Thornton Tomasetti

Findlay Creek #2 Elementary Public School with Daycare

820 Miikana Road, Ottawa, Ontario

SW22240

Prepared For

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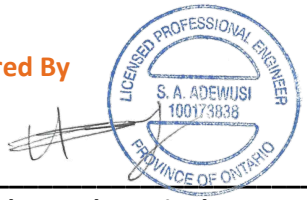
NOISE IMPACT STUDY

Prepared By



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1.0 Introduction

At the request of N45 Architecture Inc. (the Client), Thornton Tomasetti (TT) is pleased to present this Noise Impact Study (NIS) for the proposed two-storey Findlay Creek Elementary Public School with Daycare (the Project) to be located at 820 Miikana Road, Ottawa, Ontario. The objective of this study is to assess noise impacts from nearby surface transportation sources, as well as noise impacts from the Project onto nearby noise-sensitive points of reception (residences) to determine if the proposed Project meets the requirements stipulated in the City of Ottawa Environmental Noise Control Guidelines (ENCG) [1].

2.0 Site

TT staff visited the site on May 30, 2022. A draft Site Plan of the Project and an aerial photo of the Project surrounding areas are provided in Figure 1 and Figure 2, respectively. Figure 1 shows the Point of Reception (POR) locations. The site area and roads are approximately at the same level as shown in the topography drawing and observed during the site visit. The Project will be in a residential area with split zone site – Minor Institutional Zone (I1) and Residential Fourth Density Zone (R4Z).

The Project is bordered on the north and west by Miikana Road and Kelly Farm Drive respectively. The Project is bordered on the east and south by one- and two-storey residential buildings and a public Park (Salamander Park). The surrounding neighborhood consists of residential land uses.

3.0 Noise Sources

The only significant sources of noise impacting the Project are from the adjacent roads: Miikana Road and Kelly Farm Drive.

During the site visit on May 30, 2022, the surrounding arears were observed for any substantial existing stationary noise sources. The only source of noise heard was from tractors working on the internal roads construction for the residential buildings along Kelly Farm Drive opposite to the Project site. This is temporary noise source and will not be considered.

According to the City of Ottawa ENCG, human activities at Public Parks are not considered as stationary noise sources, hence noise from human activities at the Salamander Public Park located at the Project East is not an issue.

The proposed school has Kindergarten Play Area, Outdoor Classroom Area and Sport Field. The activities at these locations will not be considered as sources of noise but the Outdoor Classroom and Kindergarten Play Area will be considered as outdoor points of reception due to the transportation noise sources.

The HVAC system for the Project is a source of stationary noise to the surrounding residential buildings. The impact of the HVAC system on the surrounding area will be assessed. A quiet HVAC systems may be recommended to ensure the noise radiated to the surrounding area is small.

4.0 Noise Assessment Criteria

The City of Ottawa requirements for environmental noise impact assessments are outlined in the ENCG [1], which in turn reference the Environmental Noise Guideline, NPC-300 [2], prepared by the Ontario Ministry of the Environment, Conservation and Parks (MECP). The Project will be located in a Class 1 area, which is defined as "an area with an acoustical environment typical of a major population center, where the background sound level is dominated by the activities of people, usually road traffic, often referred to as "urban hum.".

The sections below describe the applicable noise assessment criteria for surface transportation noise sources and stationary noise sources.

4.1 Surface Transportation Noise Assessment Criteria

Sound level limits outlined in ENCG for road traffic noise impacting on noise-sensitive areas applicable to the Project are summarized in Table 1. Sound level limits are given in A-weighted, equivalent sound levels (L_{eq}, dBA). Furthermore, based on the plane-of-window calculations for indoor spaces, upgraded building components, ventilation systems and warning clauses may be required. The ENCG building component and ventilation requirements for road noise applicable to the Project are shown in Tables 2 and 3, respectively. These requirements are based on calculated sound levels at Outdoor Living Areas (OLAs) and the plane-of-window of bedrooms and living/dining rooms.

Table 1: Sound Level Limits for Noise-Sensitive Areas – Road Noise

Type of Space	Time Period	Maximum L_{eq}(dBA)
Outdoor Living Area	Daytime (07:00 to 23:00)	55
Living/dining, den areas of residences, hospitals, **schools**, etc. (indoor)	Daytime (07:00 to 23:00)	45
	Nighttime (23:00 to 07:00)	45
Sleeping quarters of residences (indoor)	Daytime (07:00 to 23:00)	45
	Nighttime (23:00 to 07:00)	40

Table 2: ENCG Building Component Requirements (Road Noise – Daytime Only)

Assessment Location	Sound Level (time as noted)	Building Component Requirements
Plane of Window	Daytime $L_{EQ\text{-}16HR}$ Less than or equal to 65 dBA	Building compliant with the Ontario Building Code
	Daytime $L_{EQ\text{-}16HR}$ Greater than 65 dBA	Building components (walls, windows, etc.) must be designed to achieve indoor sound level criteria

Table 3: ENCG Ventilation and Warning Clause Requirements (Road noise - Daytime Only)

Assessment Location	Sound Level (time as noted)	Ventilation Requirement	Warning Clause Requirement
Plane of Window	Daytime $L_{EQ-16HR}$ Less than or equal to 55 dBA	None required	Not required
	Daytime $L_{EQ-16HR}$ Greater than 55 dBA to less than or equal to 65 dBA	Forced air heating with provision for central air conditioning	Required Type C
	Daytime $L_{EQ-16HR}$ Greater than 65 dBA	Central air conditioning is required	Required Type D

4.2 Stationary Source Noise Assessment Criteria

Stationary sources of noise include all sources of sound and vibration that exist or operate on nearby premises, excluding construction noise sources. The noise level criterion for noise from stationary sources in a given time period is the higher value between (1) the time period exclusion limit value prescribed by the MECP, and (2) the corresponding minimum hourly background/ambient sound level (Leq,1hr) due to traffic during the time period. Exclusion limit values outlined in the ENCG for new noise-sensitive land uses in proximity to existing stationary noise sources have been summarized in Table 4 for Class 1 areas.

Table 4: ENCG Exclusion Limit Values for Class 1 Areas (New Noise-Sensitive Land Uses in Proximity to Existing Stationary Sources)

Type of Point of Reception	Time Period (Description)	Exclusion Limit - $L_{eq,1hr}$ (dBA)
Outdoor Living Area (OLA)	07:00 to 23:00 (Daytime)	50
Plane of Window (Living Quarters)	07:00 to 23:00 (Daytime)	50
Plane of Window (Sleeping Quarters)	23:00 to 07:00 (Night-time)	45

The exclusion limits outlined in Table 4 apply to both neighboring “off-site” stationary noise sources which may impact the Project, as well as “on-site” stationary noise sources associated with the Project which may impact neighboring noise sensitive land uses (in this case, the neighboring residences).

4.3 Aircraft Traffic Noise Assessment Criteria

Noise originating from aircraft is addressed by the City and the Ottawa International Airport Authority using the Noise Exposure Forecast (NEF) and Noise Exposure Projection (NEP) methods. The methods predict the potential degree of community annoyance from aircraft noise based on the sound levels of various aircraft and the operation considerations such as the number of flights and time of day (night being weighted more strongly). The resulting noise contours have been used to define the Airport Operating Influence Zone (AOIZ) and Airport Vicinity Development Zone (AVDZ) and are illustrated on the City Official Plan for Ottawa International Airport and its surrounding.

Impacts to OLAs from aircraft noise are assessed against a 24-hour Noise Exposure Forecast / Noise Exposure Projection (NEF/NEP). ENCG outdoor sound level limits and the sliding scale of required noise reduction measures for aircraft noise at OLAs are adopted from the Ministry of Environment document NPC-300 and are listed in Table 5.

Table 5: ENCG Outdoor Sound Level Limit & Mitigation for Aircraft Traffic Noise

Category	NEF/NEP	Mitigation Measure
Outdoor Living Area Mitigation Threshold	≤ 30	None
	> 30 and ≤ 35	Warning Clause that outdoor environment is subjected to aircraft noise
	> 35	Required to relocate OLA to achieve NEP/NEP of 30

Impacts to POWs from aircraft noise are assessed against a 24-hour Noise Exposure Forecast / Noise Exposure Projection (NEF/NEP). Applicable indoor sound level limits are listed in Table 6, if aircraft noise is expected to impact the Project, building components shall be designed to achieve the applicable indoor limit(s).

Table 6: Indoor Sound Level Limit & Mitigation for Aircraft Traffic Noise

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

Table 7 shows the supplementary indoor sound level limits for land uses not generally considered sensitive to aircraft noise. These supplementary sound level limits are based on the windows and doors to an indoor space being closed.

Table 7: Supplementary Indoor Sound Level Limit & Mitigation for Aircraft Traffic Noise

Type of Space	NEF/NEP
General offices, reception area, retail stores, etc.	15
Individual or semi-private offices, conference rooms, etc.	10
Sleeping quarters of hotels/motels, theatres, libraries, places of worship	5

5.0 Impact of the Environment on the Project – Surface Transportation Noise

5.1 Points of Reception

The surface transportation corridors impacting on the Project are Miikana Road and Kelly Farm Drive and both are located within 100 m of the Project.

Other local transportation routes in the area such as Salamander Way are shielded from the Project by residential buildings; and Quest Private is both far away from the critical POR and expected to have a very low volume of traffic. Therefore, they are not considered since their impact on the critical PORs will not be substantial.

