



REPORT
PROJECT: 114312-5.2.2

ENVIRONMENTAL NOISE IMPACT ASSESSMENT PATHWAYS - BLOCK 225



Prepared for The Regional Group
by IBI GROUP
MARCH 2018
UPDATED NOVEMBER 2019

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1 INTRODUCTION

This report has been prepared to determine the impact of roadway traffic on the residential Block 225 located in the south portion of the Leitrim Development Area (LDA) as part of the Pathways at Findlay Creek subdivision. The report deals with the expected noise levels in the development and any required noise control measures.

The subject property is bounded by Miikana Road to the north, Salamander Way and the future park to the south and residential lands to the east and west.

2 BACKGROUND

2.1 Noise Sources

The study area is primarily subject to roadway noise from the collector road and Miikana Road. Aircraft noise from the Ottawa International Airport impacts the site as it is included in the Airport Vicinity Development Zone (AVOZ); there are no rail lines within 500 meters of the site.

2.2 Sound Level Limits for Road Traffic

Sound level criteria for road traffic is taken from the City of Ottawa Environmental Noise Control Guidelines hereafter referred to as the guidelines. Noise levels are expressed in the form Leq (T) which refers to a weighted level of a steady sound carrying the same total energy in the time period T (in hours) as the observed fluctuation sound.

2.2.1 Indoor Sound Level Criterion

Similar to outdoor noise levels, the recommended indoor sound level criteria from Table 2.2b of the guidelines are:

- Bedrooms – 23:00 to 07:00 – 40 dBA Leq (8)
- Other areas – 07:00 to 23:00 – 45 dBA Leq (16)

The sound levels are based on the windows and doors to an indoor space being closed.

For the purpose of assessing indoor sound levels, the outdoor sound levels are observed at the plane of the living room window at 1.5 meters above the ground for daytime noise and at the plane of the bedroom window 4.5 meters above the ground for nighttime noise as per the guidelines.

As per NPC-300 C7.1.3 when the outdoor sound levels are less than or equal to 65 dBA at the living room window and/or less than or equal to 60 dBA at the bedroom level then the building must be compliant with the Ontario Building Code. Should the outdoor sound levels exceed this criteria then the building component (walls, windows etc.) must be designed to achieve indoor sound level criteria.

As per NPC-300 C7.1.2.1 and C7.1.2.2 when the outdoor noise levels at the living room are greater than 55 dBA and less than or equal to 65 dBA and/or greater than 50 dBA and less than or equal to 60 dBA at the bedroom window then a warning clause is required and forced air heating with provision for central air conditioning is required. Should the outdoor sound levels exceed the criteria central air conditioning is mandatory and a warning clause is required.

2.2.2 Outdoor Sound Level Criterion

As per Table 2.2a of the guidelines the sound level criterion for the outdoor living area (OLA) for the daytime period between 07:00 and 23:00 hours is 55 dBA Leq (16). Sound levels for the OLA are calculated 3 meters from the building face at the center of the unit or within the center of the OLA at a height of 1.5 meters above the ground.

If the Leq sound level is less than or equal to the above criteria then no further action is required by the developer. If the sound level exceeds the criteria by less than 5 dBA then the developer may either provide a warning clause to prospective purchasers or install physical attenuation. For sound levels greater than 5 dBA above the criteria, control measures are required to reduce the noise levels as close to 55 dBA as technically, economically and administratively possible. Should the sound levels with the barrier in place exceed 55 dBA a warning clause is also required.

2.2.3 Indoor Sound Level Criterion – Building Components

As per NPC-300 C7.1.3 when the outdoor sound levels are less than or equal to 65 dBA at the living room window and/or less than or equal to 60 dBA at the bedroom level then the building must be compliant with the Ontario Building Code. Should the outdoor sound levels exceed this criteria then the building component (walls, windows etc.) must be designed to achieve indoor sound level criteria.

2.3 Sound Level Limits for Aircraft Noise

Aircraft noise impact assessment is based on the Noise Exposure Forecast (NEF) and Noise Exposure Projection (NEP) methods approved by Transport Canada. The noise contours were used to define the Airport Operating Influence Zone (AOIZ) and Airport Vicinity Development Zone (AVDZ) which is shown on Schedule K of the Official Plan.

