NOISE IMPACT STUDY
RESIDENTIAL DEVELOPMENT
LISGAR DRIVE & DOUG LEAVENS BLVD.
CITY OF MISSISSAUAGA

FOR

AVENIA CONSTRUCTION INC.

PREPARED BY

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INTRODUCTION

J.E. COULTER ASSOCIATES LIMITED was commissioned by Avenia Construction Inc. to complete a Noise Impact Study for the proposed residential development at the N/E quadrant of Lisgar Drive and Doug Leavens Blvd. in the City of Mississauga (see Appendix A, Figure 1). The proposed development is situated on the east side of Lisgar Drive, north of Doug Leavens Blvd. This study entailed predicting the sound levels from various transportation and stationary sources on the development and recommending mitigation measures where applicable to meet the Ministry of the Environment, Conservation and Parks (MECP), the City of Mississauga and the Region of Peel's noise guidelines (see Appendix C). References are provided in Appendix D.

The proposed development consists of 124 single-family dwellings (see Appendix A, Figure 2). To the east, west, and south of this site are existing residential developments. To the north is Lisgar Fields Community Park and Lisgar Middle School.

TRANSPORTATION SOURCES

The potential source of transportation noise affecting this development is Lisgar Drive. Highway 407 to the west is situated more than 660m and shielded by several rows of existing housing.

Based on information provided by the Traffic Impact Assessment, the following traffic volumes are expected (see Appendix B for details):

Table 1: Traffic Volume Projections

Roadway	Traffic Volume	Truck %		# of Lanes	Speed Limit (kph)	Day/Night Split (%)
		Medium	Heavy			
Lisgar Drive (north of Doug Leavens Blvd.)	4,089	0.58%	0.58%	2	40	90/10
Highway 407	108,000	5.0%	10.0%	6	100	90/10

Notes:

1. Lisgar Drive traffic data was based on the AM and PM peak hours volumes projected to the year 2028 and converted to 24-hour AADT volumes. A growth rate of 1% (compounded) over 5 years was applied to Lisgar Drive for the 2033 (10-year projection).
2. Highway 407 traffic volumes are based on the ultimate lane capacity (18,000 vehicles per lane).
3. Ninth Line was not included in the analysis as it was deemed to be acoustically insignificant relative Lisgar Drive and Highway 407.

NOISE CRITERIA

The MECP's noise criterion for outdoor amenity areas is 55 dB L_{eq} daytime (at grade level) where road and rail traffic are concerned. Excesses of up to 5 dB (i.e., 60 dB L_{eq}) are permissible provided the *Agreement of Purchase and Sale* contains a warning clause indicating the excess above the noise criteria. Where the daytime sound levels in the private outdoor

amenity areas are greater than 60 dB L_{eq}, then measures must be implemented to reduce the sound levels to 60 dB L_{eq} or less. This would include acoustic barriers (combination of fence and/or earth berming), shielding by other building structures, or relocating the dwelling unit farther from the noise source.

The MECP's noise criteria from *NPC-300* are summarized as follows:

Table 2: Sound Level Limits – Road and Rail

Type of Space	Time Period	L_{eq} (dBA)	
		Road	Rail
INDOOR LIMITS			
Living/dining, den areas of residences, hospitals, nursing homes, schools, daycare centres, etc.	07:00–23:00	45	40
Living/dining, den areas of residences, hospitals, nursing homes, etc. (except schools or daycare centres)	23:00–07:00	45	40
Sleeping quarters	07:00–23:00	45	40
	23:00–07:00	40	35
OUTDOOR LIMITS			
Outdoor recreation areas[1]	07:00–23:00	55	55
Outside bedroom window	23:00–07:00	50	50
Outside living room window	07:00–23:00	55	55

[1] Up to 5 dB excess above criteria is allowed, provided a warning clause is given. Above 60 dB L_{eq}, exterior noise mitigation measures (i.e., noise barriers, intervening structures, additional setback from source) are required.

Exterior Building Façade

Where the sound levels at the exterior of the building façade exceed 55 dB L_{eq} daytime at the living room window or 50 dB L_{eq} nighttime at the bedroom window, the unit must be provided with forced air heating, with provision for future air conditioning by the owner. Excesses up to 10 dB are permissible, provided a warning clause is given. Where the sound levels exceed this limit (i.e., 65 dB L_{eq} daytime or 60 dB L_{eq} nighttime), central air conditioning must be incorporated into the building design prior to occupancy. Warning clauses are applicable as well.

Stationary Sources

A site review was undertaken to determine if there are any potential sources of stationary noise that may impact the proposed residential development. The Lisgar Middle School is located more than 170m from this proposed development. The potential noise sources are rooftop mechanical ventilation systems.

PROJECTED SOUND LEVELS

Transportation Sources

The daytime L_{eq} sound level at grade level and day/nighttime L_{eq} sound level at second-storey due to road traffic was calculated using the MECP's *ORNAMENT, STAMSON Version 5.04* noise prediction procedure.

The table below indicates the sound levels for various lots, with no acoustical barriers (except for shielding provided by the dwellings themselves), using the projected road traffic volumes.

Table 3: Projected L_{eq} Sound Levels – No Barriers

	Daytime (dB L_{eq})			Nighttime (dB L_{eq})		
Lot #	**Lisgar Drive**	**Highway 407**	**Total**	**Lisgar Drive**	**Highway 407**	**Total**
Lots 1–10 (Front Façade)	54	49	**55**	48	44	**49**
Lots 11–13 (Front Façade)	54	49	**55**	48	44	**49**
Lots 65–74, 88–96 (Rear Façade)	37	48	**48**	37	41	**43**
Lot 97 (Rear yard)	53	48	**54**	--	--	**--**
Lot 97 (Front Façade)	55	49	**56**	46	43	**48**

Note: The daytime sound levels for all areas are calculated for a receiver located 3m behind the rear façade. The nighttime sound levels are taken at the second-storey window, 4.5m above grade level, at the front or rear of the dwelling closest to the roadway.