Information about the exact locations of windows and doors was not available during this study. PORs were chosen to represent worst-case scenarios at the Plane of Window (PoW) of occupied spaces and Outdoor Living Areas (OLA). Only one PoW was considered, which represents the worst-case location due to exposure to both road segments. Similarly, two PORs was considered for the OLAs (playground and outdoor classroom), at locations consistent with the ENCG's definition of 'Outdoor Amenity Area' (OAA). Table 8 summarizes the descriptions of the location of the PORs, and their locations are shown in Figure 1.

Table 8: Points of Reception and Outdoor Living Areas

Point of Reception (POR)	Level	POR Height (m)	Location	Building Facade	Notes/Comments
POR 1	2nd	4.5	Corner of building, 19.6 m and 16.5 m from the center of Miikana Rood and Kelly Farm Drive, respectively	Northwest	Sound levels at the second floor plane-of-window (PoW) of classroom and library.
OLA1	Ground	1.5	Kindergarten playground behind the building, 75.8 m from the center of Kelly Farm Drive.	Facing South	OLA
OLA2	Ground	1.5	Outdoor classroom behind the building, 41.5 m from the center of Kelly Farm Drive.	Facing South	OLA

5.2 Road Traffic Noise Parameters

The surface transportation corridors impacting on the Project are Miikana Road and Kelly Farm Drive, which are already constructed and in use. Miikana Road connects to Bank Road, which is an Arterial Road according to City of Ottawa Road Classification [3, 4], hence Miikana Road is considered as a 2-lane Major Collector road and Kelly Farm Drive is considered as 2-lane Collector road.

The "ultimate" road and traffic data information, including the Annual Average Daily Traffic (AADT), for Miikana Road and Kelly Farm Drive was obtained from the ENCG based on their roadway classifications and are summarized in Table 9. These parameters are used to predict the traffic noise levels following the prediction method outlined in the Ontario Road Noise Analysis Method for Environment and Transportation (ORNAMENT) [5], developed by the MECP. Software developed by the MECP to perform ORNAMENT calculations, STAMSON Version 5.04, was used to predict the noise levels. The output report files from STAMSON software are attached as Appendix A.

Table 9: ENCG Traffic and Road Parameters for STAMSON Modelling

Road	Implied Roadway Class	Speed Limit [km/h]	Ultimate AADT [Vehicles/day]	Day/Night Split [%]	Medium Trucks [%]	Heavy Trucks [%]
Miikana	2-Lane Major Collector (2-UMCU)	50	12,000	92/8	7	5
Kelly Farm	2-Lane Urban Collector (2-UCU)	50	8,000	92/8	7	5

5.3 Estimated Sound Levels at PORs

STAMSON 5.04 software for noise studies in Ontario involving transportation corridors developed by the MECP for the assessment of road and rail noise was used for the analysis. Details of the STAMSON calculations are provided in 0 and summarized in Table 10. The sound level predictions were modelled with sound-absorptive ground surfaces, except for roadways, which were modelled as sound reflective.

Table 10: Calculated Sound Levels at PORs

POR	Daytime L_{eq} (dBA)	Nighttime L_{eq} (dBA)	Building Component OR Noise Barrier Requirement	Ventilation Requirement	Warning Clause Requirement
POR1	66	58	Building components (walls, windows, etc.) must be designed to achieve indoor sound level criteria	Central air conditioning	Type D
OLA1	51	43	N/A	N/A	N/A
OLA2	57	49	Noise Barrier or relocation of OLA2 to another area.	N/A	N/A

5.3.1 Discussion of Sound Level at POR1

Table 10 shows that the calculated daytime surface transportation noise level measured at the Plane of Window (POR1) exceeds the ENCG sound level limits (greater than 65 dBA) presented in Table 2. It should be noted that POR1 at PoW is the worst-case scenario. Furthermore, the exact location of windows and doors are not available at the time of this study, and the vehicle traffic observed during the site visit on May 30, 2022 was very low. The L_{EQ} contributed by Miikana Road and Kelly Farm Drive are 64 dBA and 61 dBA, respectively. The distance between the noise source and reception is an important factor that affects sound level, hence an increase in the setback between the proposed school and Miikana Road from 7.5 m to 11 m will reduce the overall daytime L_{EQ} value at POR1 to 65 dBA, as shown in Appendix B.

If desired, the re-orientation of the school with 11 m setback from Miikana Road will reduce the sound level from 66 dBA to the acceptable level of 65 dBA at POR1 to comply with ENCG requirements without needing to design building components beyond the specifications of the Ontario Building Code.

5.3.2 Indoor Noise Control Measures

The results presented in Table 10 indicate that the calculated surface transportation noise level measured at the Plane of Window (POR1) is greater than 65 dBA due to exposure to both Miikana Road and Kelly Farm Drive during the daytime. As stated in Tables 2 and 3, City of Ottawa ENCG requires that if the sound level at PoW (POR1) for Daytime $L_{EQ\text{-}16HR}$ is greater than 65 dBA, Building components (walls, windows, etc.) must be designed to achieve indoor sound level criteria with Type D warning clause. Therefore, the following noise control measures to mitigate the effect of surface transportation noise are required.

5.3.2.1 Ventilation Requirements

Central air conditioning must be provided to all occupied spaces inside the proposed school.

5.3.2.2 Building Component Requirements

The building envelope components (exterior walls and windows) all facades must be designed to meet indoor sound level of 45 dBA. The National Research Council of Canada (NRC) publications titled "Controlling Sound Transmission into Buildings" [6] provides a step-by-step procedure for calculating appropriate STC ratings for windows and other building envelope components to provide a required noise reduction.

For an assumed window to floor area ratio of 50 %, Acoustic Insulation Factor (AIF) calculation method revealed that fixed windows with 3mm & 3mm double glazing glass and inter-pane spacing of 16 mm, and solid walls constructed in accordance with OBC will provide STC of 31 and 35 respectively and reduce the noise level in the classrooms to acceptable value.

Note that these example constructions are provided for reference only, and the performance of building elements, including window assemblies should be confirmed by the supplier or installer.

5.3.2.3 Warning Clause Requirements

A per the ENCG, warning clause Type 'D' must be included in agreements of offers of purchase and sale, as well as any lease/rental agreements associated with the school. Sample wording from the ENCG have been adapted below for the Project.

> **WARNING CLAUSE TYPE "D"**
>
> "This school 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."

5.4 Discussion of Sound Level at OLAs

Table 10 presents the daytime calculated surface transportation noise level measured at the Outdoor Living Areas (OLAs) as 51 dBA for the Kindergarten Play Area (OLA1) and 57 dBA at the Outdoor Classroom (OLA2) locations. While the sound level at OLA1 is within the recommended limit (55 dBA), that at OLA2 is more than the limit.

If desired, STAMSON calculations showed that by shifting the Outdoor Classroom from the current 41.5 m to 55 m from the Kelly Farm Drive will reduce the noise level at OLA2 to 55 dBA required by the City of Ottawa, please see Appendix C1 for the STAMSON results.

Alternatively, STAMSON calculations show that a barrier of 1.5 m at 20 m from the outdoor classroom will reduce the daytime noise level to 53 dBA, which is below the limit. See Appendix C2.

5.4.1 Outdoor Noise Control Measures

The location of the Outdoor Classroom may be shifted to 55 m from the middle of Kelly Farm Drive to achieve the require noise limit.

Alternatively, for the proposed site layout without re-orientation of the outdoor classroom, a 1.5 meters tall roadside barrier along Kelly Farm Drive placed at 20 meters from the Outdoor Classroom area will be required to reduce the noise level to acceptable value required by the City of Ottawa.

6.0 Surrounding Stationary Noise Source

There were no significant stationary noise sources in the vicinity of the Project at the time of site visit on May 30, 2022. Two tractors were working on the construction of internal roads on the other side of the Kelly Farm Drive on the day of the site visit. This is a temporary event hence is not considered as a source of noise for the Project.

7.0 Impact of the Project on Surrounding Area

Mechanical equipment, particularly the rooftop air handling units (RTU) for the Heating Ventilation and Airconditioning (HVAC) systems for the Project, which are expected to be operated 24 hours a day, seven days a week, is considered as a noise source to the surrounding residential buildings. Figure 3 shows the locations of the point of reception for buildings closest to the proposed project and the locations of the rooftop air handling units (RTUs). Three PORs (POR A, POR B, POR C) are consdiered.

7.1 Stationary Noise Sources

As presented in section 5.3.2, noise control measures are required for the present proposed layout of the project. The windows and doors have to remain closed and air conditioning systems have to be provided for air heating and cooling purposes. The required cooling load of the Heating Ventilation and Airconditioning (HVAC) system was estimated based on the footprint area of the project, which was found to be less than the value for a similar project, the Fernbank Public School at 480 Cope Drive. Therefore, the HVAC systems for the Fernbank Public School, a two-storey public school with daycare, are assumed for the analysis to consider the worst-case scenario for the Project. Detailed information about specific mechanical equipment for the Project is not available at the time of this study.

Twelve rooftop air handling units (RTU), which are expected to run 24 hours a day, seven days a week are considered. The RTUs have been sized for the Project such that they may operate at 75% speed during worst-case predictable conditions. Other small rooftop exhaust fans for bathrooms, etc. are considered insignificant noise sources in the context of this study. The 12 RTU units are listed in Table 11, for which radiated noise levels were obtained from the manufacturer (see Appendix D). All of the RTU noise sources are considered to be running for 45 minutes during the day and night, which is 75 % capacity for the evaluation of the $L_{EQ\text{-}1HR}$ calculation of the radiated noise to the surroundings to compare with the 45 dBA limit.

