\ night}$ 51-60 dBA:

  Lots: 320 to 326, 328 to 359

  A forced-air heating system with provision for central air conditioning is therefore required.

All other receptors will have a sound level equal to or less than $L_{Aeq(day)}$ 55 dBA and/or $L_{Aeq(night)}$ 50 dBA and therefore no noise control measures need to be considered.

It must be noted that the above noise control measures are notwithstanding the results generated from the acoustic model related to the amphitheatre noise generation, and are to be superseded by any recommendations as a result of such a noise source.

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

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 4 and 5. 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 the calculation of type of windows required for each dwelling, a detailed description of each unit is required.

As an example, for a typical unit with a daytime outdoor sound level of 68 dBA, the AIF value for the Living Room will be 30 assuming 3 components. If the window to floor ratio is 32%, then the window requirements in terms of glass thickness, mm (air space thickness, mm) glass thickness, mm are any of the following:

Double Glazed: 3mm (16mm) 3mm; 4mm (13mm) 4mm

As an example, for a typical unit with a nighttime outdoor sound level of 60 dBA, the AIF value for the bedrooms will be 27 assuming 3 components. If the window to floor ratio is 20%, then the window requirements in terms of glass thickness, mm (air space thickness, mm) glass thickness, mm are any of the following:

Double Glazed: 3mm (6 mm) 3mm

The above window glazing construction is typical examples only. It is recommended that prior to the submission of the building plans for Building Permit that the detailed architectural drawings of the units requiring noise control measures, as referred to earlier, be examined by an Acoustical Engineer in order to advise the design consultant on the ***specific*** building components for noise control to suite the actual window construction details.

IMPORTANT NOTES TO THE WINDOW SUPPLIER/CONTRACTOR:

The Contractor should use the window glazing dimensions specified in this report. If the Contractor chooses to use, instead of the minimum specified STC values

herein in this report, then the Contractor MUST observe the following rules:

(1) The **specific** windows MUST be tested by an "accredited" acoustic laboratory that is "NVLAP" accredited, and
(2) The full STC test results shall be submitted to SS Wilson Associates for prior approval before installation.

4.5 CONTROL OF AIR CONDITIONING UNITS NOISE

To control the environmental noise emitted by air conditioning or heat pump units it is essential that the following procedures and specifications be considered to by the parties responsible for the selection, design and installation of the air conditioning systems:

1. Control of air conditioning noise is governed by Provincial and/or municipal standards which specify acceptable sound emission levels for the air conditioning devices and/or acceptable sound levels at the point(s) of reception.

   The Ministry of the Environment, Conservation and Parks criteria for control of air conditioning noise is outlined in several technical publications including publications NPC-300 and NPC-216 (a maximum sound level of 50 dBA[7] at the neighbour's closest point(s) of reception, i.e. at their outdoor areas as well as at the closest window on any floor level). The applicable sound level criteria for new residential development where air conditioning is a mandatory requirement for noise control inside habitable rooms are: 1) a maximum ARI* Sound Rating to suit the site-specific installation for the air conditioning device, and 2) hourly L_{Aeq} sound level limits of 50 dBA at the point(s) of reception (or the prevailing hourly L_{Aeq} due to vehicular traffic ambient noise if higher than 50 dBA).

   Municipal standards for air conditioning noise may also include specific or maximum Sound Rating numbers (in bels) and/or point-of-reception sound level limits in reference to specific municipal By-Laws and/or standards as applicable.

   Therefore, it is essential that the final selection, location, design, and specifications of the air conditioning devices ensure compliance with the applicable sound level criteria prior to making any commitment.

   The following are examples of the preferred approach when dealing with the issue of air conditioning noise.

   a) If the A/C condensing unit is to be installed in backyards in urban areas,

[7] Or the lowest hourly ambient Leq due to road traffic projected at the receptor location(s)
* When tested in accordance with ARI Standard 270-84

then units having lower bels rating will likely be required. The use of units with a lower sound rating of 6.8bel (equivalent to 68 dBA sound power) or lower may give the builder the flexibility of locating the unit as close as 3 metres from the joint property lines without exceeding the MECP 50 dBA standard for houses in urban areas.

b) If the unit is to be located in the front or in the side yard areas (closer to the front and provided that there are no windows to habitable rooms on the side walls), then units having less stringent sound level rating requirements may result in complying with sound criteria.
c) Through the building permit process of the specific properties, additional calculations must be performed to optimize the unit sound ratings depending on the house model and the installation location.

2. The resulting sound levels due to residential air conditioners at the nearest points-of-reception must not exceed the levels in MECP Publication NPC-216 (a maximum sound level of 50 dBA[8] at the neighbour's closest point(s) of reception, i.e. at their outdoor areas as well as at the closest window on any floor level).

3. The siting of the split-system central air conditioning units and other systems should follow good planning principles.

4. Should the location of the outdoor air conditioner unit be in the back or side yard areas where noise is likely to interfere with the outdoor and indoor activities of any occupant and/or neighbour, then it is necessary to design and install noise control measures. Noise control measures include any or a combination of the following:

    a. Distance setback away from the receptor(s).
    b. Sound barrier wall(s) or ultimately an acoustic enclosure.
    c. Sealing selected windows, i.e. installation of non-operable windows.
    d. Deleting selected windows.

    It is also **important** that the necessary detailed technical analysis be performed prior to submitting an application for Building Permit to optimize the required air conditioning unit Sound Rating number in order to meet the Provincial sound level standards at the closest receptors after taking into consideration the specific property design and proposed A/C unit location. Other A/C noise control measures, where required to meet the sound level criteria at the point(s) of reception, should also be identified and shown on the applicable permit drawings/specifications.

[8] Or the lowest hourly ambient Leq due to road traffic projected at the receptor location(s)

4.6 STATIONARY SOURCES OF NOISE EXTERNAL TO THE PROPOSED DEVELOPMENT

1. Introduction

The potential external source of noise affecting the proposed development is the Kawartha Downs Racing facility located to the south. Currently, the facility contains Horse Harness racing, The Kawartha Downs Speedway, and a Casino building. The Kawartha Downs facility is expected to incorporate a future proposed amphitheatre as well as a multi-use event centre and hotel as part of the expansion. However, the existing Speedway is to be decommissioned.

2. Description of the Sources of Stationary Noise

The following is a description of the existing and future potential noise sources around the Kawartha Racing Facility:

1. Rooftop HVAC equipment associated with the existing casino building as well as the proposed HVAC equipment for the future event centre, hotel, and outdoor amphitheatre.
2. Outer race track used for horse harness racing.

The noise impact from the use of the outdoor amphitheatre will be the subject of a future noise assessment, based on the finalized amphitheatre design and in consultation with Township staff to comply with applicable zoning and noise by-law requirements.

While the exact details of the rooftop and mechanical systems of the proposed buildings are not yet designed, it is expected that the hotel will incorporate the use of individual PTAC/split A/C systems for individual suites. Such equipment have moderate sound levels, however due to the distance setback between the proposed hotel location and the residential subdivision, it is not expected that these units will produce an adverse noise impact at the proposed residential units. A detailed assessment of the hotel equipment shall be undertaken as the details of the proposed buildings become available to comply with applicable MECP and local noise guidelines, including the selection of quiet units with low sound power levels.

3. Points of Reception

The following are the points of reception used for stationary noise analysis:

POR 1 to 4: Proposed residential dwellings to the north of the Kawartha Downs

Figure 5 shows the location of the subject receptors relative to the Kawartha Downs Facility.

4. Description of the Sources of Ambient / Background Noise and Operational Data

The selected receptors are in close proximity to Peterborough Road 28, however, they are exposed to relatively low ambient/background sound levels. For this report, the exclusion limits (MECP NPC-300) were used as criteria based on the location of the development. The subject area is considered to be classified as an MECP Class 1 Area. The following MECP exclusion limits were used for the Receptors:

Receptor POR 1 to POR 4: Leq (1h) 50 dBA Day, 50 dBA Evening and 45 dBA Night

Figure 5 shows the relative location of the receptors with respect to the sources of noise.

5. Methodology

The standard practice for impact assessment of stationary sources of noise such as with the subject development is to consider the noise potential at the outside of the nearest noise-sensitive points of reception to assist in determining the degree of impact on the indoor noise-sensitive spaces. For noise-sensitive land uses where outdoor amenity areas, such as patios, backyards and common outdoor living areas are provided, it is equally important to also address the noise impact on such cases.

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

6. Established Stationary Source Sound Levels & Operational Data

The following table outlines the stationary sources of noise associated with the Kawartha Downs Facility including its existing and proposed activities:

Name	ID	Sound Power Level (dBA)	Operating Time			Height (m)
			Day (min)	Eve (min)	Night (min)	
RTU-1	RTU_1	99	60	45	30	2
RTU-2	RTU_2	99	60	45	30	2
RTU-3	RTU_3	99	60	45	30	2
RTU-4	RTU_4	99	60	45	30	2
RTU-5	RTU_5	92	60	45	30	2
RTU-6	RTU_6	92	60	45	30	2

RTU-7	RTU_7	92	60	45	30	2
RTU-8	RTU_8	89	60	45	30	2
RTU-9	RTU_9	99	60	45	30	2
RTU-10	RTU_10	99	60	45	30	2
RTU-11	RTU_11	99	60	45	30	2
RTU-12	RTU_12	99	60	60	60	2
RTU-13	RTU_13	89	60	60	60	2
RTU-14	RTU_14	89	60	60	60	2
RTU-15	RTU_15	89	60	60	60	2
AC-1	AC_1	93	60	30	45	2
AC-2	AC_2	93	60	30	45	2
AC-3	AC_3	88	60	30	45	2
AC-4	AC_4	88	60	30	45	2
AC-5	AC_5	80	60	30	45	2
AC-6	AC_6	80	60	30	45	2
AC-7	AC_7	80	60	30	45	2
AC-8	AC_8	80	60	30	45	2
AC-9	AC_9	80	60	30	45	2
AC-10	AC_10	80	60	30	45	2

Figure 6 illustrates the location of all the stationary sources within the Kawartha Downs Facility considered in this analysis.

7. Sound Level Calculations Model

A 3-D computer program[9] 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.

[9] 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.

8. Impact Assessment and Findings of the Harness Racing Activities

Harness racing activities are predicted during daytime hours only, and as such, are only compared against the MECP exclusion hours for daytime sound level limits. Harness Racing activities and Amphitheater activities will not be happening concurrently. The unmitigated acoustic sound assessment at all points of reception comply with the applicable MECP criteria for a class 1 area.

Figure 7 illustrates the sound levels at the selected points of reception due to the harness racing around the outer track.

Harness Racing Noise Evaluation: Unmitigated (Class 1)

Point of Reception ID	Point of Reception Description	Sound Level at Point of Reception Leq(1h)	Applicable MECP Criteria	Compliance with MECP Criteria
POR 1	Proposed residential dwellings to the north of the Kawartha Downs	46 dBA Day 46 dBA Evening	50 dBA Day 50 dBA Evening	Yes Yes
POR 2	Proposed residential dwellings to the north of the Kawartha Downs	44 dBA Day 44 dBA Evening	50 dBA Day 50 dBA Evening	Yes Yes
POR 3	Proposed residential dwellings to the north of the Kawartha Downs	42 dBA Day 42 dBA Evening	50 dBA Day 50 dBA Evening	Yes Yes
POR 4	Proposed residential dwellings to the north of the Kawartha Downs	38 dBA Day 38 dBA Evening	50 dBA Day 50 dBA Evening	Yes Yes

As indicated by the table above, the harness racing activities are not expected to produce any adverse noise impacts on the proposed residential development, and no noise control measures (whether physical or administrative) need to be considered.

9. Impact Assessment and Findings – When Site is Considered as MECP Class 1 Area

The unmitigated acoustic assessment of the stationary noise at the points of reception can be summarized as follows:

External Stationary Noise Evaluation: Unmitigated (Class 1)

Point of Reception ID	Point of Reception Description	Sound Level at Point of Reception Leq(1h)	Applicable MECP Criteria	Compliance with MECP Criteria
POR 1	Proposed residential dwellings to the north of the Kawartha Downs	30 dBA Day 27 dBA Evening 28 dBA Night	50 dBA Day 50 dBA Evening 45 dBA Night	Yes Yes Yes
POR 2	Proposed residential dwellings to the north of the Kawartha Downs	33 dBA Day 30 dBA Evening 31 dBA Night	50 dBA Day 50 dBA Evening 45 dBA Night	Yes Yes Yes
POR 3	Proposed residential dwellings to the north of the Kawartha Downs	33 dBA Day 31 dBA Evening 31 dBA Night	50 dBA Day 50 dBA Evening 45 dBA Night	Yes Yes Yes
POR 4	Proposed residential dwellings to the north of the Kawartha Downs	32 dBA Day 27 dBA Evening 28 dBA Night	50 dBA Day 50 dBA Evening 45 dBA Night	Yes Yes Yes

Based on the acoustic prediction model, it is our finding that the existing noise environment due to the Kawartha Downs Facility is of no concern for noise impact on the proposed development, and therefore will not require the implementation of any mitigation measures.