No new noise sensitive developments are permitted within the AOIZ. Noise sensitive development is permitted within the AVDZ and outside of the AOIZ subject to a noise study or under the Prescribed Measures for Aircraft Noise in Part 6 of the Guidelines. Indoor and outdoor sound level limits for aircraft noise is included in Table 4.2a of the Guidelines.

3 ROADWAY NOISE

3.1 Traffic Volume Data

The major source of road noise impacting the site is the traffic moving along Miikana Road.

Traffic volumes Miikana Road will reach a mature state of development when the surrounding subdivision is built out. Therefore we are proposing to use the traffic volumes generated in the letter "Remer and Idone Lands – Daily Traffic Volume Summary" October 19, 2017 by IBI Group; a copy of this letter is included in the appendix. The annual average daily traffic volumes from the analysis for phase one is 2,700 for Miikana Road. The smallest AADT that can be calculated with the STAMSON Noise Model is 4,001 based on the day/night split. Therefore an AADT of 4,001 is used for Miikana Road and other traffic parameters are taken from Appendix B of the Guidelines for a 2-UCU Street. As the AADT for Miikana is much lower than the 4001 used in the calculations, a posted speed limited of 40 km/hr. is used in the STAMSON analysis. Table 3.1 summarizes the traffic and road parameters used in this report.

**TABLE 3.1
 TRAFFIC AND ROAD DATA SUMMARY**

	MIIKANA ROAD
Annual Average Daily Traffic (AADT)	4,001
Posted Speed Limit (km/hr)	40
% Medium Trucks	7%
% Heavy Trucks	5%
% Daytime Traffic	92%

3.2 Calculation Methods

Roadway noise is calculated using the STAMSON 5.04 computer program from the Ontario Ministry of the Environment.

Unattenuated daytime and nighttime noise levels at the building face (for determining indoor sound levels) are shown on Table 3.2, while unattenuated daytime outdoor living areas are shown on Table 3.3. Locations of the noise receivers is shown on Figure 1 – Noise Plan. Parameters used for calculating the noise levels, the perpendicular distance from source to receiver and the roadway segment angles are also indicated in the tables.

TABLE 3.2
UNATTENUATED NOISE LEVELS AT BUILDING FACE

LOCATION	ROADWAY	SOURCE – RECEIVER DISTANCE (m)	SEGMENT ANGLES		INDOOR NOISE LEVELS (dBa)	
			LEFT	RIGHT	DAYTIME	NIGHTTIME
A	Miikana	15.5	90	90	59.25	51.01
B	Miikana	21.5	0	70	53.63	46.26
C	Miikana	18.0	-90	90	58.18	50.79
D	Miikana	55.0	-90	20	48.27	41.29

TABLE 3.3
UNATTENUATED NOISE LEVELS AT OLA

LOCATION	ROADWAY	SOURCE – RECEIVER DISTANCE (m)	SEGMENT ANGLES		DAYTIME NOISE LEVEL LEVELS (dBa)
			LEFT	RIGHT	
E	Miikana	15.0	-90	90	59.49
F	Miikana	18.5	-45	80	57.07
G	Miikana	24.5	-20	65	53.63

As indicated in Tables 3.2 and 3.3, the recommended outdoor and indoor sound levels are exceeded for some of the locations.

4 ABATEMENT MEASURES

4.1 Indoor Sound Levels

No units have daytime indoor noise levels above 65 dBA, or nighttime indoor noise levels above 60 dBA, so there is no requirement for central air conditioning, a review of the building components or a type 'D' warning clause. For all units exposed to Miikana Road, the daytime noise level at the building face is below 65 dBA, but above 55dBA, requiring alternative means of ventilation, as well as a Type 'C' warning clause in the Agreement of Purchase and Sale. Alternative means of ventilation usually consist of a forced air heating system with ducts sized for future installation of central air conditioning.

4.2 Outdoor Sound Levels

There are no outdoor living areas with sound levels above 60 dBA however, all units backing onto or directly flanking Miikana Road, the sound level is above 55 dBA. A 1.8 meter high noise barrier is proposed along Miikana Road rather than a warning clause. With the barrier in place, the noise level drops below 55 dBA so no further action is required. Table 4.1 summarizes the noise results with the barrier in place.