Table 11: Mechanical Noise Sources Associated With School

Source No.	Location	Description (make / model)	Sound Power Level Data Used (see Appendix B)	Overall Sound Power Level [dBA]
RTU-1	Rooftop	20 Ton RTU (AAON / RN-020)	"RN 13-20 Ton (75%)"	84
RTU-2	Rooftop	5 Ton RTU (AAON / RQ-005)	"RQ 4-6 RN 6 & 7 Ton (75%)"	74
RTU-3, 4	Rooftop	11 Ton RTU (AAON / RN-011)	"RN 9 & 11 Ton (75%)"	77
RTU-5	Rooftop	6 Ton RTU (AAON / RQ-006)	"RQ 4-6 RN 6 & 7 Ton (75%)"	74
RTU-6	Rooftop	10 Ton RTU (AAON / RN-010)	"RN 8 & 10 Ton (75%)"	81
RTU-7	Rooftop	7 Ton RTU (AAON / RN-007)	"RQ 4-6 RN 6 & 7 Ton (75%)"	74
RTU-8	Rooftop	18 Ton RTU (AAON / RN-018)	"RN 13-20 Ton (75%)"	84
RTU-9	Rooftop	16 Ton RTU (AAON / RN-016)	"RN 13-20 Ton (75%)"	84
RTU-10	Rooftop	11 Ton RTU (AAON / RN-011)	"RN 9 & 11 Ton (75%)"	77
RTU-11	Rooftop	9 Ton RTU (AAON / RN-009)	"RN 9 & 11 Ton (75%)"	77
RTU-12	Rooftop	7 Ton RTU (AAON / RN-007)	"RQ 4-6 RN 6 & 7 Ton (75%)"	74

7.2 Receptor Locations

Three critical plane-of-window receptor locations are chosen for nearest residential buildings to the west, north and east labelled as POR A, POR B and POR C. These critical noise receptors represent the locations that are most exposed to the nearest stationary noise sources, at a height of 4.5 m. These receptor locations are shown in Figure 3. Protection of these receptors is expected to result in protection of all other potential off-site plane-of-window and outdoor living area receptors.

7.3 Stationary Source Noise Level Prediction

Sound levels at the PORs due to the stationary sources associated with the school were calculated using CadnaA software, version 2019, in accordance with the methods described in ISO 9613-2, and the results are summarized in Table 12 below. Calculated noise level contours are also presented in Figure 4 and CadnaA input and output information is presented as Appendix E . The predicted stationary sound levels do not exceed the ENCG limit at the PORs hence no noise mitigation is required.

Table 12: Predicted Stationary Noise Source Levels at the Receptors

Receptor	Time Period	Predicted Stationary Sound Levels $L_{EQ\text{-}1hr}$ (dBA)	Stationary Source Sound Level Limit $L_{EQ\text{-}1hr}$ (dBA)	Compliance?
POR A	Night-time (0700 – 1900)	38	45	Yes
POR B	Night-time (0700 – 1900)	38	45	Yes
POR C	Night-time (0700 – 1900)	34	45	Yes

8.0 Impact of the Environment on the Project – Aircraft Noise

The Project is located within land use controlled by the Airport Zoning Regulations (AZR) for the Ottawa International Airport, in an area designated on the City of Ottawa Official Plan as Airport Vicinity Development Zone (AVDZ), and outside the 25 NEF/NEP composite noise contour. A copy of the official

Composite Noise Contour map (Official Plan Annex 10) with the Project site highlighted is included as Appendix F. Because the project site is located outside the NEF/NEP 25 contour line, no mitigation measures are required, as shown in Table 5.

9.0 Concluding Comments

With the implementation of the proposed mitigation measures outlined in Sections 5.3.2 and 5.4.1, the noise impact of the nearby transportation noise sources on the Project is expected to meet the requirements of the ENCG. These noise control measures include:

- Provision of a central air conditioning system which will allow windows and exterior doors to remain closed;
- Design of the building components (walls, windows, etc.) to achieve indoor sound level criteria and/or re-orientation of the building.
- Installation of a noise barrier around the outdoor classroom and/or re-location of the outdoor classroom.

The proposed Project at 820 Miikana Road, Ottawa should therefore be approved from a noise perspective.

Please do not hesitate to contact us if there are any questions.

Yours Truly,

Thornton Tomasetti

Surajudeen Adewusi, Ph.D., P.Eng.
Senior Engineer

Reviewed by:

Robert Fuller, P.Eng.
Project Engineer

DISCLAIMER - Achieving the required noise control requirements relies on correct incorporation of noise control recommendations into Architectural and Mechanical drawings and specifications, as well as correct installation during construction. On Request, TT will conduct drawing reviews and onsite reviews of noise control measures and provide observations as appropriate; however, notwithstanding the foregoing, it is expressly understood and agreed that TT shall not have control or charge of, and shall not be responsible for the acts or omissions, including but not limited to means, methods, techniques, sequences and procedures, of the Design Professionals and/or Contractors performing design and/or construction on the Project. Accordingly, TT shall not be held responsible for the failure of any party to properly incorporate the noise control measures stated in this report.

---------- End ----------

10.0 References

1. City of Ottawa Environmental Noise Control Guidelines (ENCG), approved by Ottawa City Council in January 2016.

2. Ministry of the Environment, Conservation and Parks (MOECP) Publication NPC-300: Stationary and Transportation Sources - Approval and Planning, published in October 2013.

3. https://ottawa.ca/en/planning-development-and-construction/community-design/design-and-planning-guidelines/completed-guidelines/village-collector-and-rural-arterialcollector-road-design

4. https://ottawa.ca/en/planning-development-and-construction/official-plan-and-master-plans/official-plan/volume-1-official-plan/section-7-annexes/annex-1-road-classification-and-rights-way

5. Ontario Road Noise Analysis Method for Environment and Transportation (ORNAMENT), Technical document published by the MOECC in October 1989.