Figure 8 illustrates the sound level contours of equal lines at the second storey Plane of window from the HVAC equipment for the existing and future building.

As stated previously, this assessment has not considered the noise impact from occasional concerts and entertainment activities taking place within the proposed amphitheatre. A detailed assessment of the amphitheatre noise impact will be prepared at a later date to comply with noise guidelines set by the local planning authority and the MECP.

10. Recommendations

In order for the conclusions of this report to remain valid, rooftop HVAC equipment for the proposed buildings must be selected to have sound power levels equal to or less than the assumed values. In the event that the equipment locations or sizes are different from those assumed in this study, and update to the noise model will be required. It is recommended that a detailed noise assessment be undertaken prior to application for a building permit to consider the final location and specification of all equipment to ensure the applicable sound level limits are met.

With the implementation of the above-noted recommendations, we are satisfied that the applicable sound level criteria are met.

4.7 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[10] provides reasonably accurate information on whether such window(s) are standard industry window or not:

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

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

4.8 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 A-weighted sound level	L_{AFmax}, L_{ASmax}, L_{AImax}
Maximum Sound Level	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}	A-Weighted peak sound level	L_{Apeak}
Peak Sound Level	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

LOT NUMBER(S)	SOUND BARRIER	CENTRAL AIR CONDITIONING	PROVISION FOR CENTRAL AIR CONDITIONING	WARNING CLAUSE	OTHER REQUIREMENTS OR NOTES
327, 360, 361	Yes	Yes	N/A	Yes	Optional berm in adjacent Blks 391/392
328	Yes	No	Yes	Yes	--
309 to 319	No	Yes	N/A	Yes	--
320 to 326, 328 to 359	No	No	Yes	Yes	--
All Others	No	No	No	Yes	--

N6 Leq-AIF Master- 2019-05-16

SS WILSON ASSOCIATES

2022

2022-05-25 0:00

SUMMARY- OUTDOOR SOUND LEVEL CALCULATIONS

File Number : WA21-053

Project Name : Kawartha Downs Subdivision

Transportation Noise

OUTDOORS

Table 2

(Using NRC/MOE Pocedures)

Any Heavy Rail Line ? No

Record Number	1	2	3	4	5	6	7	8	9	10	11	12
Consider Record	Y	Y	Y	Y	Y	N	N	N	N	N	N	N
LOT	1	327	328	360	361							
FACE/DIRECTION	EAST	East	South	East	South							
LOCATION	OUTDOOR LIVING AREA	OUTDOOR LIVING AREA	OUTDOOR LIVING AREA	OUTDOOR LIVING AREA	OUTDOOR LIVING AREA							
Source 1: Roads	**Road Traffic**		**OUTDOOR DAYTIME LEVELS**			OUTDOOR DAYTIME LEVELS			OUTDOOR DAYTIME LEVELS			
Leq Outdoors	54.00	65.00	57.00	66.00	66.00							
Partial angle of exposure, degrees	180	180	180	180	180							
Partial exposure adjust., dB												
Barrier Adjustment, dB		-10.00	-6.00	-11.00	-8.00							
Additional Adjustment, dB												
Sub-Total Leq, dBA	**54.00**	**55.00**	**51.00**	**55.00**	**58.00**							
Source 2:	**Road Traffic**		**OUTDOOR DAYTIME LEVELS**			OUTDOOR DAYTIME LEVELS			OUTDOOR DAYTIME LEVELS			
Leq Daytime												
Partial angle of exposure, degrees	180	180	180	180	180							
Partial exposure adjust., dB												
Barrier Adjustment, dB												
Additional Adjustment, dB												
Sub-Total Leq, dBA												
Source 3:	**Road Traffic**		**OUTDOOR DAYTIME LEVELS**			OUTDOOR DAYTIME LEVELS			OUTDOOR DAYTIME LEVELS			
Leq Daytime												
Partial angle of exposure, degrees	180	180	180	180	180							
Partial exposure adjust., dB												
Barrier Adjustment, dB												
Additional Adjustment, dB												
Sub-Total Leq, dBA												
Source 4:	**Road Traffic**		**OUTDOOR DAYTIME LEVELS**			OUTDOOR DAYTIME LEVELS			OUTDOOR DAYTIME LEVELS			
Leq Daytime												
Partial angle of exposure, degrees	180	180	180	180	180							
Partial exposure adjust., dB												
Barrier Adjustment, dB												
Additional Adjustment, dB												
Sub-Total Leq, dBA												
Sub-Tot. 4 Sources Leq, dBA												
Aircraft noise NEF/NEP												
Adjust.1												
Adjust.2												
Adjusted NEF/NEP												
Approx. Overall Combined Leq												
Overall Road and/or Rail and/or Stationary Sources, Leq (dBA)												
Aircraft Noise Only, NEF												
Additional Requirements	No Barrier Required	3.2m berm / barrier required	Minimum 1.8m berm / barrier required (match Lot 327)	Minimum 1.8m berm / barrier required (match Lot 361)	3.2m berm / barrier required							

	N6 Leq-AIF Master- 2019-05-16		SS WILSON ASSOCIATES			(Using NRC/MOE Pocedures)						
2022-05-25 15:53		Leq- AIF CALCULATIONS AND TYPICAL WINDOW GLAZING REQUIREMENTS										
File Number :	WA21-053				DAYTIME			NOTES	. . . . .	. . . . .	. . . . .	
Project Name :	Kawartha Downs Subdivision				Table 3				. . . . .	. . . . .	. . . . .	
Description :	Transportation Noise								. . . . .	. . . . .	. . . . .	
Record Number	1	2	3	4	5	6	7	8	9	10	11	12
Consider Record	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	N
LOT	1	36	315	322	327	358	361					
FACE/DIRECTION	North	East	South	East	East	East	East					
LOCATION	BUILDING FAÇADE	BUILDING FAÇADE	BUILDING FAÇADE	BUILDING FAÇADE	BUILDING FAÇADE	BUILDING FAÇADE	BUILDING FAÇADE					
ROOM CLASSIFICATION	Living /Dining	Living /Dining	Living /Dining	Living /Dining	Living /Dining	Living /Dining	Living /Dining					
Manual Adjust. to Criterion,												
MOE Transportation Sources Daytime Leq Indoor Criteria, dBA	45	45	45	45	45	45	45					
Aircraft Indoor Criteria, NEF	5	5	5	5	5	5	5					
Source 1: Roads	Road Traffic		DAYTIME LEVELS			DAYTIME LEVELS			DAYTIME LEVELS			
Leq Daytime	55.00	51.00	68.00	60.00	67.00	59.00	67.00					
Partial angle of exposure, 1-180°	180	180	180	180	180	180	180					
Partial exposure adjust., dB												
Additional Adjustment, dB												
Sub-Total Leq, dBA	55.00	51.00	68.00	60.00	67.00	59.00	67.00					
Angular range of incidence Case(0,12,3)												
Adjusted AIF	17	13	30	22	29	21	29	23	-38	-38	-38	-38
Source 2:	Road Traffic		DAYTIME LEVELS			DAYTIME LEVELS			DAYTIME LEVELS			
Leq Daytime												
Partial angle of exposure, 1-180°	180	180	180	180	180	180	180					
Partial exposure adjust., dB												
Additional Adjustment, dB												
Sub-Total Leq, dBA												
Angular range of incidence Case(0,12,3)												
Adjusted AIF	-38	-38	-38	-38	-38	-38	-38	-38	-38	-38	-38	-38
Source 3:	Road Traffic		DAYTIME LEVELS			DAYTIME LEVELS			DAYTIME LEVELS			
Leq Daytime												
Partial angle of exposure, 1-180°	180	180	180	180	180	180	180					
Partial exposure adjust., dB												
Additional Adjustment, dB												
Sub-Total Leq, dBA												
Angular range of incidence Case(0,12,3)												
Adjusted AIF	-38	-38	-38	-38	-38	-38	-38	-38	-38	-38	-38	-38
Source 4:	Road Traffic		DAYTIME LEVELS			DAYTIME LEVELS			DAYTIME LEVELS			
Leq Daytime												
Partial angle of exposure, 1-180°	180	180	180	180	180	180	180					
Partial exposure adjust., dB												
Additional Adjustment, dB												
Sub-Total Leq, dBA												
Angular range of incidence Case(0,12,3)												
Adjusted AIF	-38	-38	-38	-38	-38	-38	-38	-38	-38	-38	-38	-38
Sub-Tot. 4 Sources Leq, dBA												
Aircraft noise NEF/NEP												
Adjust.1												
Adjust.2												
Adjusted NEF/NEP												
Approx. Overall Combined Leq												
Assume 32% W/F ratio for Living/Dining rooms in the absence of specific data	32.0	32.0	32.0	32.0	32.0	32.0	32.0					
Assumed Total # of Components (Road, Rail, and Other Sources)	3	3	3	3	3	3	3					
Assumed Total # of Components Aircraft ONLY	3	3	3	3	3	3	3					
AIF of 4 Sources	*17*	*13*	*30*	*22*	*29*	*21*	*29*					
Aircraft AIF												
Combined AIF	17	13	30	22	29	21	29					
Openable or Fixed windows ?	Openable	Openable	Openable	Openable	Openable	Openable	Openable					
Adjustment, dB/AIF												
Regular or Laminated Glass	Regular	Regular	Regular	Regular	Regular	Regular	Regular					
Other Adjustment (dB,AIF), Specify												
Final Adjusted AIF	17	13	30	22	29	21	29					
Minimum STC (Approx)	***18***	***14***	***31***	***23***	***30***	***22***	***30***					
Typical Minimum Double Glazing Alternatives	3(6)3	3(6)3	3(16)3 4(13)4 3(6)6 6(6)6	3(6)3	3(13)3 4(6)4	3(6)3	3(13)3 4(6)4					
NOTES	No Indoor Requirements	No Indoor Requirements	Air Conditioning Required	Forced Air Required	Air Conditioning Require	Forced Air Required	Air Conditioning Required					

SS WILSON ASSOCIATES

SUMMARY TABLE OF **Leq- AIF CALCULATIONS AND TYPICAL WINDOW GLAZING REQUIREMENTS**

WA21-053

NOTES . . . . . **Kawartha Downs Subdivision**

. . . . . **Transportation Noise**

. . . . . .

. . . . . **DAYTIME**

. . . . . **Table 3**

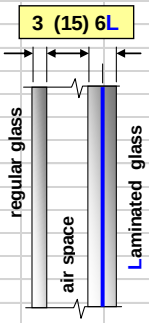
- Windows must be well-fitted weatherstripped units.
- The interpane spacing shown in the tables are the minimum acceptable.
- Larger spacing for a given glazing thickness normally improves the performance.

LOT	FACE/DIRECTION	ROOM CLASSIFICATION	LOCATION	Openable or Fixed Window	Regular Strength or Laminated Glass	Combined AIF	Approx. Overall Combined Leq	Double Glazing Alternatives, mm	Triple Glazing Alternatives, mm	*Minimum STC (Approx)*
1	North	Living/Dining	BUILDING FAÇADE	Openable	Regular	17		3(6)3		***18***
36	East	Living/Dining	BUILDING FAÇADE	Openable	Regular	13		3(6)3		***14***
315	South	Living/Dining	BUILDING FAÇADE	Openable	Regular	30		3(16)3 4(13)4		***31***
322	East	Living/Dining	BUILDING FAÇADE	Openable	Regular	22		3(6)3		***23***
327	East	Living/Dining	BUILDING FAÇADE	Openable	Regular	29		3(13)3 4(6)4		***30***
358	East	Living/Dining	BUILDING FAÇADE	Openable	Regular	21		3(6)3		***22***
361	East	Living/Dining	BUILDING FAÇADE	Openable	Regular	29		3(13)3 4(6)4		***30***

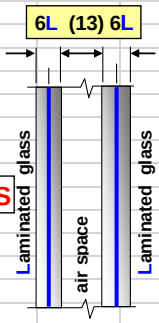
ABBREVIATIONS SPECIFIC TO THIS PROJECT : FF(Front Face), RF(Rear Face), RS(Right Side face), LS(Left Side face)