**TABLE 4.1
ATTENUATED NOISE LEVELS AT OLA**

LOCATION	ROADWAY	BARRIER RECEIVER DISTANCE(M)	BARRIER ANGLES		DAYTIME NOISE LEVEL dBA
			LEFT	RIGHT	
E	Miikana	3.0	-90	90	54.61
F	Miikana	6.5	-45	50	53.32

4.3 Aircraft Sound Levels

As stated in Section 2.1, the site is within the Airport Vicinity Development Zone (AVDZ). The site however is outside of the 25 NEF/NEP contour line so the building components and ventilation requirements of Part 6 Prescribed Measures for Aircraft Noise of the Guidelines do not apply. A warning clause is required for the residential units inside the AVDZ.

Warning clause for aircraft noise is as follows:

"Purchasers/tenants are advised that due to the proximity of the airport, noise from the airport and individual aircraft may at times interfere with outdoor or indoor activities".

5 SUMMARY OF ATTENUATION MEASURES

5.1 Warning Clauses

A clause regarding noise must appear on the Agreement of Purchase and Sale on the title of the lots and townhouse units indicated on the Figure 1 Noise Plan.

The following warning clauses are taken from Section C8.1 of NPC 300.

Type C	"This dwelling unit has been fitted with a forced air heating system and the ducting, etc. was sized to accommodate central air conditioning. Installation of central air conditioning by the occupant will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the City's and the Ministry of the Environment's noise criteria. (Note: The location and installation of the outdoor air conditioning device should be done so as to comply with noise criteria of MOE Publication NPC-216, Residential Air Conditioning Devices and thus minimize the noise impacts both on and in the immediate vicinity of the subject property."
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5.2 Ventilation Requirements and Building Components

All lots and townhouse units requiring a type 'C' warning clause shown on Figure 1 Noise Plan, require a forced air heating system sized to accommodate a central air conditioning system.

5.3 Noise Barrier

Noise barriers constructed to current City of Ottawa and MOE standards is required at the locations shown on the Noise Plan.

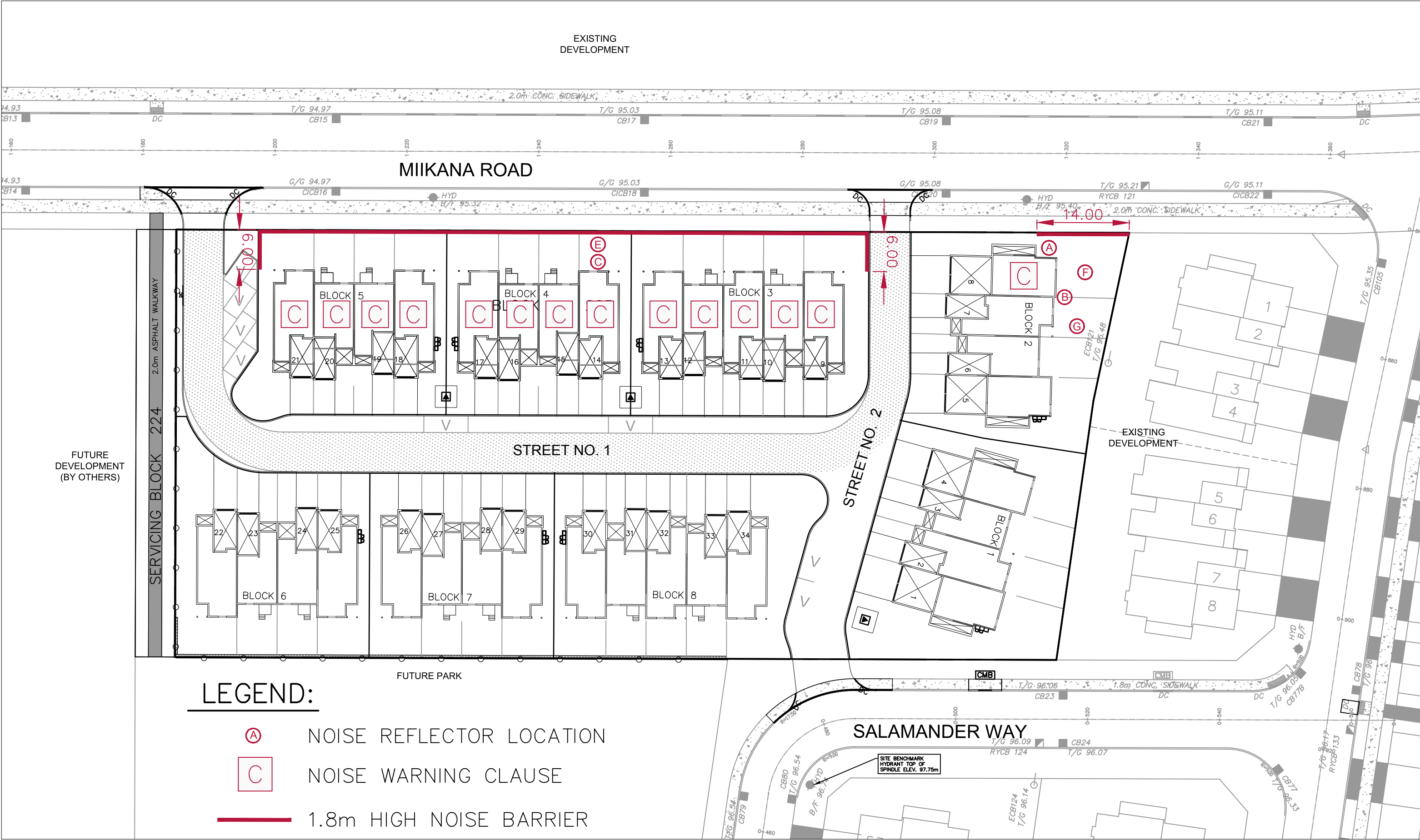
Prepared by:



Lance Erion, P. Eng.



J:\114312_Block225\5.9 Drawings\59civil\layouts\NOISE.dwg Layout Name: FIG1 Plot Scale: 1:5.13 Plotted At: 11/4/2019 Last Saved By: dsurna Last Saved At: Nov. 4, 19



LEGEND:

- (A) NOISE REFLECTOR LOCATION
- (C) NOISE WARNING CLAUSE
- 1.8m HIGH NOISE BARRIER

Appendix



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October 19, 2017

Mr. Asad Youfsani
Project Manager, Development Review-Urban Services
City of Ottawa
110 Laurier Avenue West
Ottawa, ON
K1P 1J1

Dear Mr. Youfsani:

RE: REMER AND IDONE LANDS – DAILY TRAFFIC VOLUME SUMMARY

The following letter has been prepared in support of the Remer Lands (4800 Bank Street) development application. City staff requested confirmation of expected ultimate daily traffic volumes on local collector roadways, to determine if noise mitigation measures would be required. The City set the maximum average daily traffic volume at 8,000 vehicles per day on any collector road without noise mitigation measures.

For the purposes of this analysis, the Idone Lands (4840 Bank Street), adjacent to the Remer Lands, was included. Both developments are expected to use the same collector road system and should be accounted for in the daily traffic volume calculation.

BACKGROUND

The Remer and Idone Lands are located off Bank Street in the Leirtrim Community in the City of Ottawa. The main east-west collector road is Dun Skipper Drive, approximately 400m south and parallel to Blais Road. The existing Kelly Farm Drive collector road will be extended south from its current terminus through the subject site. Both these roadways will have direct frontage within the proposed developments and will be the focus of the following analysis.

ANALYSIS RESULTS

The methodology for estimating future daily traffic volumes was based on trip generation rates in the ITE Trip Generation Manual, 9th Edition, 2012. The morning, afternoon and daily trip generation rates for representative residential units within the Remer and Idone Lands were documented and a conversion factor was developed, as shown in Table 1.

Table 1 – AM+PM to Daily Traffic Volume Conversion Factor

LAND USE (ITE CODE)	ITE RATES (TRIPS PER UNIT)			DAILY RATE	FACTOR
	AM PEAK	PM PEAK	AM+PM		
Single Family (210)	0.75	1.00	1.75	9.52	5.44
Townhome (230)	0.44	0.52	0.96	5.81	6.05

Mr. Asad Youfsani – October 19, 2017

The results from Table 1 show that the sum of the morning and afternoon peak hour residential trip generation rates can be factored by 6.05 to estimate the corresponding daily traffic volume. The 6.05 conversion factor was based on townhouse unit types. This was a conservative approach since a large number of single family type residential units have also been proposed within the Remer and Idone Lands, which has a lower conversion factor.