6. Quirt, J David, "Controlling Sound Transmission into Buildings", NRC Publication 01-09-1985

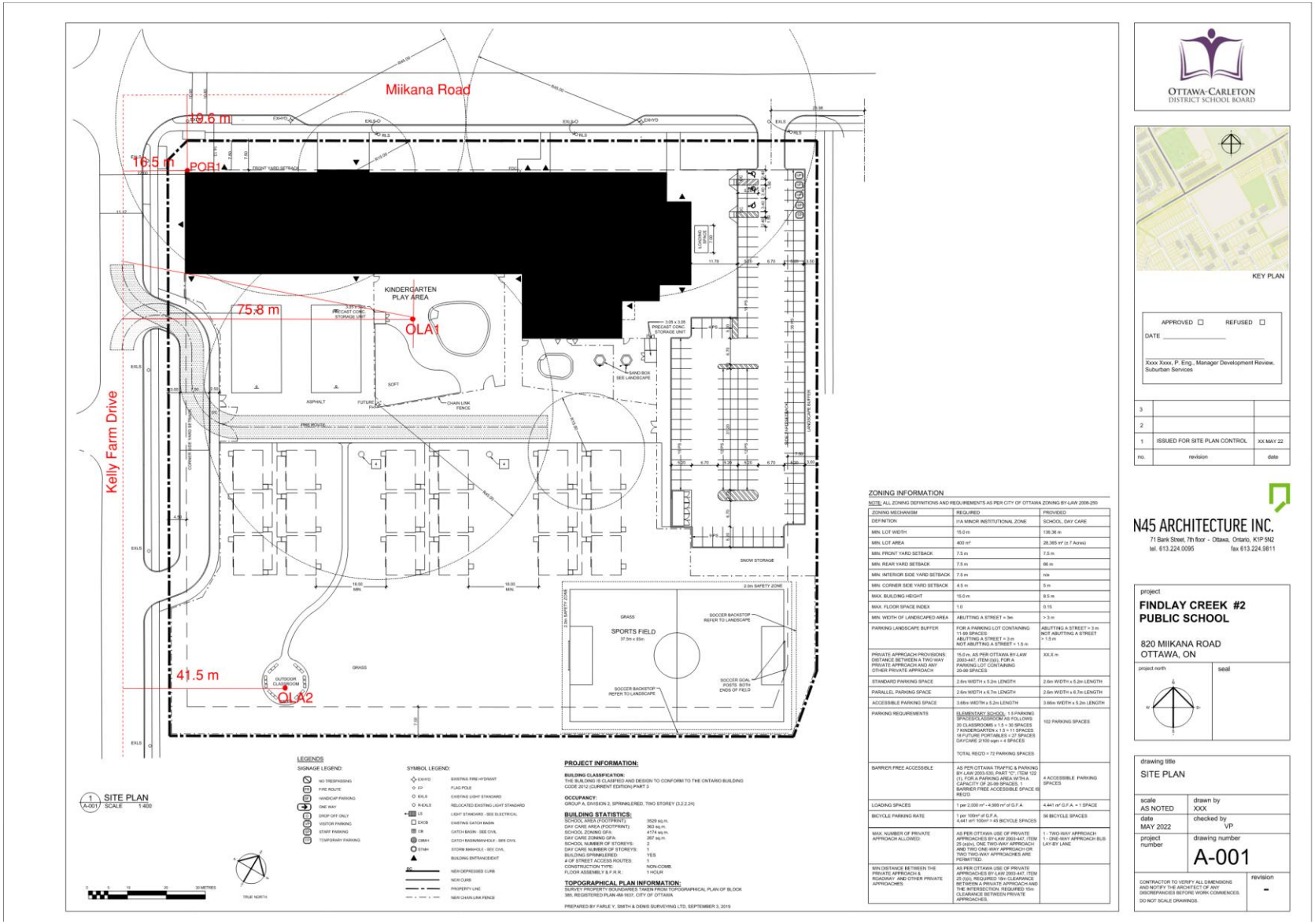

Figure 1: Site Plan with Point of Reception

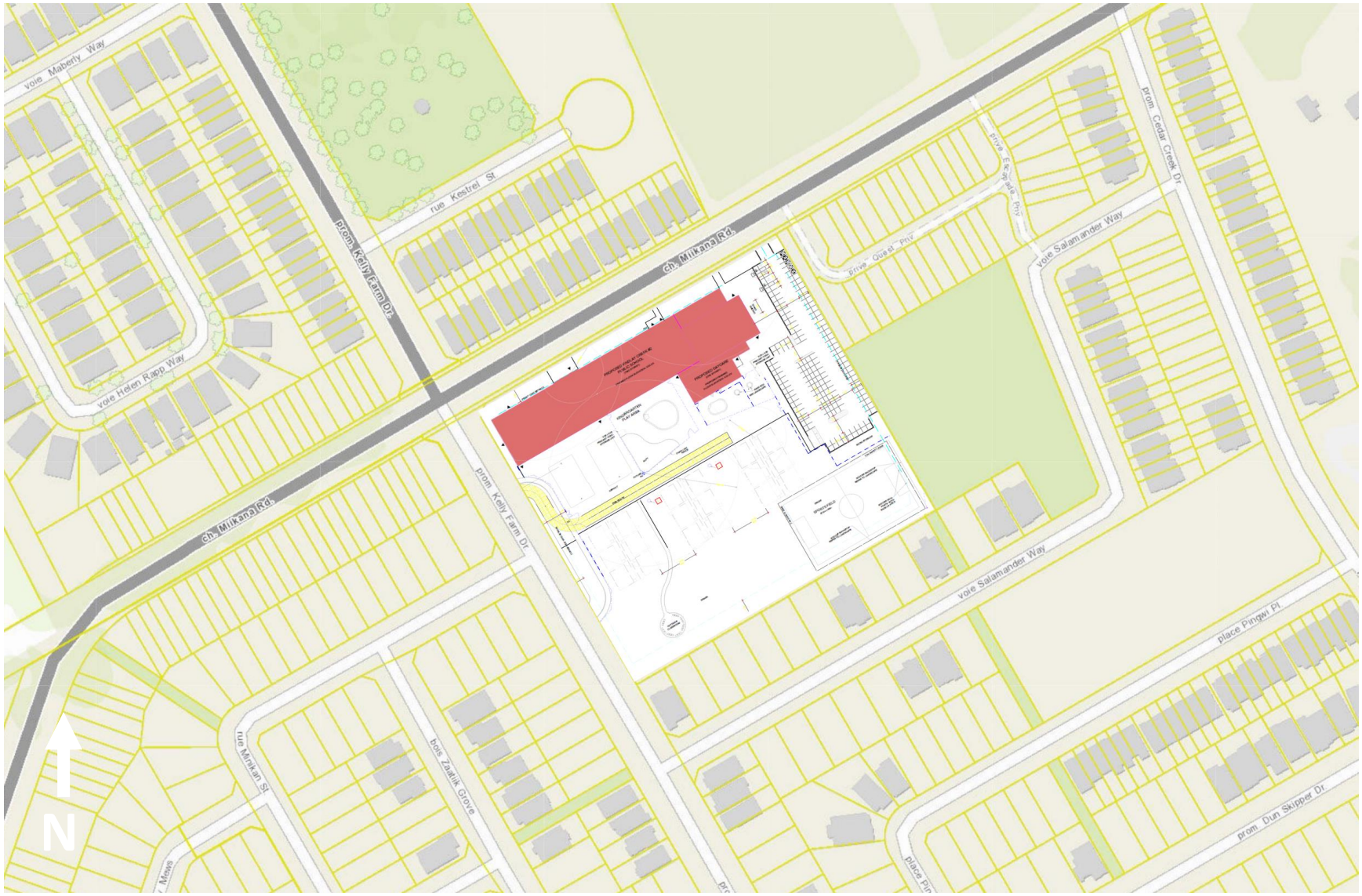

Figure 2: Aerial view of the site and surroundings

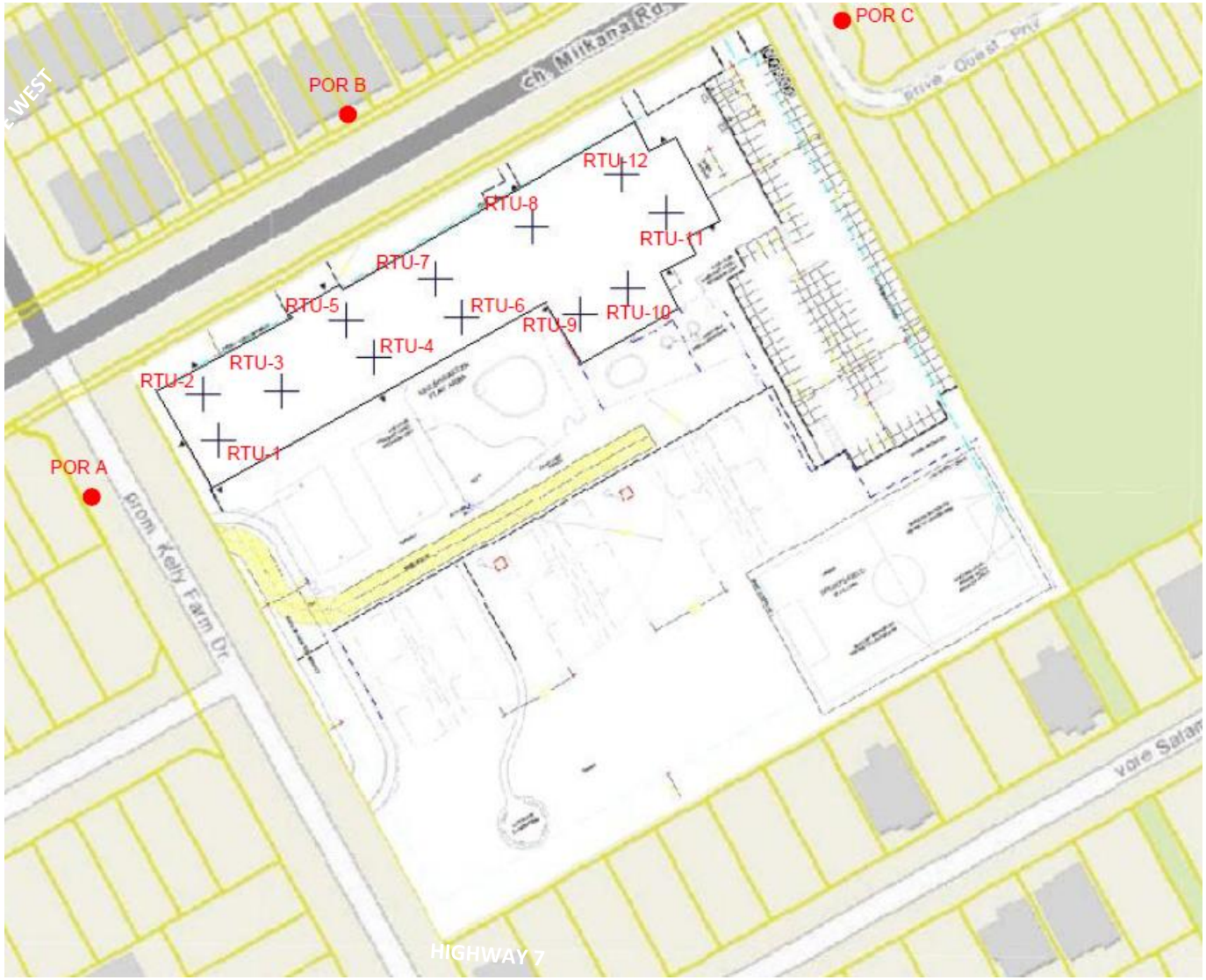

Figure 3: Location of PORs for HVAC stationary noise sources.

Figure 4: Contour lines for HVAC noise sources on the surroundings.

