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## NOISE IMPACT STUDY – **Project: 19307.00**

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**18309-18314 Hurontario Street  
Caledon, Ontario**

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Prepared for:

**Jannett & Richard Nicolson & 2683894 Ontario Inc.**

Prepared by:

A handwritten signature in blue ink, appearing to read "Iwona".

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**Iwona Stasiewicz, Sr.Eng./Arch.Tech.**

A handwritten signature in black ink, appearing to read "Bob".

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**Bob Rimrott, P.Eng.**

December 8, 2020

## Revision History

Version	Description	Author	Reviewed	Date
- -	Initial Report	IS	BR	December 8, 2020

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## Table of Contents

<b>1</b>	<b>Introduction</b>	<b>1</b>
<b>2</b>	<b>Guidelines and Criteria</b>	<b>2</b>
<b>3</b>	<b>Noise Level Predictions</b>	<b>3</b>
<b>4</b>	<b>Transportation Noise Predictions</b>	<b>5</b>
<b>5</b>	<b>Noise Control Recommendations</b>	<b>6</b>
<b>6</b>	<b>Conclusions</b>	<b>8</b>
<b>7</b>	<b>Warning Clauses</b>	<b>9</b>
<b>8</b>	<b>References</b>	<b>10</b>

## Appendix A

Road Traffic Data & Sample Calculations

## 1 Introduction

CRH Canada Group Inc. has retained Aeroustics Engineering Limited to prepare an Environmental Noise Impact Study (ENIS) to support an application for a proposed residential development in the Town of Caledon.

The proposed development is to be located at located at 18309 and 18314 Hurontario Street. Figure 1 provides a key plan showing the proposed development location.



**Figure 1: Key plan showing site location**

The purpose of this study is to examine the existing and future noise environment in the development area and evaluate its impact potential on the future residential receptors. This report also investigates the noise control features that are required for the development in order to meet the noise guidelines of the Ontario Ministry of the Environment, Conservation and Parks (MECP) and to satisfy the requirements of the municipality.

The proposed development consists of seven townhouse blocks consisting of 30 townhouse units.

This report is based on the following information:

- Preliminary Concept Plan prepared by RS Geomatics, Dated November 13, 2019;
- Road traffic information provided by Ministry of Transportation (MTO) and Region of Peel.

The dominant road traffic sources in the subject study area include Hurontario Street and Charleston Sideroad. However, due to the separation distance between Charleston Sideroad and the proposed development, Charleston is not expected to have a significant impact on the overall acoustic environment of 18309-18314 Hurontario Street.

It should be noted that the property to the northeast of the subject site is occupied by Caledon Fairground. However, this type of land use is not expected to have a significant impact on the overall acoustic environment of the proposed development but may be audible occasionally. This should be addressed through a warning clause.

This site is not affected by aircraft traffic or above-grade rail traffic.

## 2 Guidelines and Criteria

### 2.1 Transportation Noise – Outdoor Living Area (OLA)

MECP Guidelines recommend that equivalent noise levels ( $L_{eq-16hr}$ ) in outdoor living areas should not exceed 55 dBA. If it is not technically, economically, or administratively feasible to achieve a level of 55 dBA, predicted noise levels between 55 dBA and 60 dBA may be acceptable provided that the future occupants of the building are made aware of the potential noise problems through appropriate warning clauses. Noise levels above 60 dBA are generally not acceptable and will warrant noise control measures.

Further, Town of Caledon Policies and Guidelines states that the Town will not accept sound levels in excess of 55dBA unless features exceed standard detail. It should also be noted that the Town prohibits wood noise barriers and that maximum allowable fence height is limited to 2.4m.

Region of Peel's noise level limit for outdoor living areas is 55dBA.

All unenclosed balconies that are less than 4 m in depth and outside the exterior of the building façade are exempt from meeting the MECP outdoor noise criteria with regards to transportation noise sources. Should the depth of the future balconies and/or terraces be greater than 4 m, they will be subject to the MECP noise level limit of 55 dBA.

### 2.2 Transportation Noise – Indoor Living Spaces

Indoor noise levels due to road traffic were also examined with respect to the MECP Guidelines. Bedrooms are required to meet an indoor noise level ( $L_{eq-8hr}$ ) of 40 dBA from

road traffic during nighttime hours. The indoor daytime noise level ( $L_{eq-16hr}$ ) due to road traffic should not exceed 45 dBA for living or dining rooms. Lounges, lobbies, retail or general office spaces should meet the indoor noise level of 50 dBA from road traffic. In order to achieve these levels, the MECP Guidelines provide a basis for the types of windows, exterior walls, and doors that will be required based on projected outdoor noise levels.