The morning and afternoon peak hour trip generation results for the Remer and Idone Lands were based on the Leitrim Master Transportation Study (MTS) by IBI Group in March 2017. The peak hour trip generation results were then factored by the derived conversion factor to determine the estimated daily traffic volume generated by the proposed developments. The results have been summarized in Table 2.

Table 2 – Remer Lands and Idone Lands Trip Generation Results

	TRIP GENERATION		
	AM	PM	TOTAL
Remer & Idone Lands	599 vph	652 vph	1,251 vph
Conversion Factor	6.05		
TOTAL	3,624 vpd	3,945 vpd	7,569 vpd

Notes: vph = vehicles per hour; vpd = vehicles per day

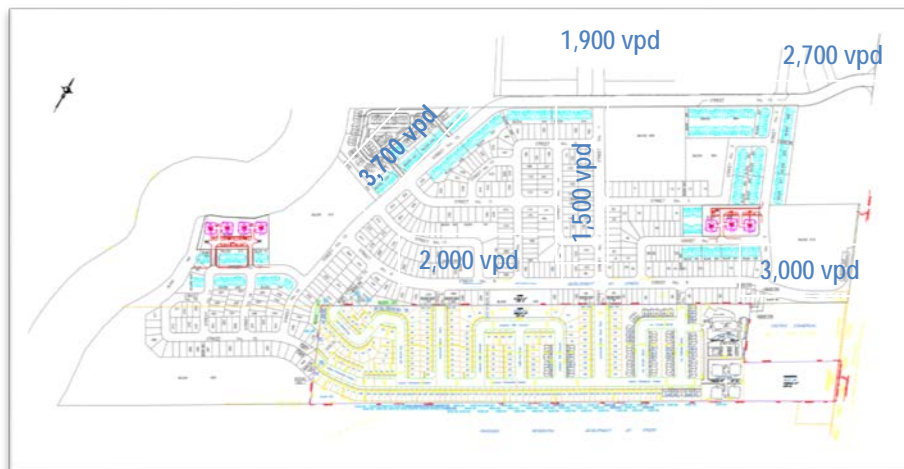
The estimated daily traffic volume from the Remer and Idone Lands at full buildout was approximately 7,500 vehicles per day. Therefore, it is assured that neither collector road (Dun Skipper Drive or Kelly Farm Drive) will exceed 8,000 vehicles per day within the proposed developments.

The estimated daily traffic volumes were assigned to each collector roadway based on the trip distributions derived in the Leitrim MTS, as outlined below:

- 40% on Dun Skipper Drive west of Bank Street
- 35% on Blais Road west of Bank Street
- 25% on Kelly Farm Drive north of Blais Road

The estimated daily traffic volumes along internal collector roadways based on the above trip distribution has been shown in Exhibit 1.

Exhibit 1 – Remer Lands and Idone Lands Estimated Daily Traffic Volume Results (in vehicles per day)



Mr. Asad Youfsani – October 19, 2017

CLOSING

All relevant documentation and data sheets have been provided in the Appendix. If there are any questions regarding the contents of this letter, please do not hesitate to contact the undersigned at 613-225-2311.

Sincerely,

A handwritten signature in black ink, appearing to read "Austin Shih". The signature is fluid and cursive, with the first name "Austin" and last name "Shih" clearly distinguishable.

Austin Shih, M.A.Sc, P.Eng.
Project Engineer

STAMSON 5.0 NORMAL REPORT Date: 28-03-2019 14:08:12
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: A.te Time Period: Day/Night 16/8 hours
Description: Location A OLA

Road data, segment # 1: Miikana Rd. (day/night)

Car traffic volume : 3239/282 veh/TimePeriod *
Medium truck volume : 258/22 veh/TimePeriod *
Heavy truck volume : 184/16 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 4001
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: Miikana Rd. (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 15.50 / 15.50 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Miikana Rd. (day)

Source height = 1.50 m

ROAD (0.00 + 59.25 + 0.00) = 59.25 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	60.95	0.00	-0.24	-1.46	0.00	0.00	0.00	59.25