Appendix A – Results of STAMSON 5.04 Calculations

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STAMSON 5.0         NORMAL REPORT         Date: 01-06-2022 15:35:24
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: por1.te               Time Period: Day/Night 16/8 hours
Description: POR1 Findlay Creek Elementary School #2


Road data, segment # 1: Miikana (day/night)
-------------------------------------------
Car traffic volume  :  9715/845   veh/TimePeriod
Medium truck volume :   773/67    veh/TimePeriod
Heavy truck volume  :   552/48    veh/TimePeriod
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 1: Miikana (day/night)
-------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  19.60 / 19.60  m
Receiver height           :   4.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

 Road data, segment # 2: Kelly Farm (day/night)
-------------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod
Medium truck volume :   515/45    veh/TimePeriod
Heavy truck volume  :   368/32    veh/TimePeriod
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 2: Kelly Farm (day/night)
-------------------------------------------
Angle1   Angle2           :   0.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  16.50 / 16.50  m
Receiver height           :   4.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
 Results segment # 1: Miikana (day)
----------------------------------

Source height = 1.50 m

ROAD (0.00 + 64.38 + 0.00) = 64.38 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.57  67.51   0.00  -1.82  -1.30   0.00   0.00   0.00  64.38
-------------------------------------------------------------------------------

Segment Leq : 64.38 dBA

 Results segment # 2: Kelly Farm (day)
-------------------------------------

Source height = 1.50 m

ROAD (0.00 + 60.79 + 0.00) = 60.79 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
     0     90   0.57  65.75   0.00  -0.65  -4.31   0.00   0.00   0.00  60.79
-------------------------------------------------------------------------------

Segment Leq : 60.79 dBA

Total Leq All Segments: 65.96 dBA

 Results segment # 1: Miikana (night)
------------------------------------

Source height = 1.50 m

ROAD (0.00 + 56.79 + 0.00) = 56.79 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.57  59.91   0.00  -1.82  -1.30   0.00   0.00   0.00  56.79
-------------------------------------------------------------------------------

Segment Leq : 56.79 dBA

 Results segment # 2: Kelly Farm (night)
---------------------------------------

Source height = 1.50 m

ROAD (0.00 + 53.19 + 0.00) = 53.19 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
```

```
-------------------------------------------------------------------------------
     0      90    0.57  58.15    0.00  -0.65  -4.31    0.00    0.00    0.00  53.19
-------------------------------------------------------------------------------

Segment Leq : 53.19 dBA

Total Leq All Segments: 58.36 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 65.96
                           (NIGHT): 58.36
```

```
STAMSON 5.0        NORMAL REPORT        Date: 01-06-2022 16:57:16
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: OLA1.te              Time Period: Day/Night 16/8 hours
Description: OLA1 Findlay Creek Elementary School #2

Road data, segment # 1: Kelly Farm (day/night)
----------------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod
Medium truck volume :   515/45    veh/TimePeriod
Heavy truck volume  :   368/32    veh/TimePeriod
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 1: Kelly Farm (day/night)
--------------------------------------------
Angle1   Angle2           : -25.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  75.80 / 75.80  m
Receiver height           :   1.50 / 1.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

 Results segment # 1: Kelly Farm (day)
---------------------------------------

Source height = 1.50 m

ROAD (0.00 + 51.00 + 0.00) = 51.00 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -25     90   0.66  65.75   0.00 -11.68  -3.07   0.00   0.00   0.00  51.00
-------------------------------------------------------------------------------

Segment Leq : 51.00 dBA

Total Leq All Segments: 51.00 dBA

 Results segment # 1: Kelly Farm (night)
-----------------------------------------

Source height = 1.50 m

ROAD (0.00 + 43.41 + 0.00) = 43.41 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
```

```
   -25      90    0.66  58.16    0.00 -11.68  -3.07    0.00    0.00    0.00  43.41
-------------------------------------------------------------------------------

Segment Leq : 43.41 dBA

Total Leq All Segments: 43.41 dBA


 TOTAL Leq FROM ALL SOURCES (DAY): 51.00
                            (NIGHT): 43.41
```

```
STAMSON 5.0        NORMAL REPORT        Date: 01-06-2022 17:02:39
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: OLA2.te              Time Period: Day/Night 16/8 hours
Description: OLA2 Findlay Creek Elementary School #2

Road data, segment # 1: Kelly Farm (day/night)
----------------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod
Medium truck volume :   515/45    veh/TimePeriod
Heavy truck volume  :   368/32    veh/TimePeriod
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 1: Kelly Farm (day/night)
--------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  41.50 / 41.50  m
Receiver height           :   1.50 / 1.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

 Results segment # 1: Kelly Farm (day)
---------------------------------------

Source height = 1.50 m

ROAD (0.00 + 56.96 + 0.00) = 56.96 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.66  65.75   0.00  -7.34  -1.46   0.00   0.00   0.00  56.96
-------------------------------------------------------------------------------

Segment Leq : 56.96 dBA

Total Leq All Segments: 56.96 dBA

 Results segment # 1: Kelly Farm (night)
-----------------------------------------

Source height = 1.50 m

ROAD (0.00 + 49.36 + 0.00) = 49.36 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
```

```
   -90      90    0.66  58.16    0.00  -7.34  -1.46    0.00    0.00    0.00  49.36
-------------------------------------------------------------------------------

Segment Leq : 49.36 dBA

Total Leq All Segments: 49.36 dBA

 TOTAL Leq FROM ALL SOURCES (DAY): 56.96
                            (NIGHT): 49.36
```

Appendix B– Results of STAMSON 5.04 Calculations with Increased Right of Way (ROW) for Miikana Road

```
STAMSON 5.0        NORMAL REPORT        Date: 02-06-2022 15:37:05
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: por1.te              Time Period: Day/Night 16/8 hours
Description: POR1 with increased ROW for Miikana Road


Road data, segment # 1: Miikana (day/night)
-------------------------------------------
Car traffic volume  :  9715/845   veh/TimePeriod
Medium truck volume :   773/67    veh/TimePeriod
Heavy truck volume  :   552/48    veh/TimePeriod
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 1: Miikana (day/night)
-------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  23.00 / 23.00  m
Receiver height           :   4.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

 Road data, segment # 2: Kelly Farm (day/night)
-----------------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod
Medium truck volume :   515/45    veh/TimePeriod
Heavy truck volume  :   368/32    veh/TimePeriod
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 2: Kelly Farm (day/night)
-------------------------------------------
Angle1   Angle2           :   0.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  16.50 / 16.50  m
Receiver height           :   4.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00
```

```
 Results segment # 1: Miikana (day)
----------------------------------

Source height = 1.50 m

ROAD (0.00 + 63.29 + 0.00) = 63.29 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.57  67.51   0.00  -2.91  -1.30   0.00   0.00   0.00  63.29
-------------------------------------------------------------------------------

Segment Leq : 63.29 dBA

 Results segment # 2: Kelly Farm (day)
-------------------------------------

Source height = 1.50 m

ROAD (0.00 + 60.79 + 0.00) = 60.79 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
     0     90   0.57  65.75   0.00  -0.65  -4.31   0.00   0.00   0.00  60.79
-------------------------------------------------------------------------------

Segment Leq : 60.79 dBA

Total Leq All Segments: 65.23 dBA

 Results segment # 1: Miikana (night)
-----------------------------------

Source height = 1.50 m

ROAD (0.00 + 55.69 + 0.00) = 55.69 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.57  59.91   0.00  -2.91  -1.30   0.00   0.00   0.00  55.69
-------------------------------------------------------------------------------

Segment Leq : 55.69 dBA

 Results segment # 2: Kelly Farm (night)
---------------------------------------

Source height = 1.50 m

ROAD (0.00 + 53.19 + 0.00) = 53.19 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
```

```
-------------------------------------------------------------------------------
     0      90    0.57  58.15    0.00  -0.65  -4.31    0.00    0.00    0.00  53.19
-------------------------------------------------------------------------------

Segment Leq : 53.19 dBA

Total Leq All Segments: 57.63 dBA


 TOTAL Leq FROM ALL SOURCES (DAY): 65.23
                            (NIGHT): 57.63
```

Appendix C1– Results of STAMSON 5.04 Calculations with Outdoor Classsroom relocated to 55 m from Kelly Farm Drive

```
STAMSON 5.0        NORMAL REPORT        Date: 03-06-2022 17:03:01
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: ola1.te              Time Period: Day/Night 16/8 hours
Description: Findlay Creek School-OLA2 moved to 55m 4rm Kelly


Road data, segment # 1: Kelly Farm (day/night)
----------------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod
Medium truck volume :   515/45    veh/TimePeriod
Heavy truck volume  :   368/32    veh/TimePeriod
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 1: Kelly Farm (day/night)
--------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  55.00 / 55.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

 Results segment # 1: Kelly Farm (day)
-------------------------------------

Source height = 1.50 m

ROAD (0.00 + 54.93 + 0.00) = 54.93 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.66  65.75   0.00  -9.37  -1.46   0.00   0.00   0.00  54.93
-------------------------------------------------------------------------------

Segment Leq : 54.93 dBA

Total Leq All Segments: 54.93 dBA

 Results segment # 1: Kelly Farm (night)
---------------------------------------

Source height = 1.50 m
```

```
ROAD (0.00 + 47.33 + 0.00) = 47.33 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.66  58.16   0.00  -9.37  -1.46   0.00   0.00   0.00  47.33
-------------------------------------------------------------------------------

Segment Leq : 47.33 dBA

Total Leq All Segments: 47.33 dBA


 TOTAL Leq FROM ALL SOURCES (DAY): 54.93
                            (NIGHT): 47.33
```

Appendix C2– Results of STAMSON 5.04 Calculations with 1.5 m Barrier located 20 meters from Outdoor Classsroom along Kelly Farm Drive.