From the above, the unmitigated sound levels generated by the combination of Lisgar Drive and Highway 407 marginally exceed MECP's noise criteria (55 dB L_{eq} daytime) at the exterior building façades only. The noise impact is considered minor. There are no acoustical barriers needed. Ventilation measures and warning clauses will be required for those lots directly exposed to Lisgar Drive, as noted below.

VENTILATION AND WARNING CLAUSE REQUIREMENTS

Where the nighttime and daytime sound levels exceed 60 and 65 dB L_{eq}, respectively, the MECP requires that each affected dwelling incorporate central air conditioning prior to occupancy. For this proposed residential development, the sound levels do not exceed this threshold. Lot 97 will however require a forced air heating system with ducting sized to accommodate the future installation of central air conditioning (an air-cooled condenser unit) at the homeowner's option, in addition to warning clauses. Warning clauses Type A and Type C (see Appendix C) must be inserted into the *Agreement of Purchase and Sale* for the affected lots indicating the sound levels will exceed the MECP's noise guidelines.

FAÇADE COMPONENTS

To meet the MECP's interior sound level criteria of 40 dB L_{eq} nighttime in the bedrooms and 45 dB L_{eq} daytime in the living/dining room areas, no special façade components are required for any dwelling in this development. Even where extraordinarily large window-area to floor-area ratios are used, the interior noise criteria can be met. Any OBC-compatible construction will be satisfactory.

NOISE IMPACT OF SCHOOL ON PROPOSED DEVELOPMENT (STATIONARY SOURCES)

An analysis of the rooftop mechanical equipment at Lisgar Middle School was conducted to determine if a noise impact would occur at the proposed residential subdivision. The potential noise impact was calculated for two scenarios: daytime operation (all equipment running at a 100% duty-cycle) and nighttime operation where the equipment is running at a 50% duty-cycle because of reduced loads.

A review of the school rooftop identified the following (see Appendix A, Figure 5).

a. Packaged HVAC Units (9): 85 dB PWLA
b. MUA-1 (2): East roof – 95 dB PWLA
c. Main HVAC Unit (1): 95 dB PWLA.

Tables 3 and 4, below, summarize the projected sound levels at the residential property to the north (closest point of reception). The quiet MECP's ambient sound levels were considered for a Class 1 Area: 50 dB and 45 dB, day and night. Two points of reception were considered at the northern part of the development (worst case):

R1: Lot 65 – North Façade
R2: Lot 52 – North Façade.

Table 4: Mechanical Ventilation Equipment Daytime (0700–2300 Hours)

Source ID	Sound Level (L_{eq})	
	R1	**R2**
MUA-1 (2)	39.8	38.1
Main HVAC (1)	38.4	41.8
HVAC (9)	39.1	33.6
Total Sound Level (dBA)	44	44
Noise Criteria (dBA)	50	50
Daytime Noise Impact (dB)	**-3**	**-4**
Meet Noise Criteria	**YES**	**YES**

Table 5: Mechanical Ventilation Equipment Nighttime (2300–0700 Hours)		
Source ID	**Sound Level (L_{eq})**	
	R1	**R2**
MUA-1 (2)	36.8	35.1
Main HVAC (1)	35.4	38.8
HVAC (9)	36.1	30.6
Total Sound Level (dBA)	41	41
Noise Criteria (dBA)	45	45
Nighttime Noise Impact (dB)	**-1**	**-2**
Meet Noise Criteria	**YES**	**YES**

The operation of the mechanical ventilation equipment will generate sound levels at the proposed residential development that meet MECP's *NPC-300* noise criteria without the need for any additional noise control measures.

CONCLUSIONS

The analysis shows the projected unmitigated sound levels generated by combined traffic on Lisgar Drive and Highway 407 would create a minor noise impact at the residential development. Only those lots directly adjacent to Lisgar Drive are affected. The remaining lots meet all MECP's noise criteria. Ventilation measures and warning clauses are recommended. Standard OBC-compatible construction is expected to meet the criteria for indoor noise. These measures are common for a residential development adjacent to an arterial road and are not considered an onerous requirement.

The existing school to the north was found not to generate any noise impacts at the proposed residential subdivision.

RECOMMENDATIONS

To satisfy the requirements of the Ministry of the Environment, Conservation and Parks, the following noise mitigation measures are proposed.

1. The installation of forced air heating with provisions for future air conditioning is requested by the MECP where the road sound levels exceed 50 dB L_{eq} nighttime or 55 dB L_{eq} daytime. This is applicable to Lot 97. This lot will also require warning clauses Type A and Type C, notifying owners of the noise excess (see Appendix C).

2. To meet the MECP's interior sound level criteria of 40 dB L_{eq} nighttime in the bedrooms and 45 dB L_{eq} daytime in the living/dining room areas, no special façade components are required for any dwelling in this development. Even where extraordinarily large window-area to floor-area ratios are used, the interior noise criteria can be met. Any OBC-compatible construction will be satisfactory.

/hp/pt

APPENDIX A: FIGURES


BEACHAM STREET
LISGAR MIDDLE SCHOOL
WORTHVIEW PLACE
LISGAR FIELDS COMMUNITY PARK
EXISTING RESIDENTIAL
BERRYMAN TRAIL
BLOCK 125 PARK 0.25ha (0.62ac)
EXISTING 7.5m SANITARY & STORM EASEMENT (TO BE ABANDONED)
METEOR COURT
EXISTING RESIDENTIAL
STREET 'B'
INDIGO CRESCENT
STREET 'A'
LISGAR DRIVE
STREET 'D'
STREET 'C'
LISGAR FIELDS COMMUNITY PARK
TRELAWNY CIRCLE
ASTRO COURT
EXISTING RESIDENTIAL
BLOCK 126 6.0m SERVICING / OVERLAND FLOW 0.02ha (0.05ac)
INDIGO CRESCENT
STREET 'C'
EXISTING CELLULAR TOWER EASEMENT
EXISTING RESIDENTIAL
BLOCK 127 STORMWATER TANK BLOCK 0.22ha (0.54ac)
TINTERN ABBEY CT.
DOUG LEAVENS BOULEVARD
ASTON MARTIN MEWS
CEDAR RAPIDS CRESCENT
ALDERWOOD TRAIL
MOON LILY CRES.