Segment Leq : 59.25 dBA

Total Leq All Segments: 59.25 dBA

Results segment # 1: Miikana Rd. (night)

Source height = 1.50 m

ROAD (0.00 + 51.81 + 0.00) = 51.81 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	53.34	0.00	-0.22	-1.30	0.00	0.00	0.00	51.81

Segment Leq : 51.81 dBA

Total Leq All Segments: 51.81 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 59.25
(NIGHT): 51.81

STAMSON 5.0 NORMAL REPORT Date: 28-03-2019 14:13:46
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: A.te Time Period: Day/Night 16/8 hours
Description: Location B OLA

Road data, segment # 1: Miikana Rd. (day/night)

Car traffic volume : 3239/282 veh/TimePeriod *
Medium truck volume : 258/22 veh/TimePeriod *
Heavy truck volume : 184/16 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 4001
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: Miikana Rd. (day/night)

Angle1 Angle2 : 0.00 deg 75.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 21.50 / 21.50 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Miikana Rd. (day)

Source height = 1.50 m

ROAD (0.00 + 53.63 + 0.00) = 53.63 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	75	0.66	60.95	0.00	-2.60	-4.73	0.00	0.00	0.00	53.63

Segment Leq : 53.63 dBA

Total Leq All Segments: 53.63 dBA

Results segment # 1: Miikana Rd. (night)

Source height = 1.50 m

ROAD (0.00 + 46.27 + 0.00) = 46.27 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	75	0.57	53.34	0.00	-2.45	-4.61	0.00	0.00	0.00	46.27

Segment Leq : 46.27 dBA

Total Leq All Segments: 46.27 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 53.63
(NIGHT): 46.27

STAMSON 5.0 NORMAL REPORT Date: 28-03-2019 14:17:14
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: A.te Time Period: Day/Night 16/8 hours
Description: Location C indoor

Road data, segment # 1: Miikana Rd. (day/night)

Car traffic volume : 3239/282 veh/TimePeriod *
Medium truck volume : 258/22 veh/TimePeriod *
Heavy truck volume : 184/16 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 4001
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: Miikana Rd. (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 : 18.00 / 18.00 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Miikana Rd. (day)

Source height = 1.50 m

ROAD (0.00 + 58.18 + 0.00) = 58.18 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	60.95	0.00	-1.31	-1.46	0.00	0.00	0.00	58.18

Segment Leq : 58.18 dBA

Total Leq All Segments: 58.18 dBA

Results segment # 1: Miikana Rd. (night)

Source height = 1.50 m

ROAD (0.00 + 50.79 + 0.00) = 50.79 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	53.34	0.00	-1.24	-1.30	0.00	0.00	0.00	50.79

Segment Leq : 50.79 dBA

Total Leq All Segments: 50.79 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 58.18
(NIGHT): 50.79

STAMSON 5.0 NORMAL REPORT Date: 28-03-2019 14:18:07
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: A.te Time Period: Day/Night 16/8 hours
Description: Location D indoor

Road data, segment # 1: Miikana Rd. (day/night)

Car traffic volume : 3239/282 veh/TimePeriod *
Medium truck volume : 258/22 veh/TimePeriod *
Heavy truck volume : 184/16 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 4001
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: Miikana Rd. (day/night)

Angle1 Angle2 : -90.00 deg 20.00 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 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Miikana Rd. (day)

Source height = 1.50 m

ROAD (0.00 + 48.27 + 0.00) = 48.27 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	20	0.66	60.95	0.00	-9.37	-3.31	0.00	0.00	0.00	48.27

Segment Leq : 48.27 dBA

Total Leq All Segments: 48.27 dBA

Results segment # 1: Miikana Rd. (night)

Source height = 1.50 m

ROAD (0.00 + 41.29 + 0.00) = 41.29 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	20	0.57	53.34	0.00	-8.86	-3.19	0.00	0.00	0.00	41.29

Segment Leq : 41.29 dBA

Total Leq All Segments: 41.29 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 48.27
(NIGHT): 41.29

STAMSON 5.0 NORMAL REPORT Date: 28-03-2019 14:18:49
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: A.te Time Period: Day/Night 16/8 hours
Description: Location E OLA