EXAMPLES

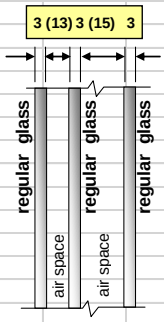
Double Glazing- regular glass



Double Glazing- *single laminated glass*



Double Glazing- *double laminated glass*



Triple Glazing- regular glass

	N6 Leq-AIF Master- 2019-05-16			SS WILSON ASSOCIATES			(Using NRC/MOE Pocedures)				
2022-05-25 15:53			Leq- AIF CALCULATIONS AND TYPICAL WINDOW GLAZING REQUIREMENTS								
File Number :	WA21-053				NIGHT TIME			NOTES	. . . . .	. . . . .	. . . . .
Project Name :	Kawartha Downs Subdivision				Table 4				. . . . .	. . . . .	. . . . .
Description :	Transportation Noise								. . . . .	. . . . .	. . . . .
Record Number	1	2	3	4	5	6	7	8	9	10	11	12
Consider Record	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	N
LOT	1	36	315	322	327	358	361					
FACE/DIRECTION	North	East	South	East	East	East	East					
LOCATION	BUILDING FAÇADE	BUILDING FAÇADE	BUILDING FAÇADE	BUILDING FAÇADE	BUILDING FAÇADE	BUILDING FAÇADE	BUILDING FAÇADE					
ROOM CLASSIFICATION	Bedroom	Bedroom	Bedroom	Bedroom	Bedroom	Bedroom	Bedroom					
Manual Adjust. to Criterion,												
MOE Transportation Sources Night Leq Indoor Criteria, dBA	40	40	40	40	40	40	40					
Aircraft Indoor Criteria, NEF												
Source 1: Roads	Road Traffic		NIGHT TIME LEVELS			NIGHT TIME LEVELS			NIGHT TIME LEVELS			
Leq Night Time	49.00	44.00	60.00	52.00	59.00	52.00	60.00					
Partial angle of exposure, degrees	180	180	180	180	180	180	180					
Partial exposure adjust., dB												
Additional Adjustment, dB												
Sub-Total Leq, dBA	49.00	44.00	60.00	52.00	59.00	52.00	60.00					
Angular range of incidence (0,12,3)												
Adjusted AIF	16	11	27	19	26	19	27	20	-33	37	37	37
Source 2:	Road Traffic		NIGHT TIME LEVELS			NIGHT TIME LEVELS			NIGHT TIME LEVELS			
Leq Night Time												
Partial angle of exposure, degrees	180	180	180	180	180	180	180					
Partial exposure adjust., dB												
Additional Adjustment, dB												
Sub-Total Leq, dBA												
Angular range of incidence (0,12,3)												
Adjusted AIF	-33	-33	-33	-33	-33	-33	-33	-33	-33	-33	-33	-33
Source 3:	Road Traffic		NIGHT TIME LEVELS			NIGHT TIME LEVELS			NIGHT TIME LEVELS			
Leq Night Time												
Partial angle of exposure, degrees	180	180	180	180	180	180	180					
Partial exposure adjust., dB												
Additional Adjustment, dB												
Sub-Total Leq, dBA												
Angular range of incidence (0,12,3)												
Adjusted AIF	-33	-33	-33	-33	-33	-33	-33	-33	-33	-33	-33	-33
Source 4:	Road Traffic		NIGHT TIME LEVELS			NIGHT TIME LEVELS			NIGHT TIME LEVELS			
Leq Night Time												
Partial angle of exposure, degrees	180	180	180	180	180	180	180					
Partial exposure adjust., dB												
Additional Adjustment, dB												
Sub-Total Leq, dBA												
Angular range of incidence (0,12,3)												
Adjusted AIF	-33	-33	-33	-33	-33	-33	-33	-33	-33	-33	-33	-33
Sub-Tot. 4 Sources Leq, dBA												
Aircraft noise NEF/NEP												
Adjust.1												
Adjust.2												
Adjusted NEF/NEP												
Approx. Overall Combined Leq												
Assume 20% W/F ratio for Living/Dining rooms in the absence of specific data	20.0	20.0	20.0	20.0	20.0	20.0	20.0					
Assumed Total # of Components (Road, Rail, and Other Sources)	3	3	3	3	3	3	3					
Assumed Total # of Components Aircraft ONLY	3	3	3	3	3	3	3					
AIF of 4 Sources	*16*	*11*	*27*	*19*	*26*	*19*	*27*					
Aircraft AIF												
Combined AIF	16	11	27	19	26	19	27					
Openable or Fixed windows ?	Openable	Openable	Openable	Openable	Openable	Openable	Openable					
Adjustment, dB/AIF												
Regular or Laminated Glass	Regular	Regular	Regular	Regular	Regular	Regular	Regular					
Other Adjustment												
Final Adjusted AIF	16	11	27	19	26	19	27					
Minimum STC (Approx)	*15*	*10*	*26*	*18*	*25*	*18*	*26*					
Typical Minimum Double Glazing Alternatives	3(6)3	3(6)3	3(6)3	3(6)3	3(6)3	3(6)3	3(6)3					
NOTES	No Indoor Requirements	No Indoor Requirements	Forced Air Required	Forced Air Required	Forced Air Required	Forced Air Required	Forced Air Required					

SS WILSON ASSOCIATES

SUMMARY TABLE OF **Leq- AIF CALCULATIONS AND TYPICAL WINDOW GLAZING REQUIREMENTS**

WA21-053

NOTES . . . . . **Kawartha Downs Subdivision**

. . . . . **Transportation Noise**

. . . . . **NIGHT TIME**

. . . . . **Table 4**

- Windows must be well-fitted weatherstripped units.
- The interpane spacing shown in the tables are the minimum acceptable.
- Larger spacing for a given glazing thickness normally improves the performance.

LOT	FACE/DIRECTION	ROOM CLASSIFICATION	LOCATION	Openable or Fixed Window	Regular Strength or Laminated Glass	Combined AIF	Approx. Overall Combined Leq	Double Glazing Alternatives, mm		Triple Glazing Alternatives, mm	*Minimum STC (Approx)*
1	North	Bedroom	BUILDING FAÇADE	Openable	Regular	16		3(6)3			***15***
36	East	Bedroom	BUILDING FAÇADE	Openable	Regular	11		3(6)3			***10***
315	South	Bedroom	BUILDING FAÇADE	Openable	Regular	27		3(6)3			***26***
322	East	Bedroom	BUILDING FAÇADE	Openable	Regular	19		3(6)3			***18***
327	East	Bedroom	BUILDING FAÇADE	Openable	Regular	26		3(6)3			***25***
358	East	Bedroom	BUILDING FAÇADE	Openable	Regular	19		3(6)3			***18***
361	East	Bedroom	BUILDING FAÇADE	Openable	Regular	27		3(6)3			***26***

ABBREVIATIONS SPECIFIC TO THIS PROJECT : FF(Front Face), RF(Rear Face), RS(Right Side face), LS(Left Side face)

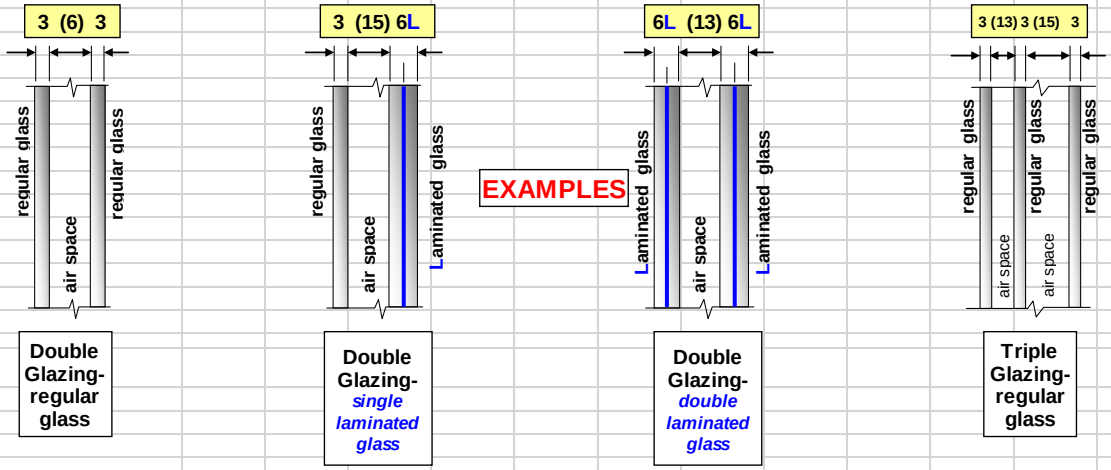


TABLE 5
BARRIER HEIGHTS TO ACHIEVE L_{Aeq} 55 dBA IN OLAs
(TRANSPORTATION NOISE)

RECEPTOR(S)	OLA Sound Level Without Barrier, $L_{Aeq(day)}$, dBA	BARRIER HEIGHT, (m) TO ACHIEVE THE FOLLOWING, $L_{Aeq(day)}$, dBA					
		60	59	58	57	56	55
327	65	1.8	2.0	2.4	2.6	3.0	3.2
328*	57	-	-	-	-	-	1.8 (51 dBA)
360*	62	-	-	-	1.8	2.6	3.0
361	66	2.6	3.0	3.2	3.6	4.2	4.8

***** Lots 328 and 360 will benefit from the barriers constructed upon Lot 327 and 361, respectively, and it is recommended that the barrier be extended along Lot 328 for best acoustic practices. This will also serve the dwellings set further back.