```
STAMSON 5.0        NORMAL REPORT        Date: 13-06-2022 16:08:49
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: ola2bar.te           Time Period: Day/Night 16/8 hours
Description: Barrier between Kelly Farm and Outdoor Classroom


Road data, segment # 1: Kelly Farm (day/night)
----------------------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod
Medium truck volume :   515/45    veh/TimePeriod
Heavy truck volume  :   368/32    veh/TimePeriod
Posted speed limit  :    50 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 1: Kelly Farm (day/night)
----------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  41.50 / 41.50  m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : 90.00 deg
Barrier height            :   1.50 m
Barrier receiver distance :  20.00 / 20.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00

 Results segment # 1: Kelly Farm (day)
-------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !        1.50 !        1.50 !         1.50

ROAD (0.00 + 52.51 + 0.00) = 52.51 dBA
```

```
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.57  65.75   0.00  -6.94  -1.30   0.00   0.00  -5.00  52.51
-------------------------------------------------------------------------------

Segment Leq : 52.51 dBA

Total Leq All Segments: 52.51 dBA

 Results segment # 1: Kelly Farm (night)
----------------------------------------

Source height = 1.50 m

Barrier height for grazing incidence
------------------------------------
Source      ! Receiver    ! Barrier     ! Elevation of
Height  (m) ! Height  (m) ! Height  (m) ! Barrier Top  (m)
------------+-------------+-------------+--------------
       1.50 !        1.50 !        1.50 !         1.50

ROAD (0.00 + 44.92 + 0.00) = 44.92 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.57  58.16   0.00  -6.94  -1.30   0.00   0.00  -5.00  44.92
-------------------------------------------------------------------------------