Road data, segment # 1: Miikana Rd. (day/night)

Car traffic volume : 3239/282 veh/TimePeriod *
Medium truck volume : 258/22 veh/TimePeriod *
Heavy truck volume : 184/16 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 4001
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: Miikana Rd. (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 15.00 / 15.00 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Miikana Rd. (day)

Source height = 1.50 m

ROAD (0.00 + 59.49 + 0.00) = 59.49 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	60.95	0.00	0.00	-1.46	0.00	0.00	0.00	59.49

Segment Leq : 59.49 dBA

Total Leq All Segments: 59.49 dBA

Results segment # 1: Miikana Rd. (night)

Source height = 1.50 m

ROAD (0.00 + 52.03 + 0.00) = 52.03 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	53.34	0.00	0.00	-1.30	0.00	0.00	0.00	52.03

Segment Leq : 52.03 dBA

Total Leq All Segments: 52.03 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 59.49
(NIGHT): 52.03

STAMSON 5.0 NORMAL REPORT Date: 28-03-2019 14:06:43
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: A.te Time Period: Day/Night 16/8 hours
Description: Location F OLA

Road data, segment # 1: Miikana Rd. (day/night)

Car traffic volume : 3239/282 veh/TimePeriod *
Medium truck volume : 258/22 veh/TimePeriod *
Heavy truck volume : 184/16 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 4001
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: Miikana Rd. (day/night)

Angle1 Angle2 : -45.00 deg 80.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 18.50 / 18.50 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Miikana Rd. (day)

Source height = 1.50 m

ROAD (0.00 + 57.07 + 0.00) = 57.07 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-45	80	0.66	60.95	0.00	-1.51	-2.37	0.00	0.00	0.00	57.07

Segment Leq : 57.07 dBA

Total Leq All Segments: 57.07 dBA

Results segment # 1: Miikana Rd. (night)

Source height = 1.50 m

ROAD (0.00 + 49.63 + 0.00) = 49.63 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-45	80	0.57	53.34	0.00	-1.43	-2.27	0.00	0.00	0.00	49.63

Segment Leq : 49.63 dBA

Total Leq All Segments: 49.63 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 57.07
(NIGHT): 49.63

STAMSON 5.0 NORMAL REPORT Date: 28-03-2019 14:05:41
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: A.te Time Period: Day/Night 16/8 hours
Description: Location G OLA

Road data, segment # 1: Miikana Rd. (day/night)

Car traffic volume : 3239/282 veh/TimePeriod *
Medium truck volume : 258/22 veh/TimePeriod *
Heavy truck volume : 184/16 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 4001
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: Miikana Rd. (day/night)

Angle1 Angle2 : -20.00 deg 65.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 24.50 / 24.50 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Miikana Rd. (day)

Source height = 1.50 m

ROAD (0.00 + 53.63 + 0.00) = 53.63 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-20	65	0.66	60.95	0.00	-3.54	-3.78	0.00	0.00	0.00	53.63

Segment Leq : 53.63 dBA

Total Leq All Segments: 53.63 dBA

Results segment # 1: Miikana Rd. (night)

Source height = 1.50 m

ROAD (0.00 + 46.28 + 0.00) = 46.28 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-20	65	0.57	53.34	0.00	-3.35	-3.71	0.00	0.00	0.00	46.28

Segment Leq : 46.28 dBA

Total Leq All Segments: 46.28 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 53.63
(NIGHT): 46.28

STAMSON 5.0 NORMAL REPORT Date: 28-03-2019 14:04:38
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: A.te Time Period: Day/Night 16/8 hours
Description: Location H OLA

Road data, segment # 1: Miikana Rd. (day/night)

Car traffic volume : 3239/282 veh/TimePeriod *
Medium truck volume : 258/22 veh/TimePeriod *
Heavy truck volume : 184/16 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 4001
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: Miikana Rd. (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 15.00 / 24.50 m
Receiver height : 1.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Miikana Rd. (day)

Source height = 1.50 m

ROAD (0.00 + 59.49 + 0.00) = 59.49 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.66	60.95	0.00	0.00	-1.46	0.00	0.00	0.00	59.49