FIGURE 1

LISGAR FIELDS
COMMUNITY PARK

EXISTING
RESIDENTIAL

RAIL

BLOCK 125
PARK
0.25ha (0.62ac)

BLOCK 356
REGISTERED PLAN 43M-1052

STREET 'B'

STREET 'A'

BLOCK 366
REGISTERED PLAN 43M-1066

STREET 'C'

STREET 'D'

LISGAR DRIVE

BLOCK 126
6.0m SERVICING /
OVERLAND FLOW
0.02ha (0.05ac)

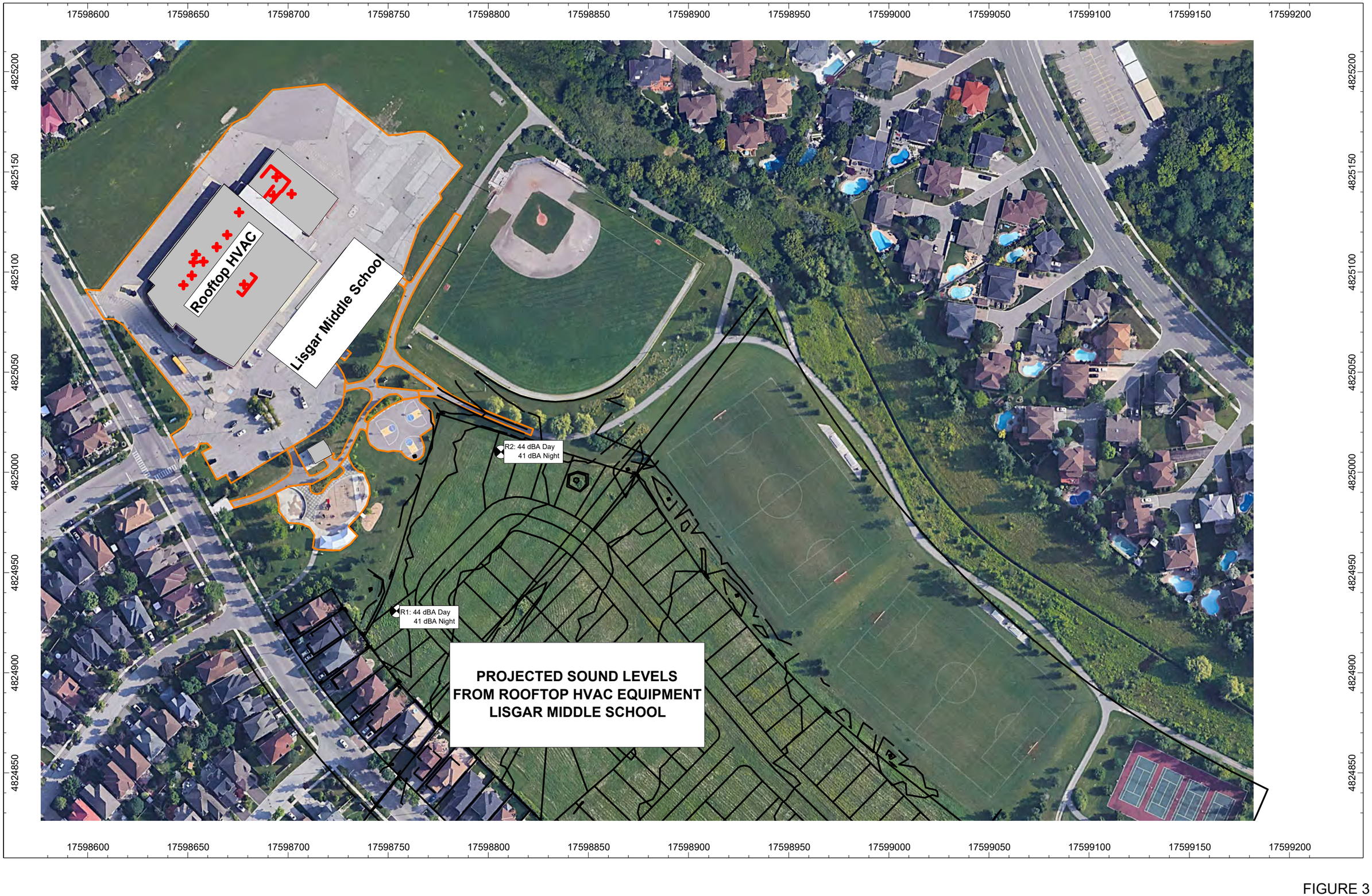
EXISTING
CELLULAR TOW
EASEMENT

BLOCK 127
STORMWATER
TANK BLOCK
0.22ha (0.54ac)

EXISTING
RESIDENTIAL

LISGAR FIE
COMMUNITY

FIGURE 2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Rooftop HVAC
Lisgar Middle School
R2: 44 dBA Day
41 dBA Night
R1: 44 dBA Day
41 dBA Night
PROJECTED SOUND LEVELS
FROM ROOFTOP HVAC EQUIPMENT
LISGAR MIDDLE SCHOOL

FIGURE 3

APPENDIX B: SOUND LEVEL CALCULATIONS

STAMSON 5.0 NORMAL REPORT Date: 27-10-2023 130:27:30
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: lot10.te Time Period: Day/Night 16/8 hours
Description: Lot 10 - West facade

Road data, segment # 1: Hwy 407 (day/night)