FIGURES

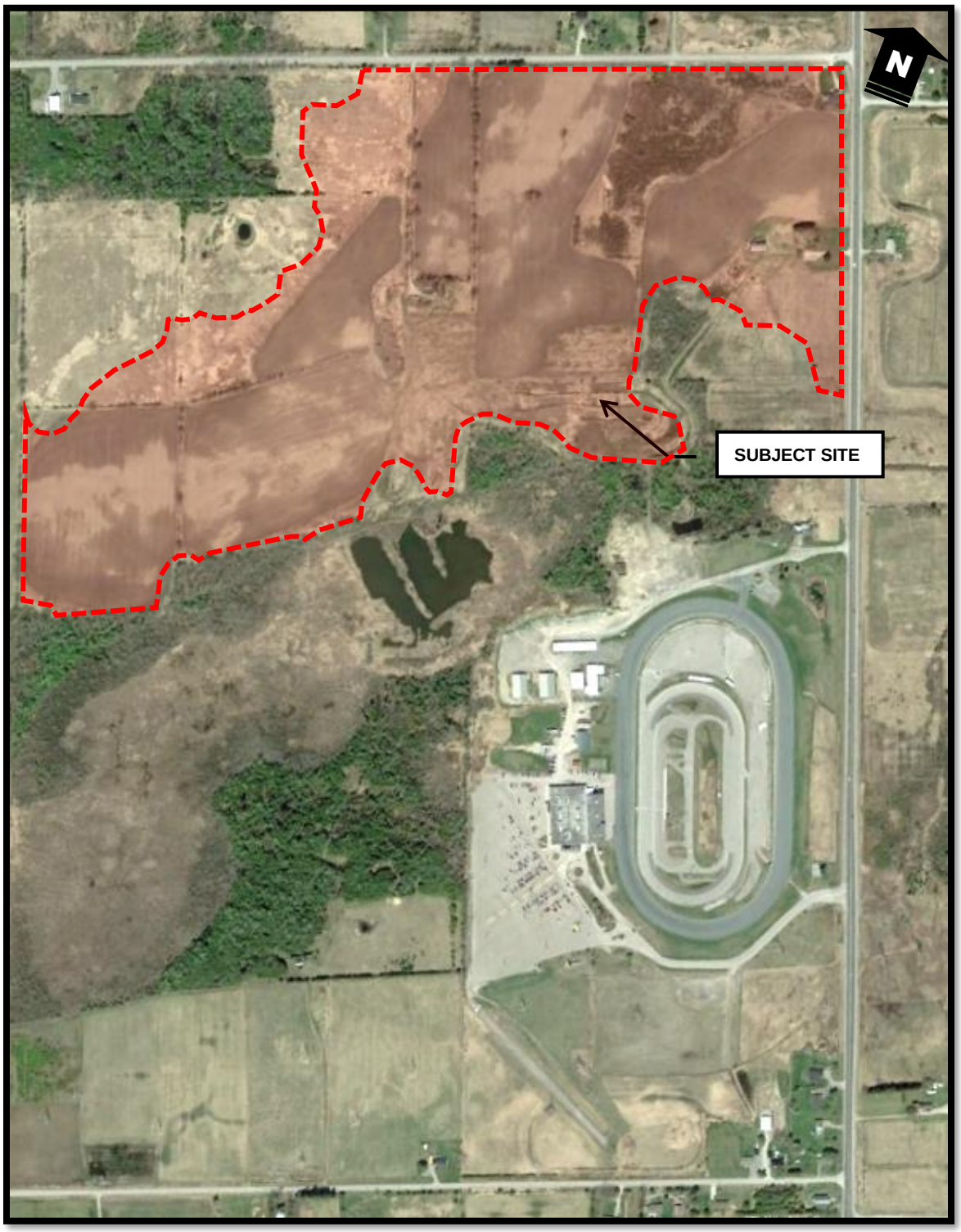


FIGURE 1
SITE LOCATION

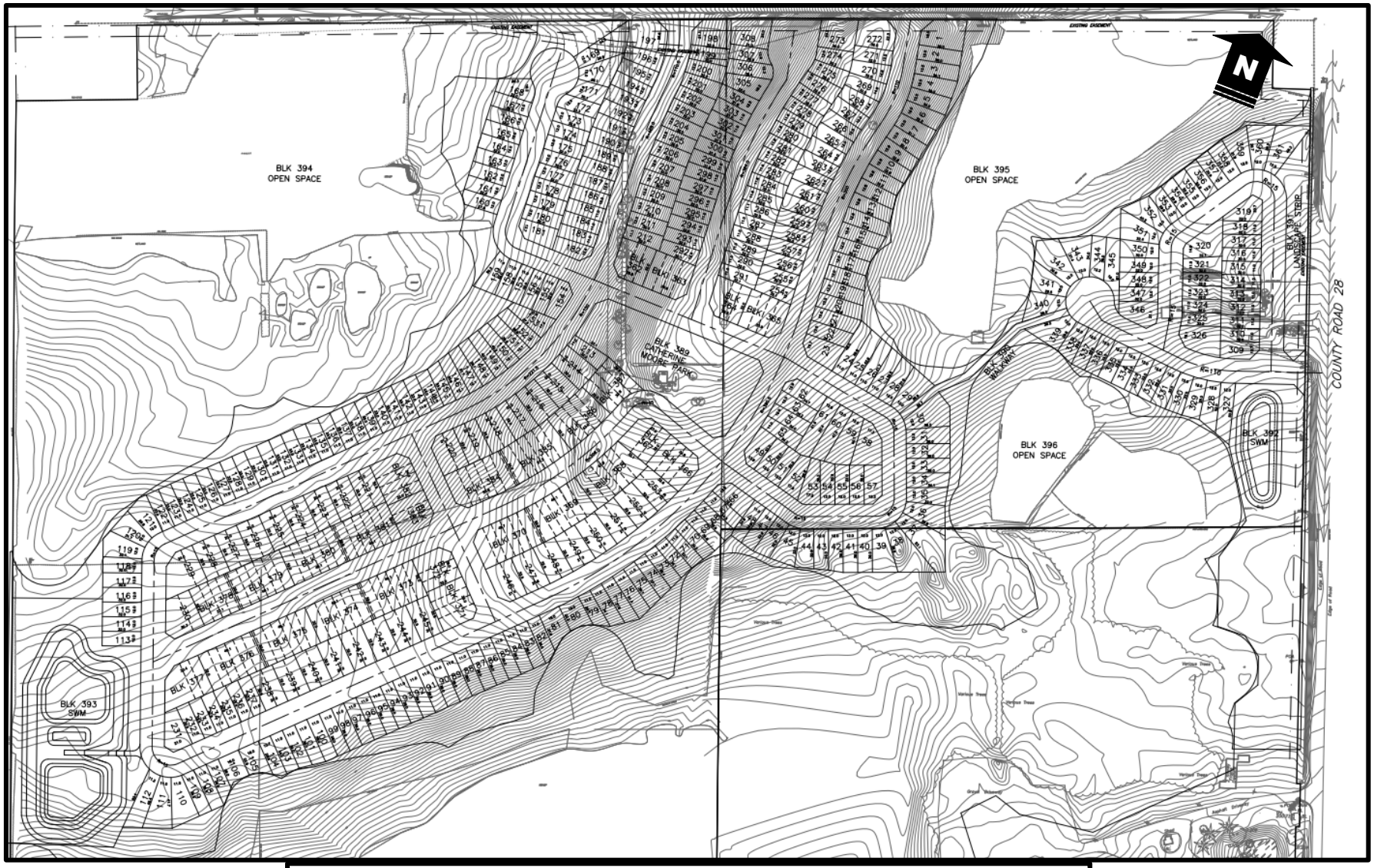


FIGURE 2
GENERAL LAYOUT OF PROPOSED DEVELOPMENT

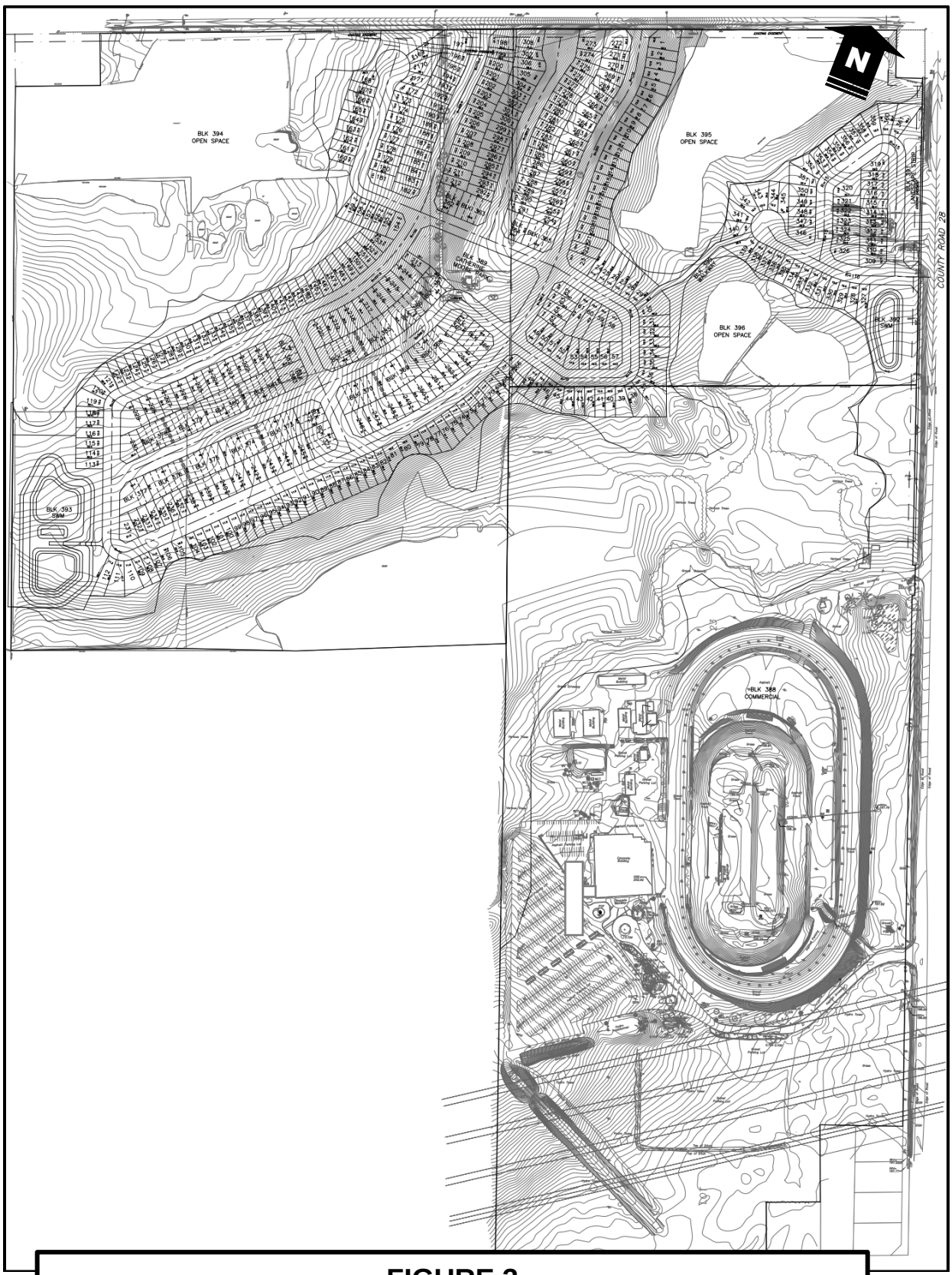


FIGURE 3
PROXIMITY OF PROPOSED DEVELOPMENT TO THE KAWARTHA DOWNS

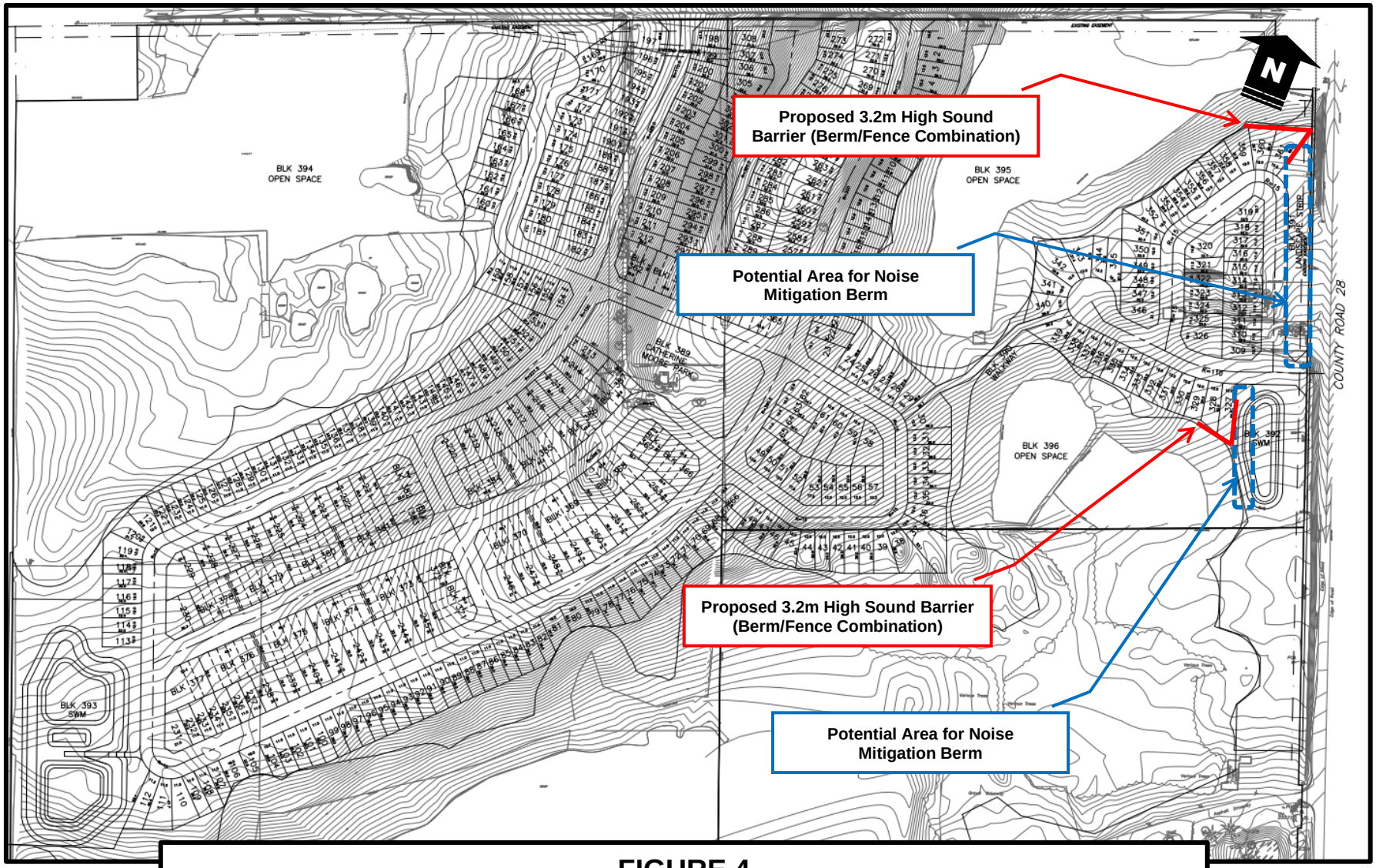


FIGURE 4
PROPOSED BARRIER HEIGHTS AND ALIGNMENTS DUE TO TRANSPORTATION NOISE SOURCE (CR 28)