Segment Leq : 44.92 dBA

Total Leq All Segments: 44.92 dBA


 TOTAL Leq FROM ALL SOURCES (DAY): 52.51
                           (NIGHT): 44.92
```

Appendix D – Sound Power Level Data for AAON RTUs

Speed %			Fans	Dia	RPM	Sound Power Level 63	125	250	500	1000	2000	4000	8000	LwA
100%	RQ 2 & 3 Ton	Inlet	1	30	850	79	74	72	70	66	62	59	59	72
		Outlet				81	77	71	71	67	62	59	58	73
		Total				83	79	74	73	69	65	62	61	75
75%	RQ 2 & 3 Ton	Inlet	1	30	638	73	68	66	63	59	56	53	52	65
		Outlet				75	71	64	65	60	56	53	52	66
		Total				77	73	68	67	63	59	56	55	69
50%	RQ 2 & 3 Ton	Inlet	1	30	425	64	59	57	54	51	47	44	44	57
		Outlet				66	62	56	56	52	47	44	43	57
		Total				68	64	59	58	54	50	47	46	60
25%	RQ 2 & 3 Ton	Inlet	1	30	213	49	44	42	39	36	32	29	29	42
		Outlet				51	47	40	41	37	32	29	28	42
		Total				53	49	44	43	39	35	32	31	45
100%	RQ 4-6 RN 6 & 7 Ton	Inlet	1	30	1085	85	79	77	75	71	68	65	64	77
		Outlet				86	83	76	76	72	68	65	63	78
		Total				89	84	80	79	75	71	68	67	80
75%	RQ 4-6 RN 6 & 7 Ton	Inlet	1	30	814	78	73	71	69	65	61	58	58	71
		Outlet				80	77	70	70	66	61	58	57	72
		Total				82	78	73	72	68	64	61	61	74
50%	RQ 4-6 RN 6 & 7 Ton	Inlet	1	30	543	70	64	62	60	56	53	50	49	
		Outlet				71	68	61	61	57	53	50	48	63
		Total				74	69	65	64	59	56	53	52	65
25%	RQ 4-6 RN 6 & 7 Ton	Inlet	1	30	271	54	49	47	45	41	37	35	34	47
		Outlet				56	53	46	46	42	38	35	33	48
		Total				59	54	50	48	44	41	38	37	50
100%	RN 8 & 10 Ton	Inlet	1	30	1085	92	86	85	82	78	75	72	71	84
		Outlet				94	90	83	83	79	75	72	71	85
		Total				96	91	87	86	82	78	75	74	88
75%	RN 8 & 10 Ton	Inlet	1	30	814	86	80	78	76	72	68	66	65	78
		Outlet				87	84	77	77	73	69	66	64	79
		Total				90	85	81	80	75	72	69	68	81
50%	RN 8 & 10 Ton	Inlet	1	30	543	77	71	69	67	63	60	57	56	69
		Outlet				79	75	68	68	64	60	57	56	70
		Total				81	76	72	71	67	63	60	59	73
25%	RN 8 & 10 Ton	Inlet	1	30	271	62	56	54	52	48	45	42	41	54
		Outlet				64	60	53	53	49	45	42	41	55
		Total				66	61	57	56	52	48	45	44	58
100%	RN 9 & 11 Ton	Inlet	2	30	1085	88	82	80	78	74	71	68	67	80
		Outlet				89	86	79	79	75	71	68	66	81
		Total				92	87	83	82	78	74	71	70	83
75%	RN 9 & 11 Ton	Inlet	2	30	814	81	76	74	72	68	64	61	61	74
		Outlet				83	80	73	73	69	64	61	60	75
		Total				85	81	76	75	71	67	64	64	77
50%	RN 9 & 11 Ton	Inlet	2	30	407	66	61	59	57	53	49	46	46	59
		Outlet				68	64	58	58	54	49	46	45	60
		Total				70	66	61	60	56	52	49	48	62
25%	RN 9 & 11 Ton	Inlet	2	30	271	57	52	50	48	44	40	38	37	50
		Outlet				59	56	49	49	45	41	38	36	51
		Total				62	57	53	51	47	44	41	40	53
100%	RN 13-20 Ton	Inlet	2	30	1085	95	89	88	85	81	78	75	74	87
		Outlet				97	93	86	86	82	78	75	74	88
		Total				99	94	90	89	85	81	78	77	91
75%	RN 13-20 Ton	Inlet	2	30	814	89	83	81	79	75	71	69	68	81
		Outlet				90	87	80	80	76	72	69	67	82
		Total				93	88	84	83	78	75	72	71	84
50%	RN 13-20 Ton	Inlet	2	30	543	80	74	72	70	66	63	60	59	72
		Outlet				82	78	71	71	67	63	60	59	73
		Total				84	79	75	74	70	66	63	62	76
25%	RN 13-20 Ton	Inlet	2	30	271	65	59	57	55	51	48	45	44	57
		Outlet				67	63	56	56	52	48	45	44	58
		Total				69	64	60	59	55	51	48	47	61
100%	RN 25 & 30 Ton	Inlet	3	30	1085	97	91	89	87	83	80	77	76	89
		Outlet				98	95	88	88	84	80	77	75	90
		Total				101	96	92	91	86	83	80	79	92
75%	RN 25 & 30 Ton	Inlet	3	30	814	90	85	83	81	77	73	70	70	83
		Outlet				92	88	82	82	78	73	70	69	83
		Total				94	90	85	84	80	76	73	72	86
50%	RN 25 & 30 Ton	Inlet	3	30	543	81	76	74	72	68	64	62	61	74
		Outlet				83	80	73	73	69	65	62	60	75
		Total				86	81	77	75	71	67	65	64	77
25%	RN 25 & 30 Ton	Inlet	3	30	271	66	61	59	57	53	49	47	46	59
		Outlet				68	65	58	58	54	49	47	45	60
		Total				70	66	62	60	56	52	50	49	62

Appendix E – CadnaA Input and Output Information

Report (Siteplan_HVAC_EffectJune7b.cna)

Calculation Configuration

Configuration	
Parameter	Value
General	
Country	(user defined)
Max. Error (dB)	0.00
Max. Search Radius (#(Unit,LEN))	2000.00
Min. Dist Src to Rcvr	0.00
Partition	
Raster Factor	0.50
Max. Length of Section (#(Unit,LEN))	1000.00
Min. Length of Section (#(Unit,LEN))	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)	0.00
Night-time Penalty (dB)	0.00
DTM	
Standard Height (m)	0.00
Model of Terrain	Triangulation
Reflection	
max. Order of Reflection	2
Search Radius Src	100.00
Search Radius Rcvr	100.00
Max. Distance Source - Rcvr	1000.00 1000.00
Min. Distance Rvcr - Reflector	1.00 1.00
Min. Distance Source - Reflector	0.10
Industrial (ISO 9613)	
Lateral Diffraction	some Obj
Obst. within Area Src do not shield	On
Screening	Excl. Ground Att. over Barrier
	Dz with limit (20/25)
Barrier Coefficients C1,2,3	3.0 20.0 0.0
Temperature (#(Unit,TEMP))	10
rel. Humidity (%)	70
Ground Absorption G	1.00
Wind Speed for Dir. (#(Unit,SPEED))	3.0
Roads (RLS-90)	
Strictly acc. to RLS-90	
Railways (Schall 03 (1990))	
Strictly acc. to Schall 03 / Schall-Transrapid	
Aircraft (???)	
Strictly acc. to AzB	

Result Table

Receiver		Land Use	Limiting Value		rel. Axis			Lr w/o Noise Control		dL req.		Lr w/ Noise Control		Exceeding		passive NC
Name	ID		Day	Night	Station	Distance	Height	Day	Night	Day	Night	Day	Night	Day	Night	
			dB(A)	dB(A)	m	m	m	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
POR A	POR_A		45	45				37.6	37.6	-	-	0.0	0.0	-	-	-
POR B	POR_B		45	45				38.2	38.2	-	-	0.0	0.0	-	-	-
POR C	POR_C		45	45				34.1	34.1	-	-	0.0	0.0	-	-	-

Group Day and Night

Name	Expression	Partial Sum Level					
		POR A		POR B		POR C	
		Day	Night	Day	Night	Day	Night

Partial Day/Night

Source			Partial Level					
Name	M.	ID	POR A		POR B		POR C	
			Day	Night	Day	Night	Day	Night
RTU-1			26.0	26.0	19.5	19.5	12.1	12.1
RTU-1			35.7	35.7	28.4	28.4	22.0	22.0
RTU-3			25.3	25.3	23.2	23.2	16.0	16.0
RTU-4			22.6	22.6	26.2	26.2	17.4	17.4
RTU-5			19.0	19.0	21.7	21.7	14.5	14.5
RTU-6			24.1	24.1	31.3	31.3	23.1	23.1
RTU-7			16.5	16.5	22.1	22.1	16.0	16.0
RTU-8			25.1	25.1	33.2	33.2	28.4	28.4
RTU-12			13.6	13.6	21.0	21.0	21.4	21.4
RTU-11			15.9	15.9	22.4	22.4	25.1	25.1
RTU-9			24.6	24.6	29.9	29.9	28.2	28.2
RTU-10			16.7	16.7	22.3	22.3	22.6	22.6

Sound Sources

Point Sources

Name	M.	ID	Result. PWL			Lw / Li			Correction			Sound Reduction		Attenuation	Operating Time			K0	Freq.	Direct.	Height		Coordinates		
			Day	Evening	Night	Type	Value	norm.	Day	Evening	Night	R	Area		Day	Special	Night						X	Y	Z
			(dBA)	(dBA)	(dBA)			dB(A)	dB(A)	dB(A)	dB(A)		(m²)		(min)	(min)	(min)	(dB)	(Hz)		(m)		(m)	(m)	(m)
RTU-1			74.0	74.0	74.0	Lw	74		0.0	0.0	0.0				45.00	45.00	45.00	0.0	500	(none)	0.50	g	453304.01	5017651.55	6.50
RTU-1			84.0	84.0	84.0	Lw	84		0.0	0.0	0.0				45.00	45.00	45.00	0.0	500	(none)	0.50	g	453307.56	5017640.89	6.50
RTU-3			77.0	77.0	77.0	Lw	77		0.0	0.0	0.0				45.00	45.00	45.00	0.0	500	(none)	0.50	g	453322.05	5017651.96	6.50
RTU-4			77.0	77.0	77.0	Lw	77		0.0	0.0	0.0				45.00	45.00	45.00	0.0	500	(none)	0.50	g	453336.74	5017668.33	6.50
RTU-5			74.0	74.0	74.0	Lw	74		0.0	0.0	0.0				45.00	45.00	45.00	0.0	500	(none)	0.50	g	453343.03	5017659.93	6.50