Car traffic volume : 82620/9180 veh/TimePeriod *
Medium truck volume : 4860/540 veh/TimePeriod *
Heavy truck volume : 9720/1080 veh/TimePeriod *
Posted speed limit : 100 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 108000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 10.00
Medium Truck % of Total Volume : 5.00
Heavy Truck % of Total Volume : 10.00
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Hwy 407 (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 2 / 2
House density : 83 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 660.00 / 660.00 m
Receiver height : 4.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)

Road data, segment # 2: Lisgar Dr. (day/night)

Car traffic volume : 3648/405 veh/TimePeriod *
Medium truck volume : 16/2 veh/TimePeriod *
Heavy truck volume : 16/2 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 4089
Percentage of Annual Growth : 0.00
Number of Years of Growth : 10.00
Medium Truck % of Total Volume : 0.43
Heavy Truck % of Total Volume : 0.43
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 2: Lisgar Dr. (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 17.00 / 17.00 m
Receiver height : 4.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)

Results segment # 1: Hwy 407 (day)

Source height = 1.78 m

ROAD (0.00 + 50.64 + 0.00) = 50.64 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.56	84.25	0.00	-25.67	-1.29	0.00	-6.66	0.00	50.64

Segment Leq : 50.64 dBA

Results segment # 2: Lisgar Dr. (day)

Source height = 0.81 m

ROAD (0.00 + 54.00 + 0.00) = 54.00 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	54.55	0.00	-0.54	0.00	0.00	0.00	0.00	54.00

Segment Leq : 54.00 dBA

Total Leq All Segments: 55.65 dBA

Results segment # 1: Hwy 407 (night)

Source height = 1.78 m

ROAD (0.00 + 44.11 + 0.00) = 44.11 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.56	77.72	0.00	-25.67	-1.29	0.00	-6.66	0.00	44.11

Segment Leq : 44.11 dBA

Results segment # 2: Lisgar Dr. (night)

Source height = 0.84 m

ROAD (0.00 + 47.63 + 0.00) = 47.63 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	48.18	0.00	-0.54	0.00	0.00	0.00	0.00	47.63

Segment Leq : 47.63 dBA

Total Leq All Segments: 49.23 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 55.65
(NIGHT): 49.23

STAMSON 5.0 NORMAL REPORT Date: 27-10-2023 130:22:37
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: lot97.te Time Period: Day/Night 16/8 hours
Description: Lot 97 - West Facade

Road data, segment # 1: Hwy 407 (day/night)

Car traffic volume : 82620/9180 veh/TimePeriod *
Medium truck volume : 4860/540 veh/TimePeriod *
Heavy truck volume : 9720/1080 veh/TimePeriod *
Posted speed limit : 100 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 108000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 10.00
Medium Truck % of Total Volume : 5.00
Heavy Truck % of Total Volume : 10.00
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Hwy 407 (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 2 / 2
House density : 83 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 660.00 / 660.00 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)

Road data, segment # 2: Lisgar Dr. (day/night)

Car traffic volume : 3648/405 veh/TimePeriod *
Medium truck volume : 16/2 veh/TimePeriod *
Heavy truck volume : 16/2 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 4089
Percentage of Annual Growth : 0.00
Number of Years of Growth : 10.00
Medium Truck % of Total Volume : 0.43
Heavy Truck % of Total Volume : 0.43
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 2: Lisgar Dr. (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 15.00 / 15.00 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)

Results segment # 1: Hwy 407 (day)

Source height = 1.78 m

ROAD (0.00 + 49.01 + 0.00) = 49.01 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.65	84.25	0.00	-27.14	-1.44	0.00	-6.66	0.00	49.01

Segment Leq : 49.01 dBA

Results segment # 2: Lisgar Dr. (day)

Source height = 0.81 m

ROAD (0.00 + 54.55 + 0.00) = 54.55 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	54.55	0.00	0.00	0.00	0.00	0.00	0.00	54.55

Segment Leq : 54.55 dBA

Total Leq All Segments: 55.62 dBA

Results segment # 1: Hwy 407 (night)

Source height = 1.78 m

ROAD (0.00 + 44.11 + 0.00) = 44.11 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.56	77.72	0.00	-25.67	-1.29	0.00	-6.66	0.00	44.11

Segment Leq : 44.11 dBA

Results segment # 2: Lisgar Dr. (night)

Source height = 0.84 m

ROAD (0.00 + 48.18 + 0.00) = 48.18 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	48.18	0.00	0.00	0.00	0.00	0.00	0.00	48.18

Segment Leq : 48.18 dBA

Total Leq All Segments: 49.62 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 55.62
(NIGHT): 49.62

STAMSON 5.0 NORMAL REPORT Date: 27-10-2023 130:22:52
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: lot97r.te Time Period: Day/Night 16/8 hours
Description: Lot 97 - Rear yard

Road data, segment # 1: Hwy 407 (day/night)

Car traffic volume : 82620/9180 veh/TimePeriod *
Medium truck volume : 4860/540 veh/TimePeriod *
Heavy truck volume : 9720/1080 veh/TimePeriod *
Posted speed limit : 100 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 108000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 10.00
Medium Truck % of Total Volume : 5.00
Heavy Truck % of Total Volume : 10.00
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Hwy 407 (day/night)

Angle1 Angle2 : -90.00 deg 45.00 deg
Wood depth : 0 (No woods.)
No of house rows : 2
House density : 83 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 660.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)

Road data, segment # 2: Lisgar Dr. (day/night)

Car traffic volume : 3648/405 veh/TimePeriod *
Medium truck volume : 16/2 veh/TimePeriod *
Heavy truck volume : 16/2 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 4089
Percentage of Annual Growth : 0.00
Number of Years of Growth : 10.00
Medium Truck % of Total Volume : 0.43
Heavy Truck % of Total Volume : 0.43
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 2: Lisgar Dr. (day/night)