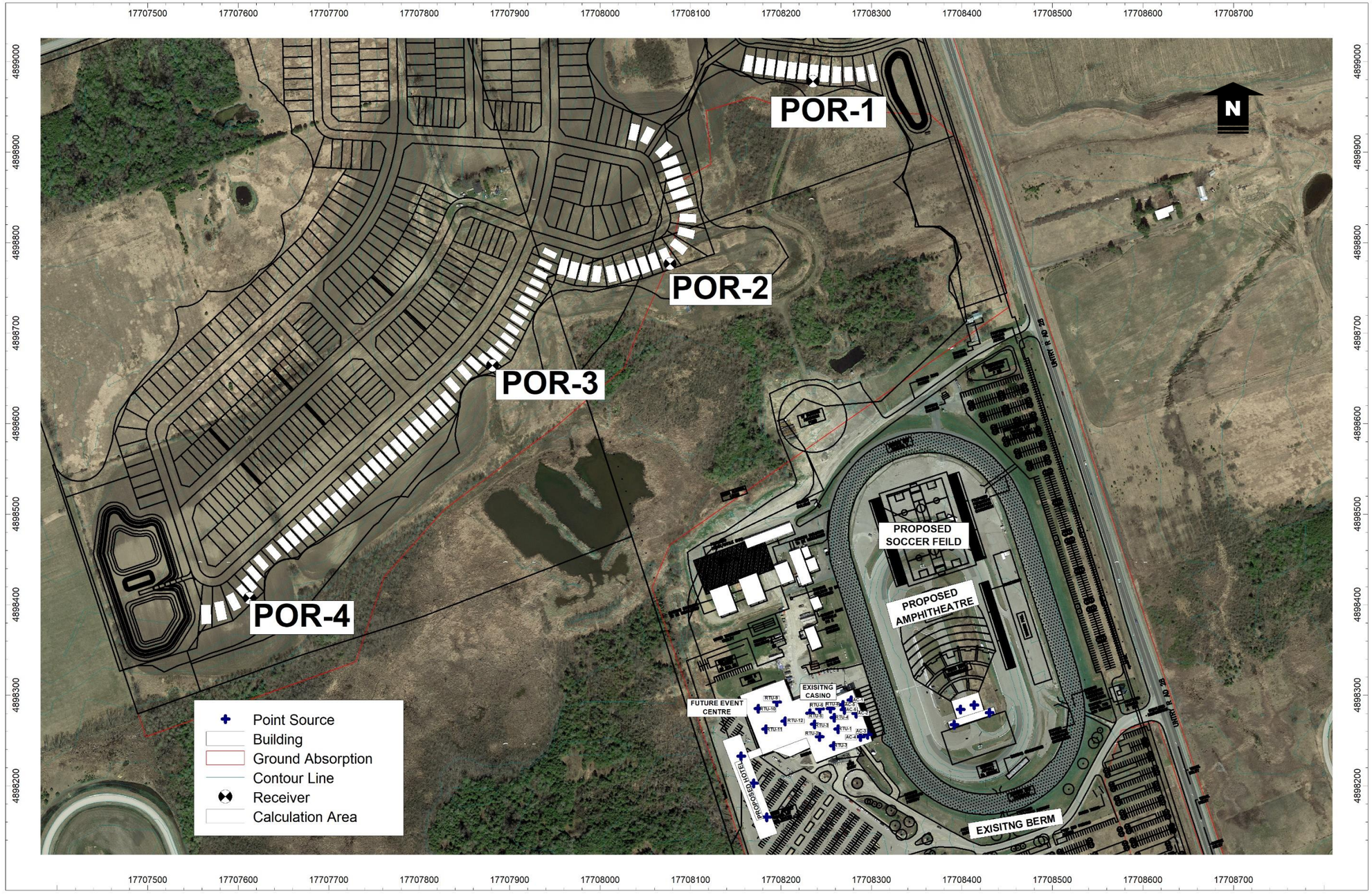


FIGURE 5
POINTS OF RECEPTORS POR 1 TO POR 4 RELATIVE TO THE KAWARTHA DOWNS FACILITY

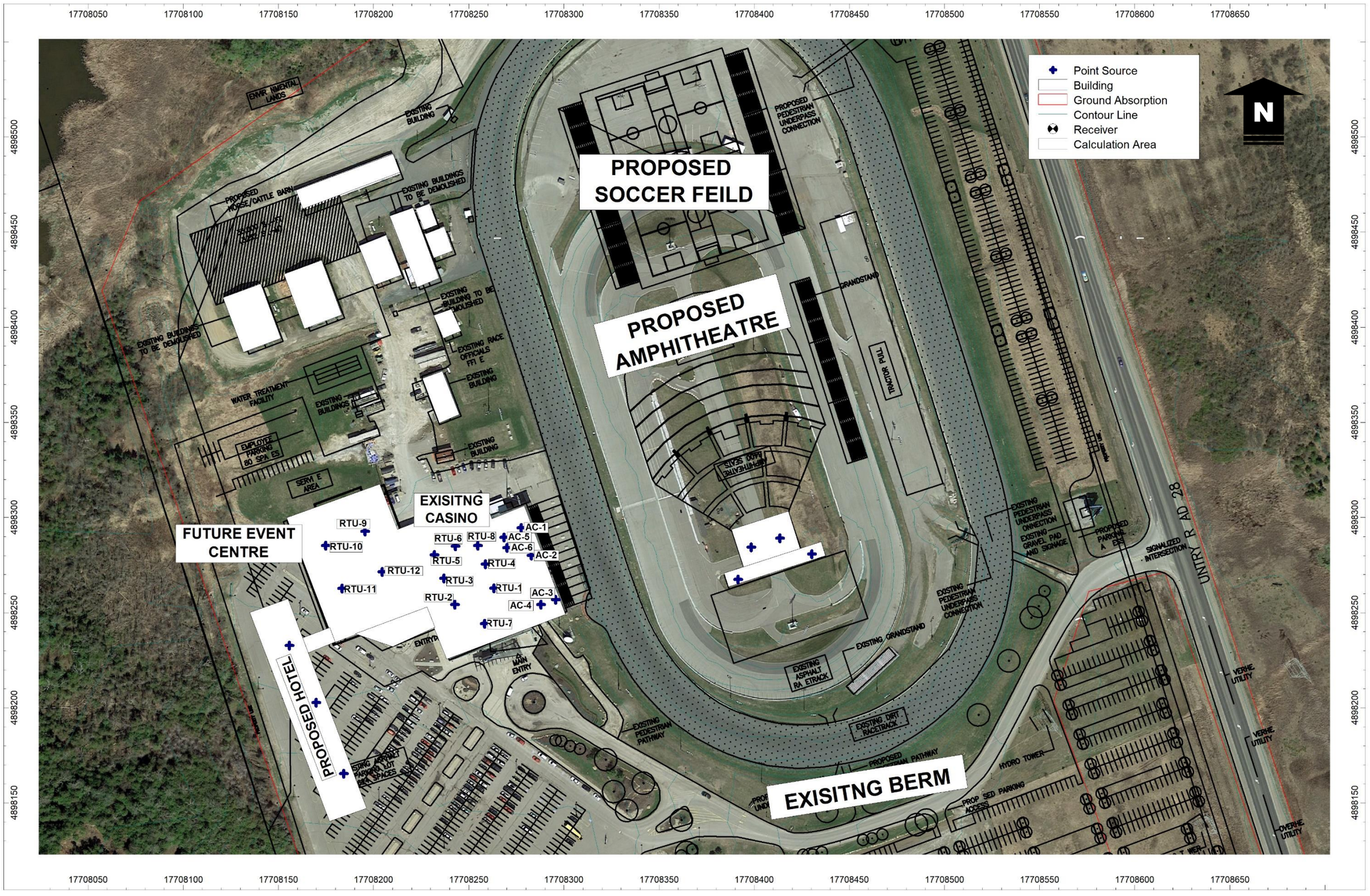


FIGURE 6
LOCATION OF THE STATIONARY SOURCES OF NOISE INCLUDING THE HVAC EQUIPMENT OF THE EXISTING AND FUTURE BUILDINGS AND THE SPEAKERS FROM AMPHITHEATRE

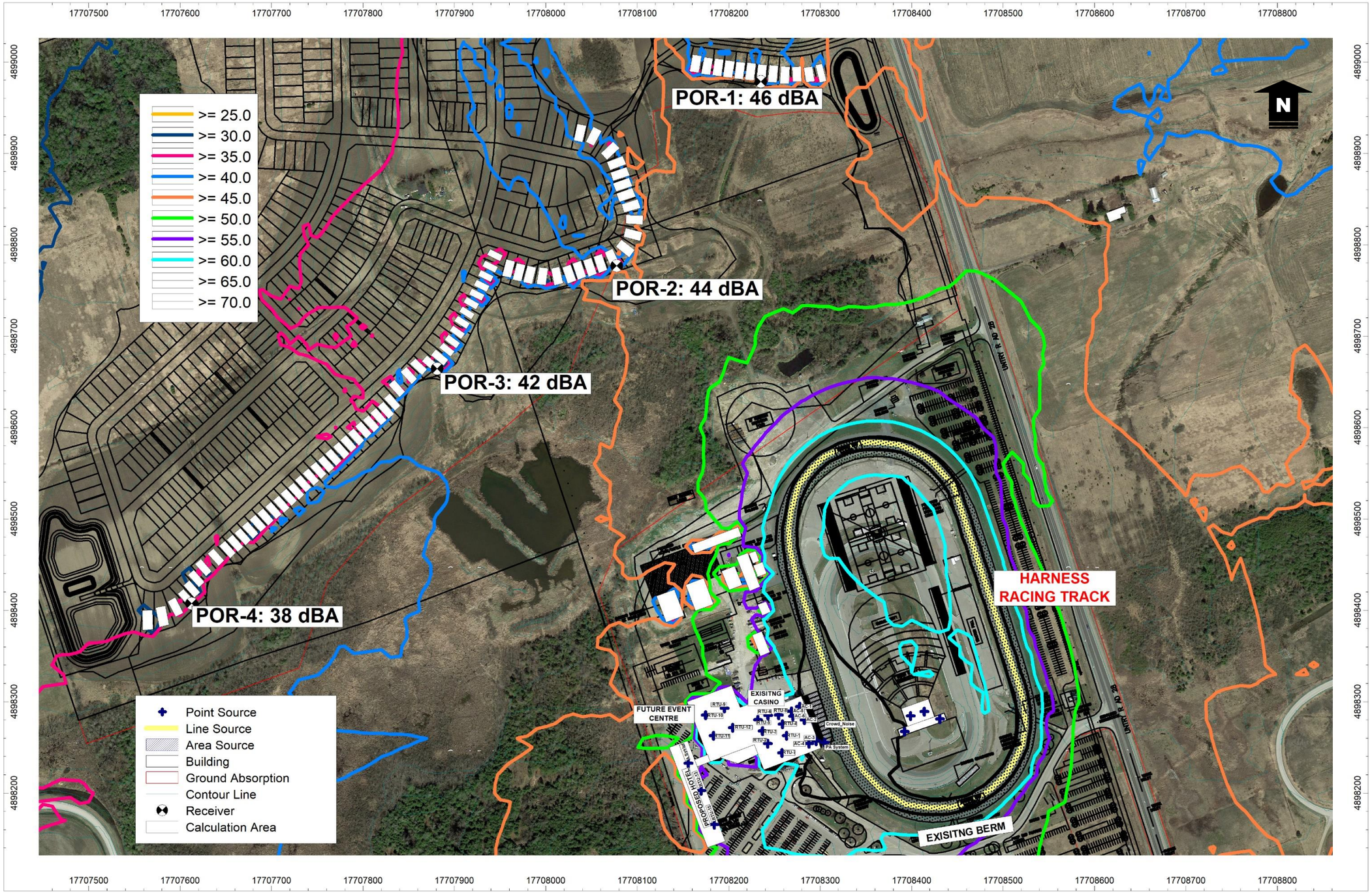


FIGURE 7
HORSE HARNESS RACING SOUND LEVEL CONTOURS OF EQUAL LINES AT 5 METERS HIGH AND THE SOUND LEVELS AT THE RECEPTORS (DAYTIME)

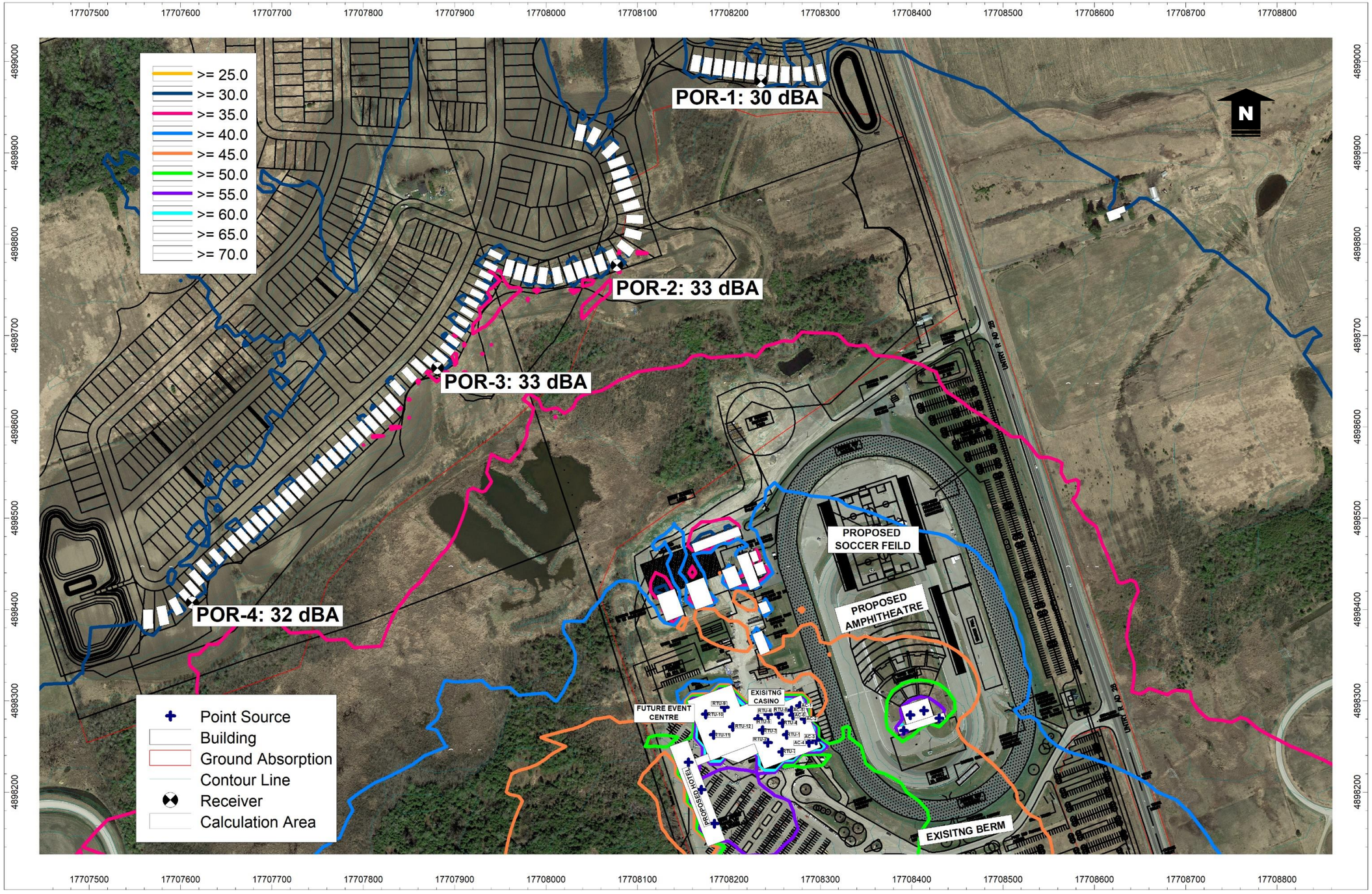


FIGURE 8
ROOFTOP EQUIPMENT SOUND LEVEL CONTOURS OF EQUAL LINES AT 5 METERS HIGH AND THE SOUND LEVELS AT THE RECEPTORS (DAYTIME)