The MECP also requires that a central air conditioning system be installed for dwellings when the daytime or nighttime outdoor transportation noise levels at the façade of the dwelling are above 65 dBA or 60 dBA, respectively. The provision for the future installation of central air conditioning must be made if:

- the nighttime sound level is greater than 50 dBA and less than or equal to 60 dBA on the outside face of a bedroom window;
- the daytime sound level is greater than 55 dBA and less than or equal to 65 dBA on the outside face of a bedroom window; or
- the daytime sound level is greater than 55 dBA and less than or equal to 65 dBA on the outside face of a living/dining room window.

This provision involves a ducted heating system sized to accommodate the addition of central air conditioning by the occupant.

The required limits as per NPC-300 are summarized in Table 1.

Table 1: Noise Limits Due to Road Traffic

Type of Space	Time Period	Minimum $L_{eq}$ (dBA) Road Traffic
Living/dining, den areas of residences, hospitals, nursing homes, schools, day-care centres (Indoor)	07:00 – 23:00	45 dBA
Living/dining, den areas of residences, hospitals, nursing homes (Indoor)	23:00 – 07:00	45 dBA
Sleeping quarters (Indoor)	07:00 – 23:00	45 dBA
	23:00 – 07:00	40 dBA
Outdoor Living Areas (OLA)	07:00 – 23:00	55 dBA

### 3 Noise Level Predictions

#### 3.1 Road Traffic Noise Calculations Procedure

The dominant road traffic noise sources in the subject study area include Hurontario Street and Charleston Sideroad.

Charleston Sideroad to the north of the site was considered acoustically insignificant due to the separation distance of approximately 260m and the absorptive nature of the lands located between the proposed development and Charleston.

Noise level calculations were performed in accordance with the MECP Guidelines and by the Guidelines of the Ontario Road Noise Analysis Method for Environment and Transportation (ORNAMENT). Sample copies of the traffic noise predictions from MECP's Road and Rail Traffic Noise Prediction Model STAMSON (Version 5.04) are included in Appendix A.

The equivalent sound levels (Leq's) due to rail traffic on Hurontario Street were calculated at receptors A through G as shown in Figure 2 of this report. The calculations were performed for both daytime and nighttime conditions at receiver heights representing ground floor level as well as the 2<sup>nd</sup> floor windows. Noise levels were also predicted at the critical outdoor living areas throughout the development.