Angle1 Angle2 : -90.00 deg 45.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 18.00 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)

Results segment # 1: Hwy 407 (day)

Source height = 1.78 m

ROAD (0.00 + 48.17 + 0.00) = 48.17 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	45	0.65	84.25	0.00	-27.14	-2.28	0.00	-6.66	0.00	48.17

Segment Leq : 48.17 dBA

Results segment # 2: Lisgar Dr. (day)

Source height = 0.81 m

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	45	0.00	54.55	0.00	-0.79	-1.25	0.00	0.00	0.00	52.51

Segment Leq : 52.51 dBA

Total Leq All Segments: 53.87 dBA

Results segment # 1: Hwy 407 (night)

Source height = 1.78 m

ROAD (0.00 + 43.23 + 0.00) = 43.23 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	45	0.56	77.72	0.00	-25.67	-2.17	0.00	-6.66	0.00	43.23

Segment Leq : 43.23 dBA

Results segment # 2: Lisgar Dr. (night)

Source height = 0.84 m

ROAD (0.00 + 46.13 + 0.00) = 46.13 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	45	0.00	48.18	0.00	-0.79	-1.25	0.00	0.00	0.00	46.13

Segment Leq : 46.13 dBA

Total Leq All Segments: 47.93 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 53.87
(NIGHT): 47.93

STAMSON 5.0 NORMAL REPORT Date: 27-10-2023 130:25:17
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: lot65.te Time Period: Day/Night 16/8 hours
Description: Lot 65 - West facade

Road data, segment # 1: Hwy 407 (day/night)

Car traffic volume : 82620/9180 veh/TimePeriod *
Medium truck volume : 4860/540 veh/TimePeriod *
Heavy truck volume : 9720/1080 veh/TimePeriod *
Posted speed limit : 100 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 108000
Percentage of Annual Growth : 0.00
Number of Years of Growth : 10.00
Medium Truck % of Total Volume : 5.00
Heavy Truck % of Total Volume : 10.00
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 1: Hwy 407 (day/night)

Angle1 Angle2 : -90.00 deg 45.00 deg
Wood depth : 0 (No woods.)
No of house rows : 3 / 3
House density : 83 %
Surface : 1 (Absorptive ground surface)
Receiver source distance : 700.00 / 700.00 m
Receiver height : 4.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)

Road data, segment # 2: Lisgar Dr. (day/night)

Car traffic volume : 3648/405 veh/TimePeriod *
Medium truck volume : 16/2 veh/TimePeriod *
Heavy truck volume : 16/2 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 4089
Percentage of Annual Growth : 0.00
Number of Years of Growth : 10.00
Medium Truck % of Total Volume : 0.43
Heavy Truck % of Total Volume : 0.43
Day (16 hrs) % of Total Volume : 90.00

Data for Segment # 2: Lisgar Dr. (day/night)

Angle1 Angle2 : -90.00 deg 45.00 deg
Wood depth : 0 (No woods.)
No of house rows : 1 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 52.00 / 52.00 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)

Results segment # 1: Hwy 407 (day)

Source height = 1.78 m

ROAD (0.00 + 47.86 + 0.00) = 47.86 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	45	0.56	84.25	0.00	-26.06	-2.17	0.00	-8.16	0.00	47.86

Segment Leq : 47.86 dBA

Results segment # 2: Lisgar Dr. (day)

Source height = 0.81 m

ROAD (0.00 + 36.78 + 0.00) = 36.78 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	45	0.66	54.55	0.00	-8.96	-2.29	0.00	-6.52	0.00	36.78

Segment Leq : 36.78 dBA

Total Leq All Segments: 48.19 dBA

Results segment # 1: Hwy 407 (night)

Source height = 1.78 m

ROAD (0.00 + 41.33 + 0.00) = 41.33 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	45	0.56	77.72	0.00	-26.06	-2.17	0.00	-8.16	0.00	41.33

Segment Leq : 41.33 dBA

Results segment # 2: Lisgar Dr. (night)

Source height = 0.84 m

ROAD (0.00 + 37.39 + 0.00) = 37.39 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	45	0.59	48.18	0.00	-8.58	-2.20	0.00	0.00	0.00	37.39

Segment Leq : 37.39 dBA

Total Leq All Segments: 42.80 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 48.19
(NIGHT): 42.80

CADNAA – DAYTIME SOUND LEVELS FROM HVAC (SCHOOL)

DAYTIME SOUND LEVELS (HVAC - SCHOOL)

Receiver
Name: R2
ID: R2
X: 17598806.32 m
Y: 4825010.26 m
Z: 4.50 m

Point Source, ISO 9613, Name: "HVAC", ID: "MAIN_SCHOOL"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	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)	dB(A)
1	17598678.00	4825093.80	4.50	0	D	500	95.0	0.0	0.0	0.0	0.0	54.7	0.3	-1.5	0.0	0.0	4.8	0.0	0.0	36.7
2	17598678.00	4825093.80	4.50	1	D	500	95.0	0.0	0.0	0.0	0.0	55.1	0.3	-1.5	0.0	0.0	4.8	0.0	1.0	35.4

Point Source, ISO 9613, Name: "HVAC", ID: "MUA_SCHOOL"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	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)	dB(A)
3	17598692.82	4825138.25	7.50	0	D	500	95.0	0.0	0.0	0.0	0.0	55.7	0.3	-1.4	0.0	0.0	4.8	0.0	0.0	35.6

Point Source, ISO 9613, Name: "HVAC", ID: "MUA_SCHOOL"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	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)	dB(A)
4	17598694.23	4825147.33	7.50	0	D	500	95.0	0.0	0.0	0.0	0.0	56.0	0.3	-1.3	0.0	0.0	4.8	0.0	0.0	35.2