APPENDIX A

ROAD TRAFFIC DATA

Ontario

Ministry of Transportation

TVIS II - Traffic Volume information System

ICS Weekly Volume Summary

Hwy:	115	**Between:**	TAPLEY QUARTER LINE IC		
TS:	13	**and:**	PETERBOROUGH RD 10 UP IC		
Regn:	Eastern	**Pattern:**	IR	**PDCS:** 91	**Factor:** 0.87
LHRS:	42242	**Offset:**	3.400	**Locn:**	3.400 KM E OF TAPLEY QUARTER LINE IC
Dir:	E	**Lanes:**	2	**Speed:**	100 km/h **Dates:** 15-Jun-2020 to 22-Jun-2020

	Mon		Tue		Wed		Thu		Fri		Sat		Sun		Mon	
H. Interval	**06/15**		**06/16**	**Pk.**	**06/17**	**Pk.**	**06/18**	**Pk.**	**06/19**	**Pk.**	**06/20**	**Pk.**	**06/21**	**Pk.**	**06/22**	**Pk.**
00:00-01:00			77		48		64		73		89		55		51	
01:00-02:00			36		47		57		57		67		29		34	
02:00-03:00			44		48		49		52		49		22		28	
03:00-04:00			39		48		48		51		41		17		48	
04:00-05:00			42		50		49		49		104		32		70	
05:00-06:00			114		128		118		140		183		61		131	
06:00-07:00			286		268		289		303		248		147		328	
07:00-08:00			408		385		404		406		369		188		389	◄
08:00-09:00			434	◄	407	◄	442	◄	523	◄	529	◄	262	◄	383	
09:00-10:00			416		432		446		590		728		351		400	
10:00-11:00			407		496		547		723		843		544		459	
11:00-12:00			519		537		571		762		842	◄	594		1	◄
AM Total			**2822**		**2894**		**3084**		**3729**		**4092**		**2302**		**2322**	
12:00-13:00	465		523	◄	539		622	◄	772		832		596	◄		
13:00-14:00	491	◄	475		557	◄	620		859	◄	735		549			
14:00-15:00	531		539		561		649		877		660		525			
15:00-16:00	554		577		654	◄	684		977	◄	544	◄	486	◄		
16:00-17:00	582	◄	641	◄	640		796	◄	932		467		418			
17:00-18:00	565		620		629		765		951		432		364			
18:00-19:00	370		429		522		644		887		348		334			
19:00-20:00	300		323		375		565		706		293		304			
20:00-21:00	204		267		293		393		600		247		328			
21:00-22:00	151		170		191		256		337		181		237			
22:00-23:00	102		132		122		199		239		123		157			
23:00-00:00	70		81		105		128		146		88		86			
PM Total	**4385**		**4777**		**5188**		**6321**		**8283**		**4950**		**4384**			
24h. Total	**4385**		**7599**		**8082**		**9405**		**12012**		**9042**		**6686**		**2322**	
Noon - Noon	**7207**		**7671**		**8272**		**10050**		**12375**		**7252**		**6706**			

Ontario

Ministry of Transportation

TVIS II - Traffic Volume information System

ICS Weekly Volume Summary

Hwy: 115 **Between:** TAPLEY QUARTER LINE IC

TS: 13 **and:** PETERBOROUGH RD 10 UP IC

Regn: Eastern **Pattern:** IR **PDCS:** 91 **Factor:** 0.87

LHRS: 42242 **Offset:** 3.400 **Locn:** 3.400 KM E OF TAPLEY QUARTER LINE IC

Dir: W **Lanes:** 2 **Speed:** 100 km/h **Dates:** 15-Jun-2020 to 22-Jun-2020

	Mon		Tue		Wed		Thu		Fri		Sat		Sun		Mon	
H. Interval	06/15		06/16	Pk.	06/17	Pk.	06/18	Pk.	06/19	Pk.	06/20	Pk.	06/21	Pk.	06/22	Pk.
00:00-01:00			59		51		47		47		54		82		74	
01:00-02:00			25		34		29		31		32		43		28	
02:00-03:00			38		29		37		30		21		19		31	
03:00-04:00			50		57		53		36		29		19		62	
04:00-05:00			217		209		211		183		53		42		301	
05:00-06:00			524		508		522		426		111		75		607	
06:00-07:00			697	◄	706	◄	634	◄	511	◄	146		110		764	◄
07:00-08:00			572		501		534		502		239		179		627	
08:00-09:00			550		464		496		500		302	◄	267	◄	648	
09:00-10:00			519		479		493		491		488		538		609	
10:00-11:00			567		546		547		628		622		879		835	
11:00-12:00			595		610		563		689		762		1267		867	◄
AM Total			**4413**		**4194**		**4166**		**4074**		**2859**		**3520**		**5453**	
12:00-13:00	726		630	◄	635	◄	620		743		791		1614			
13:00-14:00	747	◄	612		624		638	◄	778	◄	890	◄	1799	◄		
14:00-15:00	719		644		679		670		787		879		1917			
15:00-16:00	809		702		710		759	◄	803		848		1880			
16:00-17:00	871	◄	746	◄	769	◄	730		909	◄	893	◄	1888	◄		
17:00-18:00	779		735		718		707		724		881		1780			
18:00-19:00	632		531		569		577		590		824		1660			
19:00-20:00	553		457		457		478		527		797		1638			
20:00-21:00	421		342		375		413		407		819		1446			
21:00-22:00	295		249		300		289		287		728		938			
22:00-23:00	167		172		191		184		202		463		487			
23:00-00:00	95		95		87		107		126		205		151			
PM Total	**6814**		**5915**		**6114**		**6172**		**6883**		**9018**		**17198**			
24h. Total	**6814**		**10328**		**10308**		**10338**		**10957**		**11877**		**20718**		**5453**	
Noon - Noon	**11227**		**10109**		**10280**		**10246**		**9742**		**12538**		**22651**			

Ontario

Ministry of Transportation

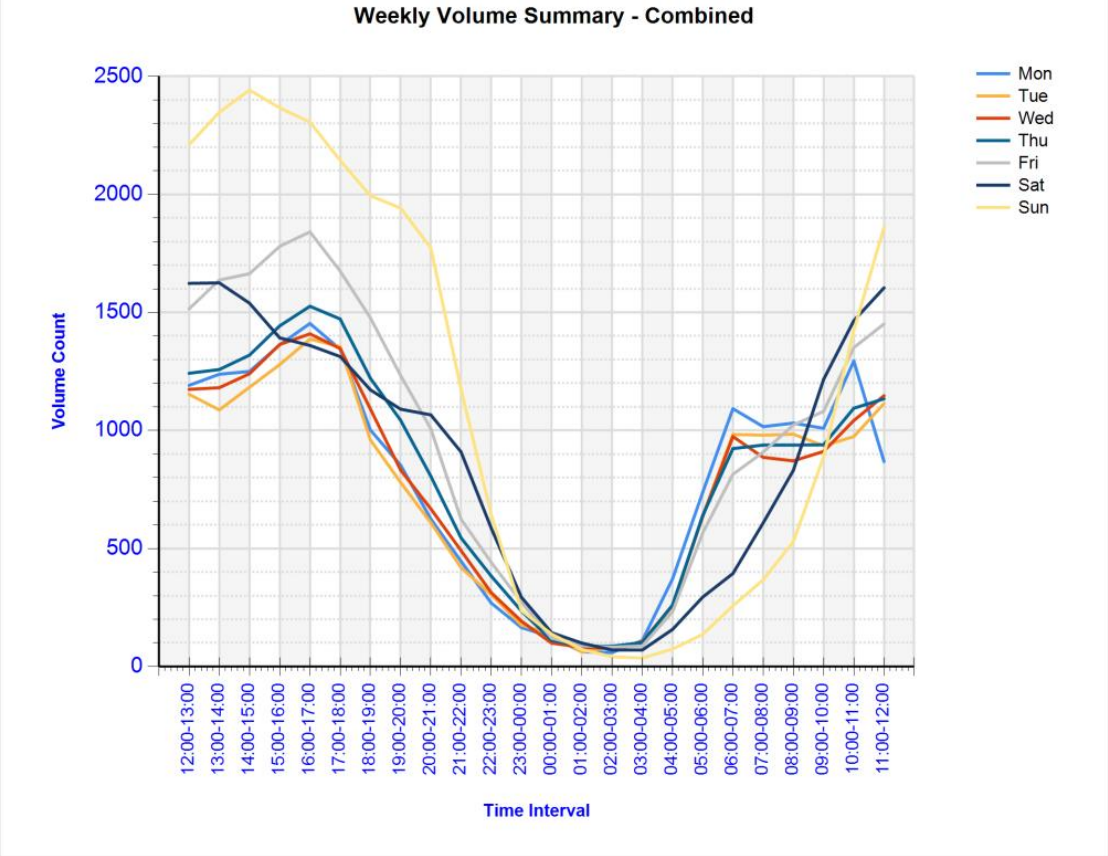
TVIS II - Traffic Volume information System

ICS Weekly Volume Summary

Hwy:	115	**Between:**	TAPLEY QUARTER LINE IC				
TS:	13	**and:**	PETERBOROUGH RD 10 UP IC				
Regn:	Eastern	**Pattern:**	IR	**PDCS:**	91	**Factor:**	0.87
LHRS:	42242	**Offset:**	3.400	**Locn:**	3.400 KM E OF TAPLEY QUARTER LINE IC		
Dir:	COMBINED	**Lanes:**	4	**Speed:**	100 km/h	**Dates:**	15-Jun-2020 to 22-Jun-2020

	Mon		Tue		Wed		Thu		Fri		Sat		Sun		Mon	
H. Interval	**06/15**		**06/16**	**Pk.**	**06/17**	**Pk.**	**06/18**	**Pk.**	**06/19**	**Pk.**	**06/20**	**Pk.**	**06/21**	**Pk.**	**06/22**	**Pk.**
00:00-01:00			136		99		111		120		143		137		125	
01:00-02:00			61		81		86		88		99		72		62	
02:00-03:00			82		77		86		82		70		41		59	
03:00-04:00			89		105		101		87		70		36		110	
04:00-05:00			259		259		260		232		157		74		371	
05:00-06:00			638		636		640		566		294		136		738	
06:00-07:00			983		974	◄	923		814		394		257		1092	◄
07:00-08:00			980		886		938	◄	908		608		367		1016	
08:00-09:00			984	◄	871		938		1023	◄	831	◄	529	◄	1031	
09:00-10:00			935		911		939		1081		1216		889		1009	
10:00-11:00			974		1042		1094		1351		1465		1423		1294	
11:00-12:00			1114		1147		1134		1451		1604		1861		868	◄
AM Total			**7235**		**7088**		**7250**		**7803**		**6951**		**5822**		**7775**	
12:00-13:00	1191		1153	◄	1174		1242		1515		1623		2210			
13:00-14:00	1238	◄	1087		1181	◄	1258	◄	1637	◄	1625	◄	2348	◄		
14:00-15:00	1250		1183		1240		1319		1664		1539		2442			
15:00-16:00	1363		1279		1364		1443		1780		1392	◄	2366	◄		
16:00-17:00	1453	◄	1387	◄	1409	◄	1526	◄	1841	◄	1360		2306			
17:00-18:00	1344		1355		1347		1472		1675		1313		2144			
18:00-19:00	1002		960		1091		1221		1477		1172		1994			
19:00-20:00	853		780		832		1043		1233		1090		1942			
20:00-21:00	625		609		668		806		1007		1066		1774			
21:00-22:00	446		419		491		545		624		909		1175			
22:00-23:00	269		304		313		383		441		586		644			
23:00-00:00	165		176		192		235		272		293		237			
PM Total	**11199**		**10692**		**11302**		**12493**		**15166**		**13968**		**21582**			
24h. Total	**11199**		**17927**		**18390**		**19743**		**22969**		**20919**		**27404**		**7775**	
Noon - Noon	**18434**		**17780**		**18552**		**20296**		**22117**		**19790**		**29357**			