Segment Leq : 59.49 dBA

Total Leq All Segments: 59.49 dBA

Results segment # 1: Miikana Rd. (night)

Source height = 1.50 m

ROAD (0.00 + 48.69 + 0.00) = 48.69 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.57	53.34	0.00	-3.35	-1.30	0.00	0.00	0.00	48.69

Segment Leq : 48.69 dBA

Total Leq All Segments: 48.69 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 59.49
(NIGHT): 48.69

STAMSON 5.0 NORMAL REPORT Date: 01-11-2019 11:35:09
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: a.te Time Period: Day/Night 16/8 hours
Description: Location E OLA with 1.8m high barrier

Road data, segment # 1: Miikana Rd. (day/night)

Car traffic volume : 3239/282 veh/TimePeriod *
Medium truck volume : 258/22 veh/TimePeriod *
Heavy truck volume : 184/16 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 4001
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: Miikana Rd. (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 15.00 / 15.50 m
Receiver height : 1.50 / 4.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : 90.00 deg
Barrier height : 1.80 m
Barrier receiver distance : 3.00 / 10.00 m
Source elevation : 95.25 m
Receiver elevation : 95.65 m
Barrier elevation : 95.37 m
Reference angle : 0.00

Results segment # 1: Miikana Rd. (day)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	1.50	1.70	97.07

ROAD (0.00 + 54.61 + 0.00) = 54.61 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.55	60.95	0.00	0.00	-1.27	0.00	0.00	-5.07	54.61

Segment Leq : 54.61 dBA

Total Leq All Segments: 54.61 dBA

Results segment # 1: Miikana Rd. (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	4.50	2.58	97.95

ROAD (0.00 + 51.81 + 0.00) = 51.81 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.46	53.34	0.00	-0.21	-1.10	0.00	0.00	-1.25	50.77*
-90	90	0.57	53.34	0.00	-0.22	-1.30	0.00	0.00	0.00	51.81

* Bright Zone !

Segment Leq : 51.81 dBA

Total Leq All Segments: 51.81 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 54.61

(NIGHT): 51.81

STAMSON 5.0 NORMAL REPORT Date: 01-11-2019 11:42:46
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: a.te Time Period: Day/Night 16/8 hours
Description: Location F OLA with 1.8m high barrier

Road data, segment # 1: Miikana Rd. (day/night)

Car traffic volume : 3239/282 veh/TimePeriod *
Medium truck volume : 258/22 veh/TimePeriod *
Heavy truck volume : 184/16 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 1 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 4001
Percentage of Annual Growth : 0.00
Number of Years of Growth : 0.00
Medium Truck % of Total Volume : 7.00
Heavy Truck % of Total Volume : 5.00
Day (16 hrs) % of Total Volume : 92.00

Data for Segment # 1: Miikana Rd. (day/night)

Angle1 Angle2 : -45.00 deg 80.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 18.50 / 18.50 m
Receiver height : 1.50 / 4.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -45.00 deg Angle2 : 50.00 deg
Barrier height : 1.80 m
Barrier receiver distance : 6.50 / 6.50 m
Source elevation : 95.35 m
Receiver elevation : 95.70 m
Barrier elevation : 95.47 m
Reference angle : 0.00

Results segment # 1: Miikana Rd. (day)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	1.50	1.61	97.08

ROAD (0.00 + 51.26 + 49.10) = 53.32 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-45	50	0.55	60.95	0.00	-1.41	-3.07	0.00	0.00	-5.21	51.26
50	80	0.66	60.95	0.00	-1.51	-10.34	0.00	0.00	0.00	49.10

Segment Leq : 53.32 dBA

Total Leq All Segments: 53.32 dBA

Results segment # 1: Miikana Rd. (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	4.50	3.55	99.02

ROAD (0.00 + 48.83 + 41.90) = 49.63 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-45	50	0.46	53.34	0.00	-1.33	-3.02	0.00	0.00	0.00	48.98*
-45	50	0.57	53.34	0.00	-1.43	-3.08	0.00	0.00	0.00	48.83
50	80	0.57	53.34	0.00	-1.43	-10.00	0.00	0.00	0.00	41.90

* Bright Zone !

Segment Leq : 49.63 dBA

Total Leq All Segments: 49.63 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 53.32

(NIGHT): 49.63