Point Source, ISO 9613, Name: "HVAC", ID: "SCHOOL"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	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)	dB(A)
5	17598701.76	4825138.98	8.00	0	D	500	85.0	0.0	0.0	0.0	0.0	55.4	0.3	-1.2	0.0	0.0	0.0	0.0	0.0	30.5

Point Source, ISO 9613, Name: "HVAC", ID: "SCHOOL"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	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)	dB(A)
6	17598669.69	4825118.48	8.00	0	D	500	85.0	0.0	0.0	0.0	0.0	55.8	0.3	-1.4	0.0	0.0	0.0	0.0	0.0	30.3

Point Source, ISO 9613, Name: "HVAC", ID: "SCHOOL"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	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)	dB(A)
7	17598664.38	4825112.50	8.00	0	D	500	85.0	0.0	0.0	0.0	0.0	55.9	0.3	-1.3	0.0	0.0	0.0	0.0	0.0	30.1

Point Source, ISO 9613, Name: "HVAC", ID: "SCHOOL"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	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)	dB(A)
8	17598657.82	4825105.26	8.00	0	D	500	85.0	0.0	0.0	0.0	0.0	55.9	0.3	-1.5	0.0	0.0	0.0	0.0	0.0	30.2

Point Source, ISO 9613, Name: "HVAC", ID: "SCHOOL"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	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)	dB(A)
9	17598675.55	4825129.89	8.00	0	D	500	85.0	0.0	0.0	0.0	0.0	56.0	0.3	-1.8	0.0	0.0	0.0	0.0	0.0	30.5

Point Source, ISO 9613, Name: "HVAC", ID: "SCHOOL"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	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)	dB(A)
10	17598651.93	4825098.19	8.00	0	D	500	85.0	0.0	0.0	0.0	0.0	56.0	0.3	-1.4	0.0	0.0	0.0	0.0	0.0	30.1

Point Source, ISO 9613, Name: "HVAC", ID: "SCHOOL"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	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)	dB(A)
11	17598647.80	4825093.48	8.00	0	D	500	85.0	0.0	0.0	0.0	0.0	56.1	0.3	-1.8	0.0	0.0	0.0	0.0	0.0	30.4

Point Source, ISO 9613, Name: "HVAC", ID: "SCHOOL"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	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)	dB(A)
12	17598652.85	4825104.93	8.00	0	D	500	85.0	0.0	0.0	0.0	0.0	56.1	0.3	-1.5	0.0	0.0	0.0	0.0	0.0	30.0

100% DUTY CYCYLE

DAYTIME SOUND LEVELS (HVAC - SCHOOL)

Point Source, ISO 9613, Name: "HVAC", ID: "SCHOOL"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	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)	dB(A)
13	17598654.03	4825108.72	8.00	0	D	500	85.0	0.0	0.0	0.0	0.0	56.2	0.3	-1.5	0.0	0.0	0.0	0.0	0.0	30.0

100% DUTY CYCYLE

Receiver
Name: R1
ID: R1
X: 17598754.21 m
Y: 4824930.89 m
Z: 4.50 m

Point Source, ISO 9613, Name: "HVAC", ID: "MAIN_SCHOOL"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	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)	dB(A)
14	17598678.00	4825093.80	4.50	0	D	500	95.0	0.0	0.0	0.0	0.0	56.1	0.3	-2.0	0.0	0.0	7.0	0.0	0.0	33.6

Point Source, ISO 9613, Name: "HVAC", ID: "MUA_SCHOOL"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	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)	dB(A)
15	17598692.82	4825138.25	7.50	0	D	500	95.0	0.0	0.0	0.0	0.0	57.7	0.4	-1.6	0.0	0.0	4.8	0.0	0.0	33.7
16	17598692.82	4825138.25	7.50	1	D	500	95.0	0.0	0.0	0.0	0.0	57.9	0.4	-1.7	0.0	0.0	0.0	0.0	0.0	38.4
17	17598692.82	4825138.25	7.50	2	D	500	95.0	0.0	0.0	0.0	0.0	58.8	0.5	-1.6	0.0	0.0	4.8	0.0	0.0	32.5

Point Source, ISO 9613, Name: "HVAC", ID: "MUA_SCHOOL"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	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)	dB(A)
18	17598694.23	4825147.33	7.50	0	D	500	95.0	0.0	0.0	0.0	0.0	58.0	0.4	-1.5	0.0	0.0	1.8	0.0	0.0	36.1

Point Source, ISO 9613, Name: "HVAC", ID: "SCHOOL"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	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)	dB(A)
19	17598647.80	4825093.48	8.00	0	D	500	85.0	0.0	0.0	0.0	0.0	56.8	0.4	-2.1	0.0	0.0	0.0	0.0	0.0	29.9

Point Source, ISO 9613, Name: "HVAC", ID: "SCHOOL"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	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)	dB(A)
20	17598651.93	4825098.19	8.00	0	D	500	85.0	0.0	0.0	0.0	0.0	56.9	0.4	-1.8	0.0	0.0	0.0	0.0	0.0	29.6

Point Source, ISO 9613, Name: "HVAC", ID: "SCHOOL"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	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)	dB(A)
21	17598657.82	4825105.26	8.00	0	D	500	85.0	0.0	0.0	0.0	0.0	57.0	0.4	-1.8	0.0	0.0	1.7	0.0	0.0	27.7

Point Source, ISO 9613, Name: "HVAC", ID: "SCHOOL"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	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)	dB(A)
22	17598652.85	4825104.93	8.00	0	D	500	85.0	0.0	0.0	0.0	0.0	57.1	0.4	-1.8	0.0	0.0	0.0	0.0	0.0	29.3

Point Source, ISO 9613, Name: "HVAC", ID: "SCHOOL"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	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)	dB(A)
23	17598664.38	4825112.50	8.00	0	D	500	85.0	0.0	0.0	0.0	0.0	57.1	0.4	-1.7	0.0	0.0	3.1	0.0	0.0	26.1