ADT	AWD	AADT	SADT	SAWDT	WADT	DHV
20904	18766	18200	24900	24900	17800	2250



Basic Volume Summary: 028000

Grand Total For Data From: 00:00 - 09/19/2019 To: 23:59 - 09/19/2019

Total Count	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	Total
Lane #1	42	28	39	49	81	196	460	785	768	671	666	706	698	723	756	798	991	1034	641	488	344	180	142	113	11399
TOTAL	42	28	39	49	81	196	460	785	768	671	666	706	698	723	756	798	991	1034	641	488	344	180	142	113	11399

Percents:	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300
Lane #1	0%	0%	0%	0%	1%	2%	4%	7%	7%	6%	6%	6%	6%	6%	7%	7%	9%	9%	6%	4%	3%	2%	1%	1%
TOTAL	0%	0%	0%	0%	1%	2%	4%	7%	7%	6%	6%	6%	6%	6%	7%	7%	9%	9%	6%	4%	3%	2%	1%	1%

ADT:	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	Total
Lane #1	42	28	39	49	81	196	460	785	768	671	666	706	698	723	756	798	991	1034	641	488	344	180	142	113	11399
TOTAL	42	28	39	49	81	196	460	785	768	671	666	706	698	723	756	798	991	1034	641	488	344	180	142	113	11399

LANE #1

	Sun	Mon	Tue	Wed	Thu	Fri	Sat		Total	Percent
DW Totals :	0	0	0	0	11399	0	0	Weekday (Mon-Fri) :	11399	100%
# Days :	0.0	0.0	0.0	0.0	1.0	0.0	0.0	ADT :	11399	
ADT :	0	0	0	0	11399	0	0	Weekend (Sat-Sun) :	0	0%
Percent :	0%	0%	0%	0%	100%	0%	0%	ADT :	0	

ALL LANES

	Sun	Mon	Tue	Wed	Thu	Fri	Sat		Total	Percent
DW Totals :	0	0	0	0	11399	0	0	Weekday (Mon-Fri) :	11399	100%
# Days :	0.0	0.0	0.0	0.0	1.0	0.0	0.0	ADT :	11399	
ADT :	0	0	0	0	11399	0	0	Weekend (Sat-Sun) :	0	0%
Percent :	0%	0%	0%	0%	100%	0%	0%	ADT :	0	

Basic Volume Summary: 02800000

Grand Total For Data From: 00:00 - 05/14/2019 To: 23:59 - 05/14/2019

Total Count	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	Total
Lane #1	41	32	28	54	49	212	421	754	789	621	605	575	671	657	685	796	940	901	520	353	269	236	137	88	10434
TOTAL	41	32	28	54	49	212	421	754	789	621	605	575	671	657	685	796	940	901	520	353	269	236	137	88	10434

Percents:	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300
Lane #1	0%	0%	0%	1%	0%	2%	4%	7%	8%	6%	6%	6%	6%	6%	7%	8%	9%	9%	5%	3%	3%	2%	1%	1%
TOTAL	0%	0%	0%	1%	0%	2%	4%	7%	8%	6%	6%	6%	6%	6%	7%	8%	9%	9%	5%	3%	3%	2%	1%	1%

ADT:	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	Total
Lane #1	41	32	28	54	49	212	421	754	789	621	605	575	671	657	685	796	940	901	520	353	269	236	137	88	10434
TOTAL	41	32	28	54	49	212	421	754	789	621	605	575	671	657	685	796	940	901	520	353	269	236	137	88	10434

LANE #1

	Sun	Mon	Tue	Wed	Thu	Fri	Sat		Total	Percent
DW Totals :	0	0	10434	0	0	0	0	Weekday (Mon-Fri) :	10434	100%
# Days :	0.0	0.0	1.0	0.0	0.0	0.0	0.0	ADT :	10434	
ADT :	0	0	10434	0	0	0	0	Weekend (Sat-Sun) :	0	0%
Percent :	0%	0%	100%	0%	0%	0%	0%	ADT :	0	

ALL LANES

	Sun	Mon	Tue	Wed	Thu	Fri	Sat		Total	Percent
DW Totals :	0	0	10434	0	0	0	0	Weekday (Mon-Fri) :	10434	100%
# Days :	0.0	0.0	1.0	0.0	0.0	0.0	0.0	ADT :	10434	
ADT :	0	0	10434	0	0	0	0	Weekend (Sat-Sun) :	0	0%
Percent :	0%	0%	100%	0%	0%	0%	0%	ADT :	0	

Basic Volume Summary: 028000

Grand Total For Data From: 00:00 - 07/03/2019 To: 23:59 - 07/03/2019

Total Count	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	Total
Lane #1	26	14	9	13	22	99	188	342	375	316	355	320	294	340	306	332	377	381	321	193	172	117	82	37	5031
Lane #2	20	18	15	16	31	74	217	252	310	247	252	273	300	299	337	354	462	457	280	210	160	138	108	44	4874
TOTAL	46	32	24	29	53	173	405	594	685	563	607	593	594	639	643	686	839	838	601	403	332	255	190	81	9905

Percents:	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300
Lane #1	1%	0%	0%	0%	0%	2%	4%	7%	7%	6%	7%	6%	6%	7%	6%	7%	7%	8%	6%	4%	3%	2%	2%	1%
Lane #2	0%	0%	0%	0%	1%	2%	4%	5%	6%	5%	5%	6%	6%	6%	7%	7%	9%	9%	6%	4%	3%	3%	2%	1%
TOTAL	0%	0%	0%	0%	1%	2%	4%	6%	7%	6%	6%	6%	6%	6%	6%	7%	8%	8%	6%	4%	3%	3%	2%	1%

ADT:	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	Total
Lane #1	26	14	9	13	22	99	188	342	375	316	355	320	294	340	306	332	377	381	321	193	172	117	82	37	5031
Lane #2	20	18	15	16	31	74	217	252	310	247	252	273	300	299	337	354	462	457	280	210	160	138	108	44	4874
TOTAL	46	32	24	29	53	173	405	594	685	563	607	593	594	639	643	686	839	838	601	403	332	255	190	81	9905

LANE #1

	Sun	Mon	Tue	Wed	Thu	Fri	Sat		Total	Percent
DW Totals :	0	0	0	5031	0	0	0	Weekday (Mon-Fri) :	5031	100%
# Days :	0.0	0.0	0.0	1.0	0.0	0.0	0.0	ADT :	5031	
ADT :	0	0	0	5031	0	0	0	Weekend (Sat-Sun) :	0	0%
Percent :	0%	0%	0%	100%	0%	0%	0%	ADT :	0	

LANE #2

	Sun	Mon	Tue	Wed	Thu	Fri	Sat		Total	Percent
DW Totals :	0	0	0	4874	0	0	0	Weekday (Mon-Fri) :	4874	100%
# Days :	0.0	0.0	0.0	1.0	0.0	0.0	0.0	ADT :	4874	
ADT :	0	0	0	4874	0	0	0	Weekend (Sat-Sun) :	0	0%
Percent :	0%	0%	0%	100%	0%	0%	0%	ADT :	0	

ALL LANES

	Sun	Mon	Tue	Wed	Thu	Fri	Sat		Total	Percent
DW Totals :	0	0	0	9905	0	0	0	Weekday (Mon-Fri) :	9905	100%
# Days :	0.0	0.0	0.0	1.0	0.0	0.0	0.0	ADT :	9905	
ADT :	0	0	0	9905	0	0	0	Weekend (Sat-Sun) :	0	0%
Percent :	0%	0%	0%	100%	0%	0%	0%	ADT :	0	

APPENDIX B

TRANSPORTATION
SAMPLE SOUND LEVEL CALCULATIONS

SS WILSON ASSOCIATES - TRAFFIC NOISE PREDICTION MODEL

Consulting Engineers, Richmond Hill, Ontario. *V8 December 4, 2018*

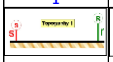
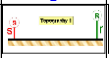
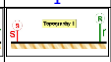
Kawartha

Text

Source(s) of Road Traffic Noise: **County Rd. 28/ Highway 115**

Receptor Name: **Lot 361 D/N**

SSWA Project Number WA21-053

Record Number	*1*	*2*	*3*	*4*
Include the following Segments in the calculations? (0 or 1)	1 Yes	1 Yes	1 Yes	0 No
Road Name & Direction	County Road	Hwy 115 (EB)	HWY 115 (WB)	Text
Segment Detail	Text	Text	Text	Text
Section/Segment Number	S1	S2	S2	S2
MOE Topographic Case (1-11)-See Instructions	1  S and R on flat ground	1  S and R on flat ground	1  S and R on flat ground	
Traffic Data Input Method	24 hour Data	24 hour Data	24 hour Data	24 hour Data
Alpha (α) Input; Manual or Auto?	Automatic	Automatic	Automatic	
Notes on your choice of α	As per MOE Procedures	As per MOE Procedures	As per MOE Procedures	
Manual Alpha				
Intermediate Surface; Absorptive or Reflective	Absorptive	Absorptive	Absorptive	
Pavement Type	Asphalt-Concret	Asphalt-Concret	Asphalt-Concret	Asphalt-Concret
Include Effect of Dense Woods?	No	No	No	
Measured Angle Case Number	1	1	1	3
Angle description	-θ1 Left & +θ2 Right	-θ1 Left & +θ2 Right	-θ1 Left & +θ2 Right	+θ1 & +θ2 Both on the Right
Angle Theta 1	-90	-90	-90	-90
Angle Theta 2	90	90	90	90
Angle Theta Error Detection Flag				
Subtended Angle (Angle of Exposure), °	180	180	180	180
% increase / year	2.50%	2.50%	2.50%	0.00%
Number of years	14	14	14	0
24 Hour Traffic Data	10350	8505	12400	9999
Medium Truck %	1.00%	5.00%	5.00%	0.00%
Heavy Truck %	9.00%	15.00%	15.00%	0.00%
Daytime Traffic Split	92.00%	90.00%	90.00%	90.00%
Daytime Hours	16	16	16	16
Posted Speed (Km/Hr) [S]	80	100	100	70
Road Gradient (%) [Gradient]	2.00%	2.00%	2.00%	0.00%
Wood Depth (m)	0	0	0	0
Number of Rows of Houses	0	0	0	0
Night time Number of Rows of Houses	0	0	0	0
Percentage of Row Occupied by Houses	1%	1%	1%	50%
Height of Row of House [HH]	0	0	0	7
Receiver Height (m) [RH]	5	5	5	1.5
Night time Reciever Height (m) [NRH]	5	5	5	1.5
Source-Receiver Distance [SRD]	33	755	785	200
Night time Source-Receiver Distance [NSRD]	33	755	785	200
Barrier Height (m) [BH]	0	0	0	0
Barrier-Receiver Distance (m)	0	0	0	12
Ground Elevation Difference (m) [e]	0	0	0	0
Source Ground Elevation (m)	0	0	0	0
Receiver Ground Elevation (m)	0	0	0	0
Barrier Ground Elevation (m)	0	0	0	0
Source Height Input [Manual or Auto]	Automatic	Automatic	Automatic	Automatic
Manual Source Height (m) [MSH]				1.00
Dominant Octave Frequency Band (Hz) [F]	500	500	500	
Additionl dBA Correction Factor 1- Specify	0	0	0	
Additionl dBA Correction Factor 2- Specify	0	0	0	
RESULTS FOR SEGMENTS				
24 Hour Daily Segment Leq	65.89	47.83	49.20	-50.00
Day Time [16 hours] Segment Leq	67.29	49.13	50.51	-50.00
Night Time [8 hours] Segment Leq	59.69	42.60	43.98	-50.00

FINAL/OVERALL	24 Hour Daily Leq	Day Time Leq	Night Time Leq
	66	67	60

SS WILSON ASSOCIATES - TRAFFIC NOISE PREDICTION MODEL

Consulting Engineers, Richmond Hill, Ontario. *v8 December 4, 2018*

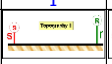
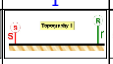
Kawartha