RTU-6			81.0	81.0	81.0	Lw	81		0.0	0.0	0.0				45.00	45.00	45.00	0.0	500	(none)	0.50	g	453357.30	5017677.98	6.50
RTU-7			74.0	74.0	74.0	Lw	74		0.0	0.0	0.0				45.00	45.00	45.00	0.0	500	(none)	6.00	r	453363.18	5017669.17	6.00
RTU-8			84.0	84.0	84.0	Lw	84		0.0	0.0	0.0				45.00	45.00	45.00	0.0	500	(none)	0.50	g	453379.55	5017689.73	6.50
RTU-12			74.0	74.0	74.0	Lw	74		0.0	0.0	0.0				45.00	45.00	45.00	0.0	500	(none)	0.50	g	453400.11	5017701.90	6.50
RTU-11			77.0	77.0	77.0	Lw	77		0.0	0.0	0.0				45.00	45.00	45.00	0.0	500	(none)	0.50	g	453410.60	5017693.09	6.50
RTU-9			84.0	84.0	84.0	Lw	84		0.0	0.0	0.0				45.00	45.00	45.00	0.0	500	(none)	0.50	g	453390.88	5017669.59	6.50
RTU-10			77.0	77.0	77.0	Lw	77		0.0	0.0	0.0				45.00	45.00	45.00	0.0	500	(none)	0.50	g	453401.79	5017675.88	6.50

Line Sources

Name	M.	ID	Result. PWL			Result. PWL'			Lw / Li			Correction			Sound Reduction		Attenuation	Operating Time			K0	Freq.	Direct.	Moving Pt. Src			
			Day	Evening	Night	Day	Evening	Night	Type	Value	norm.	Day	Evening	Night	R	Area		Day	Special	Night				Number			Speed
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			dB(A)	dB(A)	dB(A)	dB(A)		(m²)		(min)	(min)	(min)	(dB)	(Hz)		Day	Evening	Night	(km/h)

Geometry Line Sources

Name	Height			Coordinates			
	Begin		End	x	y	z	Ground
	(m)		(m)	(m)	(m)	(m)	(m)

Area Sources

Name	M.	ID	Result. PWL			Result. PWL"			Lw / Li			Correction			Sound Reduction		Attenuation	Operating Time			K0	Freq.	Direct.	Moving Pt. Src		
			Day	Evening	Night	Day	Evening	Night	Type	Value	norm.	Day	Evening	Night	R	Area		Day	Special	Night				Number		
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			dB(A)	dB(A)	dB(A)	dB(A)		(m²)		(min)	(min)	(min)	(dB)	(Hz)		Day	Evening	Night

Geometry Area Sources

Name	Height			Coordinates			
	Begin		End	x	y	z	Ground
	(m)		(m)	(m)	(m)	(m)	(m)

Vertical Area Sources

Name	M.	ID	Result. PWL			Result. PWL"			Lw / Li			Correction			Sound Reduction		Attenuation	Operating Time			K0	Freq.	Direct.
			Day	Evening	Night	Day	Evening	Night	Type	Value	norm.	Day	Evening	Night	R	Area		Day	Special	Night			
			(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			dB(A)	dB(A)	dB(A)	dB(A)		(m²)		(min)	(min)	(min)	(dB)	(Hz)	

Geometry Vertical Area Sources

Name	Height			Coordinates			
	Begin		End	x	y	z	Ground
	(m)		(m)	(m)	(m)	(m)	(m)

Road

Name	M.	ID	Lme			Count Data		exact Count Data						Speed Limit		SCS	Surface		Gradient	Mult. Reflection		
			Day	Evening	Night	DTV	Str.class.	M			p (%)			Auto	Truck	Dist.	Dstro	Type		Drefl	Hbuild	Dist.
			(dBA)	(dBA)	(dBA)			Day	Evening	Night	Day	Evening	Night	(km/h)	(km/h)		(dB)		(%)	(dB)	(m)	(m)

Geometry Road

Name	Height			Coordinates				Dist	LSlope
	Begin		End	x	y	z	Ground	(m)	(%)
	(m)		(m)	(m)	(m)	(m)	(m)		

Receptors

Name	M.	ID	Level Lr		Limit. Value		Land Use			Height		Coordinates		
			Day	Night	Day	Night	Type	Auto	Noise Type			X	Y	Z
			(dBA)	(dBA)	(dBA)	(dBA)				(m)		(m)	(m)	(m)
POR A		POR_A	37.6	37.6	45.0	45.0				4.50	r	453271.13	5017639.11	4.50
POR B		POR_B	38.2	38.2	45.0	45.0				4.50	r	453339.91	5017717.26	4.50
POR C		POR_C	34.1	34.1	45.0	45.0				4.50	r	453453.30	5017727.38	4.50

Obstacles

Barriers

Name	M.	ID	Absorption		Z-Ext.	Cantilever		Height	
			left	right		horz.	vert.	Begin	End
					(m)	(m)	(m)	(m)	(m)

Geometry Barriers

Name	M.	ID	Absorption		Z-Ext.	Cantilever		Height		Coordinates			
			left	right		horz.	vert.	Begin	End	x	y	z	Ground
					(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)

Building

Name	M.	ID	RB	Residents	Absorption	Height	
						Begin	
						(m)	
School				0		6.00	r

Geometry Building

Name	M.	ID	RB	Residents	Absorption	Height		Coordinates			
						Begin		x	y	z	Ground
						(m)		(m)	(m)	(m)	(m)
School				0		6.00	r	453293.48	5017651.97	6.00	0.00
								453324.28	5017668.90	6.00	0.00
								453323.62	5017669.82	6.00	0.00
								453335.12	5017676.30	6.00	0.00
								453336.18	5017675.37	6.00	0.00
								453403.20	5017713.97	6.00	0.00
								453406.77	5017707.10	6.00	0.00
								453412.45	5017710.14	6.00	0.00
								453422.76	5017691.37	6.00	0.00
								453415.36	5017687.53	6.00	0.00
								453417.21	5017683.44	6.00	0.00
								453409.15	5017679.21	6.00	0.00
								453413.38	5017671.14	6.00	0.00
								453391.04	5017658.58	6.00	0.00
								453382.58	5017672.73	6.00	0.00
								453306.04	5017629.90	6.00	0.00
								453293.21	5017652.50	6.00	0.00

3D Reflector

Name	M.	ID	Type	Attenuation	B	m	Height
				dB/100m	%	1/m	(m)

Geometry Absorption

Name	M.	ID	Type	Attenuation	B	m	Height	Coordinates			
				dB/100m	%	1/m	(m)	x	y	z	Ground
								(m)	(m)	(m)	(m)

Ground Absorption

Name	M.	ID	G
			0.0
			0.0

Geometry Absorption

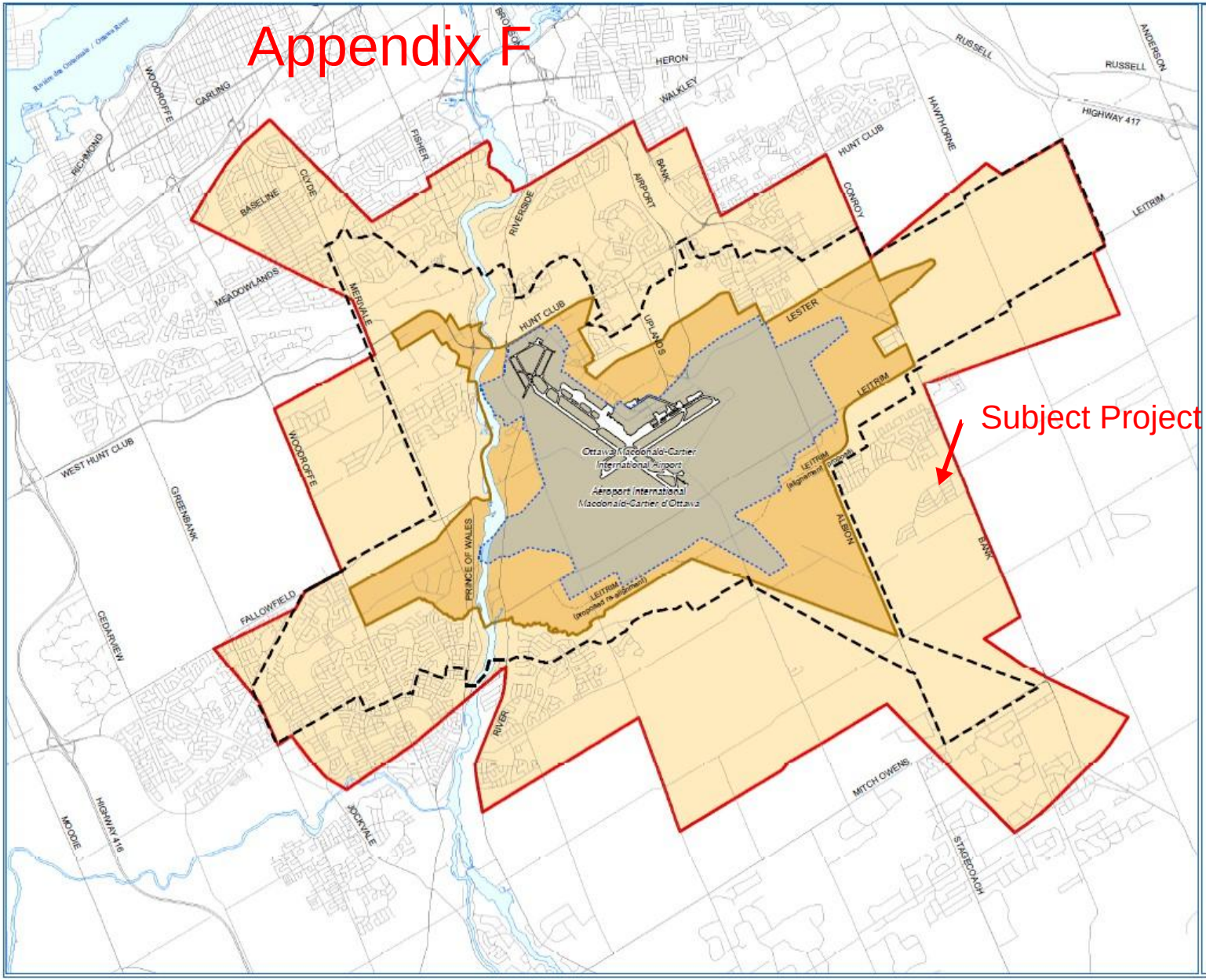
Name	M.	ID	G	Coordinates	
				x	y
				(m)	(m)
			0.0	453130.04	5017591.00
				453550.14	5017829.52
				453553.66	5017823.35
				453134.09	5017586.42
			0.0	453287.76	5017656.14
				453429.36	5017737.01
				453477.21	5017652.92
				453475.12	5017645.65
				453454.13	5017633.19
				453446.85	5017635.57
				453434.82	5017653.20
				453324.42	5017588.28

Contour Lines

Geometry Contour Line

Name	M.	ID	OnlyPts	Height		Coordinates		
				Begin	End	x	y	z
				(m)	(m)	(m)	(m)	(m)

Appendix F



OFFICIAL PLAN - Annex 10

LAND USE CONSTRAINTS DUE TO AIRCRAFT NOISE

PLAN OFFICIEL - Appendice 10

CONTRAINTES LIMITANT L'UTILISATION EN RAISON DU BRUIT DES AVIONS

- Airport Vicinity Development Zone
  Zone d'aménagement dans le voisinage de l'aéroport
- 25 Line (Composite of 25 NEF/NEP)
  Ligne 25 (ensemble des courbes NEF et NEP 25)
- 35 Line (Composite of 35 NEF/NEP)
  Ligne 35 (ensemble des courbes NEF et NEP 35)
- Airport Zoning Regulations
  Règlements de zonage applicables à de l'Aéroport
- Airport Operating Influence Zone
  Zone d'influence d'exploitation de l'aéroport

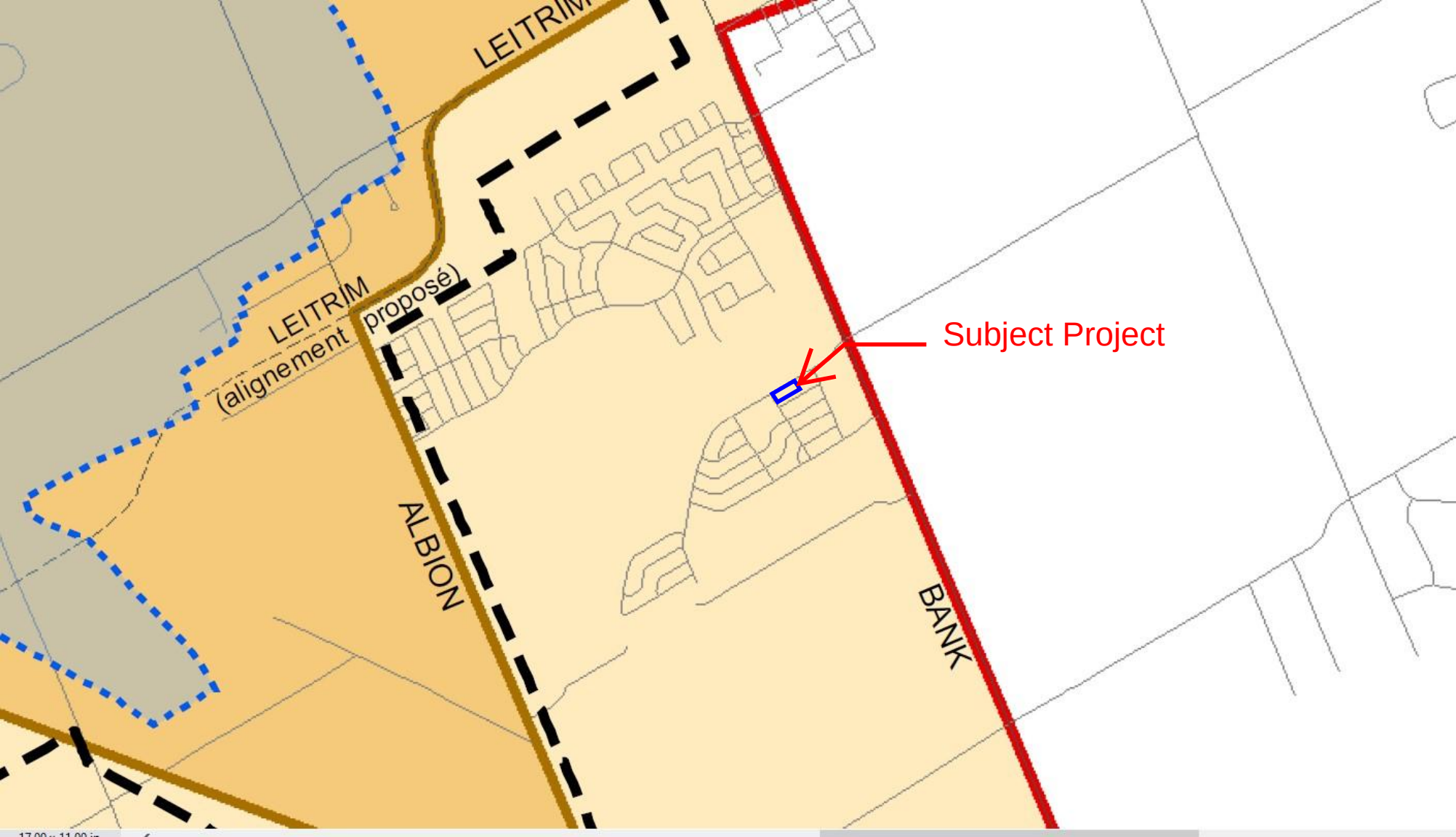
NOTE:
The boundaries of the Ottawa Airport Operating Influence Zone and the Airport Vicinity Development Zone, are not subject to interpretation and their precise locations should be readfrom a map at a scale of 1:50,000 available from the City of Ottawa and the Ottawa International Airport Authority.

NOTE:
Les limites de la Zone d'influence d'exploitation de l'aéroport Ottawa et de la Zone d'aménagement dans le voisinage de l'aéroport ne sont sujettes à aucune interprétation. Pour connaître leur emplacement exact, il faut se reporter à la carte qui les définit à une échelle de 1 : 50 000, que l'on peut se procurer auprès de la Ville d'Ottawa et de l'Administration de l'Aéroport international d'Ottawa.

Ottawa

Prepared by: Planning, Infrastructure and Economic Development Department, GIS and Data Management

Préparé par: Services de la planification, de l'infrastructure et du développement économique, SIG et Gestion des données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