Point Source, ISO 9613, Name: "HVAC", ID: "SCHOOL"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	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)	dB(A)
24	17598654.03	4825108.72	8.00	0	D	500	85.0	0.0	0.0	0.0	0.0	57.2	0.4	-1.8	0.0	0.0	0.0	0.0	0.0	29.2

Point Source, ISO 9613, Name: "HVAC", ID: "SCHOOL"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	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)	dB(A)
25	17598669.69	4825118.48	8.00	0	D	500	85.0	0.0	0.0	0.0	0.0	57.3	0.4	-1.7	0.0	0.0	2.8	0.0	0.0	26.2

Point Source, ISO 9613, Name: "HVAC", ID: "SCHOOL"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	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)	dB(A)
26	17598675.55	4825129.89	8.00	0	D	500	85.0	0.0	0.0	0.0	0.0	57.6	0.4	-1.7	0.0	0.0	0.0	0.0	0.0	28.6

DAYTIME SOUND LEVELS (HVAC - SCHOOL)

Point Source, ISO 9613, Name: "HVAC", ID: "SCHOOL"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	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)	dB(A)
27	17598701.76	4825138.98	8.00	0	D	500	85.0	0.0	0.0	0.0	0.0	57.6	0.4	-1.3	0.0	0.0	0.0	0.0	0.0	28.2

100% DUTY CYCYLE

CADNAA – NIGHTTIME SOUND LEVELS FROM HVAC (SCHOOL)

NIGHTTIME SOUND LEVELS (HVAC - SCHOOL)

Receiver
Name: R2
ID: R2
X: 17598806.32 m
Y: 4825010.26 m
Z: 4.50 m

Point Source, ISO 9613, Name: "HVAC", ID: "MAIN_SCHOOL"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	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)	dB(A)
1	17598678.00	4825093.80	4.50	0	N	500	92.0	0.0	0.0	0.0	0.0	54.7	0.3	-1.5	0.0	0.0	4.8	0.0	0.0	33.7
2	17598678.00	4825093.80	4.50	1	N	500	92.0	0.0	0.0	0.0	0.0	55.1	0.3	-1.5	0.0	0.0	4.8	0.0	1.0	32.4

Point Source, ISO 9613, Name: "HVAC", ID: "MUA_SCHOOL"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	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)	dB(A)
3	17598692.82	4825138.25	7.50	0	N	500	92.0	0.0	0.0	0.0	0.0	55.7	0.3	-1.4	0.0	0.0	4.8	0.0	0.0	32.6

Point Source, ISO 9613, Name: "HVAC", ID: "MUA_SCHOOL"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	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)	dB(A)
4	17598694.23	4825147.33	7.50	0	N	500	92.0	0.0	0.0	0.0	0.0	56.0	0.3	-1.3	0.0	0.0	4.8	0.0	0.0	32.2

Point Source, ISO 9613, Name: "HVAC", ID: "SCHOOL"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	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)	dB(A)
5	17598701.76	4825138.98	8.00	0	N	500	82.0	0.0	0.0	0.0	0.0	55.4	0.3	-1.2	0.0	0.0	0.0	0.0	0.0	27.5

Point Source, ISO 9613, Name: "HVAC", ID: "SCHOOL"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	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)	dB(A)
6	17598669.69	4825118.48	8.00	0	N	500	82.0	0.0	0.0	0.0	0.0	55.8	0.3	-1.4	0.0	0.0	0.0	0.0	0.0	27.3

Point Source, ISO 9613, Name: "HVAC", ID: "SCHOOL"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	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)	dB(A)
7	17598664.38	4825112.50	8.00	0	N	500	82.0	0.0	0.0	0.0	0.0	55.9	0.3	-1.3	0.0	0.0	0.0	0.0	0.0	27.1

Point Source, ISO 9613, Name: "HVAC", ID: "SCHOOL"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	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)	dB(A)
8	17598657.82	4825105.26	8.00	0	N	500	82.0	0.0	0.0	0.0	0.0	55.9	0.3	-1.5	0.0	0.0	0.0	0.0	0.0	27.2

Point Source, ISO 9613, Name: "HVAC", ID: "SCHOOL"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	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)	dB(A)
9	17598675.55	4825129.89	8.00	0	N	500	82.0	0.0	0.0	0.0	0.0	56.0	0.3	-1.8	0.0	0.0	0.0	0.0	0.0	27.5

Point Source, ISO 9613, Name: "HVAC", ID: "SCHOOL"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	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)	dB(A)
10	17598651.93	4825098.19	8.00	0	N	500	82.0	0.0	0.0	0.0	0.0	56.0	0.3	-1.4	0.0	0.0	0.0	0.0	0.0	27.1

Point Source, ISO 9613, Name: "HVAC", ID: "SCHOOL"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	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)	dB(A)
11	17598647.80	4825093.48	8.00	0	N	500	82.0	0.0	0.0	0.0	0.0	56.1	0.3	-1.8	0.0	0.0	0.0	0.0	0.0	27.4

Point Source, ISO 9613, Name: "HVAC", ID: "SCHOOL"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	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)	dB(A)
12	17598652.85	4825104.93	8.00	0	N	500	82.0	0.0	0.0	0.0	0.0	56.1	0.3	-1.5	0.0	0.0	0.0	0.0	0.0	27.0

50% DUTY CYCYLE

NIGHTTIME SOUND LEVELS (HVAC - SCHOOL)

Point Source, ISO 9613, Name: "HVAC", ID: "SCHOOL"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	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)	dB(A)
13	17598654.03	4825108.72	8.00	0	N	500	82.0	0.0	0.0	0.0	0.0	56.2	0.3	-1.5	0.0	0.0	0.0	0.0	0.0	27.0