Text

Source(s) of Road Traffic Noise: **County Rd. 28/ Highway 115**

Receptor Name: **Lot 361 OLA (no barrier)**

SSWA Project Number WA21-053

Record Number	*1*	*2*	*3*	*4*
Include the following Segments in the calculations? (0 or 1)	1 Yes	1 Yes	1 Yes	0 No
Road Name & Direction	County Road	Hwy 115 (EB)	HWY 115 (WB)	Text
Segment Detail	Text	Text	Text	Text
Section/Segment Number	S1	S2	S2	S2
MOE Topographic Case (1-11)-See Instructions	1  S and R on flat ground	1  S and R on flat ground	1  S and R on flat ground	
Traffic Data Input Method	24 hour Data	24 hour Data	24 hour Data	24 hour Data
Alpha (α) Input; Manual or Auto?	Automatic	Automatic	Automatic	
Notes on your choice of α	As per MOE Procedures	As per MOE Procedures	As per MOE Procedures	
Manual Alpha				
Intermediate Surface; Absorptive or Reflective	Absorptive	Absorptive	Absorptive	
Pavement Type	Asphalt-Concret	Asphalt-Concret	Asphalt-Concret	Asphalt-Concret
Include Effect of Dense Woods?	No	No	No	
Measured Angle Case Number	1	1	1	3
Angle description	-θ1 Left & +θ2 Right	-θ1 Left & +θ2 Right	-θ1 Left & +θ2 Right	+θ1 & +θ2 Both on the Right
Angle Theta 1	-90	-90	-90	-90
Angle Theta 2	60	90	90	90
Angle Theta Error Detection Flag				
Subtended Angle (Angle of Exposure), °	150	180	180	180
% increase / year	2.50%	2.50%	2.50%	0.00%
Number of years	14	14	14	0
24 Hour Traffic Data	10350	8505	12400	9999
Medium Truck %	1.00%	5.00%	5.00%	0.00%
Heavy Truck %	9.00%	15.00%	15.00%	0.00%
Daytime Traffic Split	92.00%	90.00%	90.00%	90.00%
Daytime Hours	16	16	16	16
Posted Speed (Km/Hr) [S]	80	100	100	70
Road Gradient (%) [Gradient]	2.00%	2.00%	2.00%	0.00%
Wood Depth (m)	0	0	0	0
Number of Rows of Houses	0	0	0	0
Night time Number of Rows of Houses	0	0	0	0
Percentage of Row Occupied by Houses	1%	1%	1%	50%
Height of Row of House [HH]	0	0	0	7
Receiver Height (m) [RH]	1.5	1.5	1.5	1.5
Night time Reciever Height (m) [NRH]	1.5	1.5	1.5	1.5
Source-Receiver Distance [SRD]	33	755	785	200
Night time Source-Receiver Distance [NSRD]	33	755	785	200
Barrier Height (m) [BH]				2.6
Barrier-Receiver Distance (m)	20	11	11	12
Ground Elevation Difference (m) [e]	0	0	0	0
Source Ground Elevation (m)	0	0	0	0
Receiver Ground Elevation (m)	0	0	0	0
Barrier Ground Elevation (m)	0	0	0	0
Source Height Input [Manual or Auto]	Automatic	Automatic	Automatic	Automatic
Manual Source Height (m) [MSH]				1.00
Dominant Octave Frequency Band (Hz) [F]	500	500	500	
Additionl dBA Correction Factor 1- Specify	0	0	0	
Additionl dBA Correction Factor 2- Specify	0	0	0	
RESULTS FOR SEGMENTS				
24 Hour Daily Segment Leq	64.94	45.86	47.22	-50.00
Day Time [16 hours] Segment Leq	66.33	47.16	48.52	-50.00
Night Time [8 hours] Segment Leq	58.74	40.63	41.99	-50.00

FINAL/OVERALL	24 Hour Daily Leq	Day Time Leq	Night Time Leq
	65	66	59

SS WILSON ASSOCIATES - TRAFFIC NOISE PREDICTION MODEL

Consulting Engineers, Richmond Hill, Ontario. *V8 December 4, 2018*

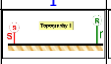
Kawartha

Text

Source(s) of Road Traffic Noise: **County Rd. 28/ Highway 115**

Receptor Name: **Lot 361 OLA (w/ barrier)**

SSWA Project Number WA21-053

Record Number	*1*	*2*	*3*	*4*
Include the following Segments in the calculations? (0 or 1)	1 Yes	1 Yes	1 Yes	0 No
Road Name & Direction	County Road	Hwy 115 (EB)	HWY 115 (WB)	Text
Segment Detail	Text	Text	Text	Text
Section/Segment Number	S1	S2	S2	S2
MOE Topographic Case (1-11)-See Instructions	1  S and R on flat ground	1  S and R on flat ground	1  S and R on flat ground	
Traffic Data Input Method	24 hour Data	24 hour Data	24 hour Data	24 hour Data
Alpha (α) Input; Manual or Auto?	Automatic	Automatic	Automatic	
Notes on your choice of α	As per MOE Procedures	As per MOE Procedures	As per MOE Procedures	
Manual Alpha				
Intermediate Surface; Absorptive or Reflective	Absorptive	Absorptive	Absorptive	
Pavement Type	Asphalt-Concret	Asphalt-Concret	Asphalt-Concret	Asphalt-Gravel
Include Effect of Dense Woods?	No	No	No	
Measured Angle Case Number	1	1	1	3
Angle description	-θ1 Left & +θ2 Right	-θ1 Left & +θ2 Right	-θ1 Left & +θ2 Right	+θ1 & +θ2 Both on the Right
Angle Theta 1	-90	-90	-90	-90
Angle Theta 2	60	90	90	90
Angle Theta Error Detection Flag				
Subtended Angle (Angle of Exposure), °	150	180	180	180
% increase / year	2.50%	2.50%	2.50%	0.00%
Number of years	14	14	14	0
24 Hour Traffic Data	10350	8505	12400	9999
Medium Truck %	1.00%	5.00%	5.00%	0.00%
Heavy Truck %	9.00%	15.00%	15.00%	0.00%
Daytime Traffic Split	92.00%	90.00%	90.00%	90.00%
Daytime Hours	16	16	16	16
Posted Speed (Km/Hr) [S]	80	100	100	70
Road Gradient (%) [Gradient]	2.00%	2.00%	2.00%	0.00%
Wood Depth (m)	0	0	0	0
Number of Rows of Houses	0	0	0	0
Night time Number of Rows of Houses	0	0	0	0
Percentage of Row Occupied by Houses	1%	1%	1%	50%
Height of Row of House [HH]	0	0	0	7
Receiver Height (m) [RH]	1.5	1.5	1.5	1.5
Night time Reciever Height (m) [NRH]	1.5	1.5	1.5	1.5
Source-Receiver Distance [SRD]	33	755	785	200
Night time Source-Receiver Distance [NSRD]	33	755	785	200
Barrier Height (m) [BH]	4.8			2.6
Barrier-Receiver Distance (m)	20	11	11	12
Ground Elevation Difference (m) [e]	0	0	0	0
Source Ground Elevation (m)	0	0	0	0
Receiver Ground Elevation (m)	0	0	0	0
Barrier Ground Elevation (m)	0	0	0	0
Source Height Input [Manual or Auto]	Automatic	Automatic	Automatic	Automatic
Manual Source Height (m) [MSH]				1.00
Dominant Octave Frequency Band (Hz) [F]	500	500	500	
Additionl dBA Correction Factor 1- Specify	0	0	0	
Additionl dBA Correction Factor 2- Specify	0	0	0	
RESULTS FOR SEGMENTS				
24 Hour Daily Segment Leq	52.01	45.86	47.22	-50.00
Day Time [16 hours] Segment Leq	53.40	47.16	48.52	-50.00
Night Time [8 hours] Segment Leq	45.81	40.63	41.99	-50.00

FINAL/OVERALL	24 Hour Daily Leq	Day Time Leq	Night Time Leq
	54	55	48

APPENDIX C

STATIONARY
SAMPLE SOUND LEVEL CALCULATIONS

POR-3 Sample 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	Off
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-3
ID: POR_3
X: 17707881.08
Y: 4898664.28
Z: 210.41

Point Source, ISO 9613, Name: "RTU-10", ID: "RTU_10"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/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)
4	17708174.82	4898285.23	222.00	0	D	A	98.5	0.0	0.0	-4.9	64.6	1.5	-1.7	0.0	0.0	3.3	0.0	0.0	25.9

Point Source, ISO 9613, Name: "RTU-9", ID: "RTU_9"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/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)
6	17708195.50	4898292.73	222.00	0	D	A	98.5	0.0	0.0	-4.9	64.7	1.5	-1.7	0.0	0.0	3.4	0.0	0.0	25.7

Point Source, ISO 9613, Name: "RTU-12", ID: "RTU_12"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/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)
12	17708204.46	4898271.55	222.00	0	D	A	98.5	0.0	0.0	-4.9	65.1	1.5	-1.7	0.0	0.0	5.9	0.0	0.0	22.8

Point Source, ISO 9613, Name: "RTU-3", ID: "RTU_3"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/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)
15	17708237.00	4898268.00	222.00	0	D	A	98.5	0.0	0.0	-4.9	65.5	1.6	-1.7	0.0	0.0	6.3	0.0	0.0	21.9

Point Source, ISO 9613, Name: "RTU-4", ID: "RTU_4"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/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)
20	17708258.84	4898275.50	222.00	0	D	A	98.5	0.0	0.0	-4.9	65.7	1.6	-1.8	0.0	0.0	5.2	0.0	0.0	22.9

Point Source, ISO 9613, Name: "RTU-1", ID: "RTU_1"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/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)
24	17708263.18	4898262.83	222.00	0	D	A	98.5	0.0	0.0	-4.9	65.9	1.7	-1.8	0.0	0.0	6.0	0.0	0.0	21.9

Point Source, ISO 9613, Name: "RTU-11", ID: "RTU_11"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/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)
29	17708183.43	4898262.73	222.00	0	D	A	98.5	0.0	0.0	-4.9	65.0	1.5	-1.7	0.0	0.0	5.9	0.0	0.0	22.9

Point Source, ISO 9613, Name: "RTU-2", ID: "RTU_2"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/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)
35	17708242.67	4898254.33	222.00	0	D	A	98.5	0.0	0.0	-4.9	65.8	1.6	-1.8	0.0	0.0	6.5	0.0	0.0	21.5

Point Source, ISO 9613, Name: "RTU-5", ID: "RTU_5"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/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)
40	17708231.99	4898280.34	222.00	0	D	A	92.3	0.0	0.0	-4.9	65.3	4.0	-1.8	0.0	0.0	5.8	0.0	0.0	14.1

Point Source, ISO 9613, Name: "RTU-6", ID: "RTU_6"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/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)
44	17708243.00	4898285.00	222.00	0	D	A	92.3	0.0	0.0	-4.9	65.4	4.0	-1.8	0.0	0.0	2.7	0.0	0.0	17.1

Point Source, ISO 9613, Name: "AC-1", ID: "AC_1"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/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)
48	17708277.53	4898294.64	222.00	0	D	A	92.5	0.0	0.0	-4.9	65.7	2.9	-2.0	0.0	0.0	2.0	0.0	0.0	19.0

Point Source, ISO 9613, Name: "AC-2", ID: "AC_2"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/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)
52	17708282.89	4898280.04	222.00	0	D	A	92.5	0.0	0.0	-4.9	65.9	3.0	-2.0	0.0	0.0	4.8	0.0	0.0	15.9

Point Source, ISO 9613, Name: "RTU-7", ID: "RTU_7"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/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)
56	17708258.34	4898244.15	222.00	0	D	A	92.3	0.0	0.0	-4.9	66.0	4.2	-1.8	0.0	0.0	6.6	0.0	0.0	12.4

Point Source, ISO 9613, Name: "RTU-8", ID: "RTU_8"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/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)
60	17708254.77	4898285.33	222.00	0	D	A	89.3	0.0	0.0	-4.9	65.5	4.1	-1.8	0.0	0.0	3.3	0.0	0.0	13.4

Point Source, ISO 9613, Name: "AC-4", ID: "AC_4"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/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)
64	17708287.93	4898254.20	222.00	0	D	A	88.4	0.0	0.0	-4.9	66.2	1.8	-1.9	0.0	0.0	6.5	0.0	0.0	10.9

Point Source, ISO 9613, Name: "AC-3", ID: "AC_3"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/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)
66	17708295.64	4898256.79	222.00	0	D	A	88.4	0.0	0.0	-4.9	66.3	1.8	-1.9	0.0	0.0	6.5	0.0	0.0	10.8

Point Source, ISO 9613, Name: "AC-5", ID: "AC_5"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/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)
68	17708268.60	4898289.60	222.00	0	D	A	80.1	0.0	0.0	-4.9	65.6	2.7	-2.0	0.0	0.0	2.8	0.0	0.0	6.0

Point Source, ISO 9613, Name: "AC-6", ID: "AC_6"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/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)
70	17708270.07	4898284.14	222.00	0	D	A	80.1	0.0	0.0	-4.9	65.7	2.7	-2.0	0.0	0.0	3.8	0.0	0.0	4.9

Point Source, ISO 9613, Name: "AC-7", ID: "AC_7"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/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)
72	17708361.48	4898362.47	202.10	0	D	A	80.1	0.0	0.0	-4.9	66.1	2.8	-3.6	0.0	0.0	8.7	0.0	0.0	1.2

Point Source, ISO 9613, Name: "AC-9", ID: "AC_9"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/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)
74	17708378.16	4898354.00	202.12	0	D	A	80.1	0.0	0.0	-4.9	66.4	2.9	-3.7	0.0	0.0	8.4	0.0	0.0	1.2

Point Source, ISO 9613, Name: "AC-8", ID: "AC_8"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/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)
76	17708400.39	4898375.45	201.96	0	D	A	80.1	0.0	0.0	-4.9	66.5	2.9	-3.7	0.0	0.0	6.8	0.0	0.0	2.7

Point Source, ISO 9613, Name: "AC-10", ID: "AC_10"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/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)
79	17708393.25	4898358.50	201.06	0	D	A	80.1	0.0	0.0	-4.9	66.5	2.9	-3.7	0.0	0.0	8.2	0.0	0.0	1.2