50% DUTY CYCYLE

Receiver
Name: R1
ID: R1
X: 17598754.21 m
Y: 4824930.89 m
Z: 4.50 m

Point Source, ISO 9613, Name: "HVAC", ID: "MAIN_SCHOOL"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	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)	dB(A)
14	17598678.00	4825093.80	4.50	0	N	500	92.0	0.0	0.0	0.0	0.0	56.1	0.3	-2.0	0.0	0.0	7.0	0.0	0.0	30.6

Point Source, ISO 9613, Name: "HVAC", ID: "MUA_SCHOOL"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	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)	dB(A)
15	17598692.82	4825138.25	7.50	0	N	500	92.0	0.0	0.0	0.0	0.0	57.7	0.4	-1.6	0.0	0.0	4.8	0.0	0.0	30.7
16	17598692.82	4825138.25	7.50	1	N	500	92.0	0.0	0.0	0.0	0.0	57.9	0.4	-1.7	0.0	0.0	0.0	0.0	0.0	35.4
17	17598692.82	4825138.25	7.50	2	N	500	92.0	0.0	0.0	0.0	0.0	58.8	0.5	-1.6	0.0	0.0	4.8	0.0	0.0	29.5

Point Source, ISO 9613, Name: "HVAC", ID: "MUA_SCHOOL"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	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)	dB(A)
18	17598694.23	4825147.33	7.50	0	N	500	92.0	0.0	0.0	0.0	0.0	58.0	0.4	-1.5	0.0	0.0	1.8	0.0	0.0	33.1

Point Source, ISO 9613, Name: "HVAC", ID: "SCHOOL"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	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)	dB(A)
19	17598647.80	4825093.48	8.00	0	N	500	82.0	0.0	0.0	0.0	0.0	56.8	0.4	-2.1	0.0	0.0	0.0	0.0	0.0	26.9

Point Source, ISO 9613, Name: "HVAC", ID: "SCHOOL"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	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)	dB(A)
20	17598651.93	4825098.19	8.00	0	N	500	82.0	0.0	0.0	0.0	0.0	56.9	0.4	-1.8	0.0	0.0	0.0	0.0	0.0	26.6

Point Source, ISO 9613, Name: "HVAC", ID: "SCHOOL"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	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)	dB(A)
22	17598652.85	4825104.93	8.00	0	N	500	82.0	0.0	0.0	0.0	0.0	57.1	0.4	-1.8	0.0	0.0	0.0	0.0	0.0	26.3

Point Source, ISO 9613, Name: "HVAC", ID: "SCHOOL"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	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)	dB(A)
24	17598654.03	4825108.72	8.00	0	N	500	82.0	0.0	0.0	0.0	0.0	57.2	0.4	-1.8	0.0	0.0	0.0	0.0	0.0	26.2

Point Source, ISO 9613, Name: "HVAC", ID: "SCHOOL"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	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)	dB(A)
26	17598675.55	4825129.89	8.00	0	N	500	82.0	0.0	0.0	0.0	0.0	57.6	0.4	-1.7	0.0	0.0	0.0	0.0	0.0	25.6

Point Source, ISO 9613, Name: "HVAC", ID: "SCHOOL"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	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)	dB(A)
27	17598701.76	4825138.98	8.00	0	N	500	82.0	0.0	0.0	0.0	0.0	57.6	0.4	-1.3	0.0	0.0	0.0	0.0	0.0	25.2

APPENDIX C: WARNING CLAUSES

MINISTRY OF THE ENVIRONMENT, CONSERVATION AND PARKS WARNING CLAUSES

TYPE A

"Purchasers/tenants are advised that sound levels due to increasing road traffic may occasionally interfere with some activities of the dwelling occupants as the sound levels exceed the Municipality's and the Ministry of the Environment, Conservation and Parks' noise criteria."

TYPE B

"Purchasers/tenants are advised that despite the inclusion of noise control features in the development and within the building units, sound levels due to increasing road traffic may on occasions interfere with some activities of the dwelling occupants as the sound levels exceed the Municipality's and the Ministry of the Environment, Conservation and Parks' noise criteria."

TYPE C

"This dwelling unit has been designed with the provision for adding central air conditioning at the occupant's discretion. Installation of central air conditioning by the occupant in low and medium density developments 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."

TYPE D

"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 Municipality's and the Ministry of the Environment, Conservation and Parks' noise criteria."

APPENDIX D: NOISE CRITERIA

The noise study will be based on the following criteria for residential units, as required by the Ministry of The Environment, Conservation and Parks:

Sound Level Limits – Road and Rail			
Type of Space	**Time Period**	**L_{eq} (dBA)**	
		Road	**Rail**
INDOOR LIMITS			
Living/dining, den areas of residences, hospitals, nursing homes, schools, daycare centres, etc.	07:00–23:00	45	40
Living/dining, den areas of residences, hospitals, nursing homes, etc. (except schools or daycare centres)	23:00–07:00	45	40
Sleeping quarters	07:00–23:00	45	40
	23:00–07:00	40	35
OUTDOOR LIMITS			
Outdoor recreation areas[1]	07:00–23:00	55	55
Outside bedroom window	23:00–07:00	50	50
Outside living room window	07:00–23:00	55	55

[1] Up to 5 dB excess above criteria is allowed, provided a warning clause is given. Above 60 dB L_{eq}, exterior noise mitigation measures (i.e., noise barriers, intervening structures, additional setback from source) are required.

All calculations are based on the latest Grading Plan dated October 19, 2021.

L_{eq}

The L_{eq} is defined as the mean energy of the sound level averaged over the measurement period. It can be considered as the continuous steady sound level which would have the same acoustic energy as the real fluctuating noise measured over the same period of time.

APPENDIX E: REFERENCES

1. Ministry of the Environment, Model Municipal Noise Control By-Law, Final Report, August 1978.

2. Ministry of the Environment, *STAMSON* Computer Programme *(STEAM, Version 5.04*) for the IBM PC.

3. Ministry of the Environment, *ORNAMENT*, “Ontario Road Noise Analysis Method for Environment and Transportation,” November 1988.