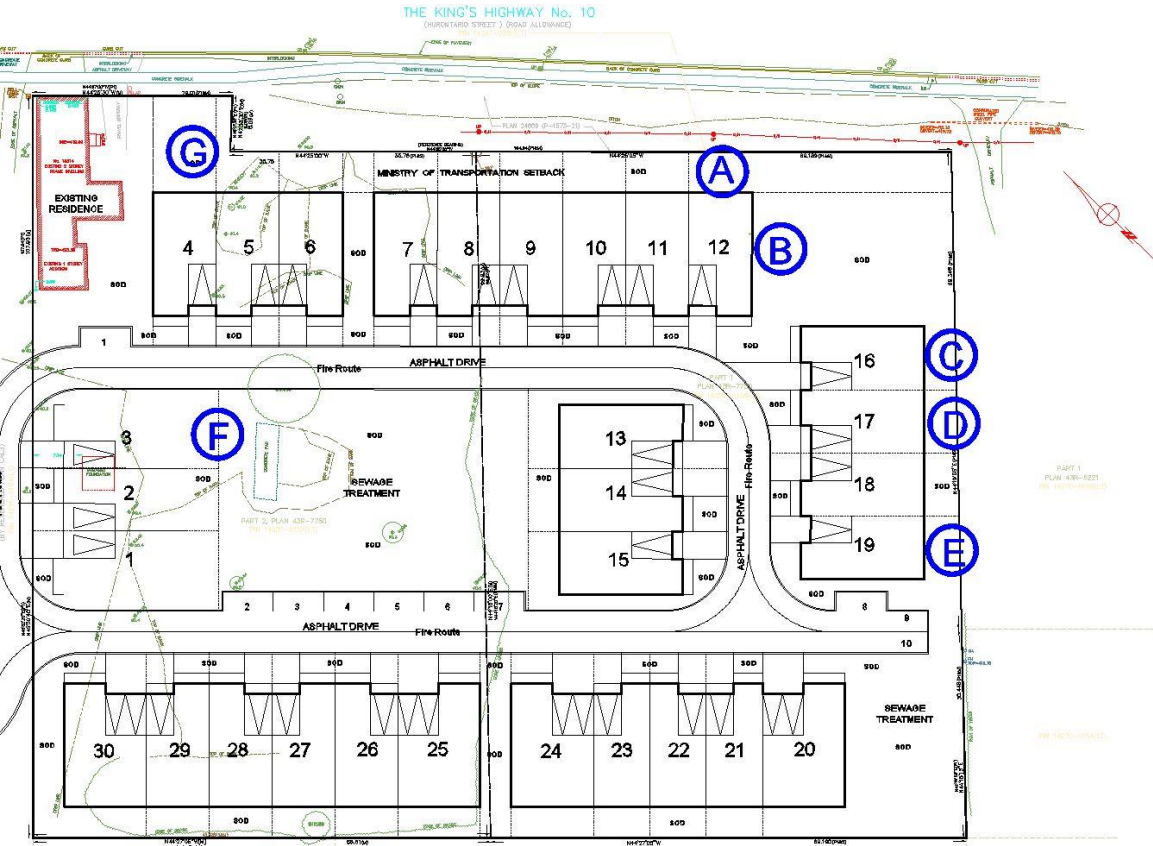


Figure 2: Noise calculation locations



### 3.2 Road Traffic Data

Road traffic noise predictions were based on the road traffic data outlined in Table 2. The road traffic volume-counts and truck percentages were obtained from Region of Peel and Ministry of Transportation. Copies of the correspondence and received data are included in Appendix A.

Table 2: Road Traffic Volumes

	Highway 10	Charleston Sideroad(*)
24-hour Volumes (AADT)	22 200 (yr 2016)	16 200 (ultimate)
No. of Lanes	4	2
Day/Night Split (%)	80/20	88/12
Percentage of Trucks (%)	9	11.41 Day 14.83 Night
Medium/Heavy Split (%)	4.5/4.5	3.97/7.44 Day 3.23/11.60 Night
Grade (%)	Up to 2 %	Up to 2 %
Posted Speed (km/hr)	50(**)	50(**)

(\*) Due to the separation distance, Charleston Sideroad does not have a significant impact on the overall noise levels at the subject site

(\*\*) As per Town of Caledon Guidelines, 10kph over the posted speed will be used in the noise level predictions

## 4 Transportation Noise Predictions

Table 3 lists the daytime and nighttime  $L_{eq}$ s due to road traffic as predicted at noise sensitive locations within the development as shown in Figure 2. The potential outdoor amenity area (OLA) locations are also shown in Figure 2. Sample calculations are provided in Appendix A.

Table 3: Calculated Noise Levels Due to Road Traffic

Calculation Location (Figure 2)	Description	Unmitigated $L_{eq}$ (dBA)		OLA with Acoustic Barrier in Place $L_{eq}$ (dBA)
		Day	Night	
A	NE Façade and OLA	68	65	<60 with 2.8m barrier <55 with 4.5m barrier
B	SE Façade/side of bldg	64	61	n/a
C	SE Façade and OLA	62	60	<55 with 2.6m barrier
D	SE Façade and OLA	60	58	<55 with 2.1m barrier
E	SE Façade and OLA	57	55	<55 with 1.8m barrier



Calculation Location (Figure 2)	Description	Unmitigated Leq (dBA)		OLA with Acoustic Barrier in Place Leq (dBA)
		Day	Night	
F	OLA/Common OLA	52	52	n/a
G	NE Façade and OLA	67	64	<60 with 2.8m barrier <55 with 4.85m barrier

OLA – indicates Outdoor Living Area(s), the rear yards of the dwellings and the common space located between the townhouse blocks (location F) in this case.

The noise levels listed in the table above were used to determine the window/door glazing as well as exterior wall requirements for each designated point of reception. The requirements were based on an assumed 30% ratio window to wall surface area this needs to be confirmed once the final architectural design of the development becomes available.

## 5 Noise Control Recommendations

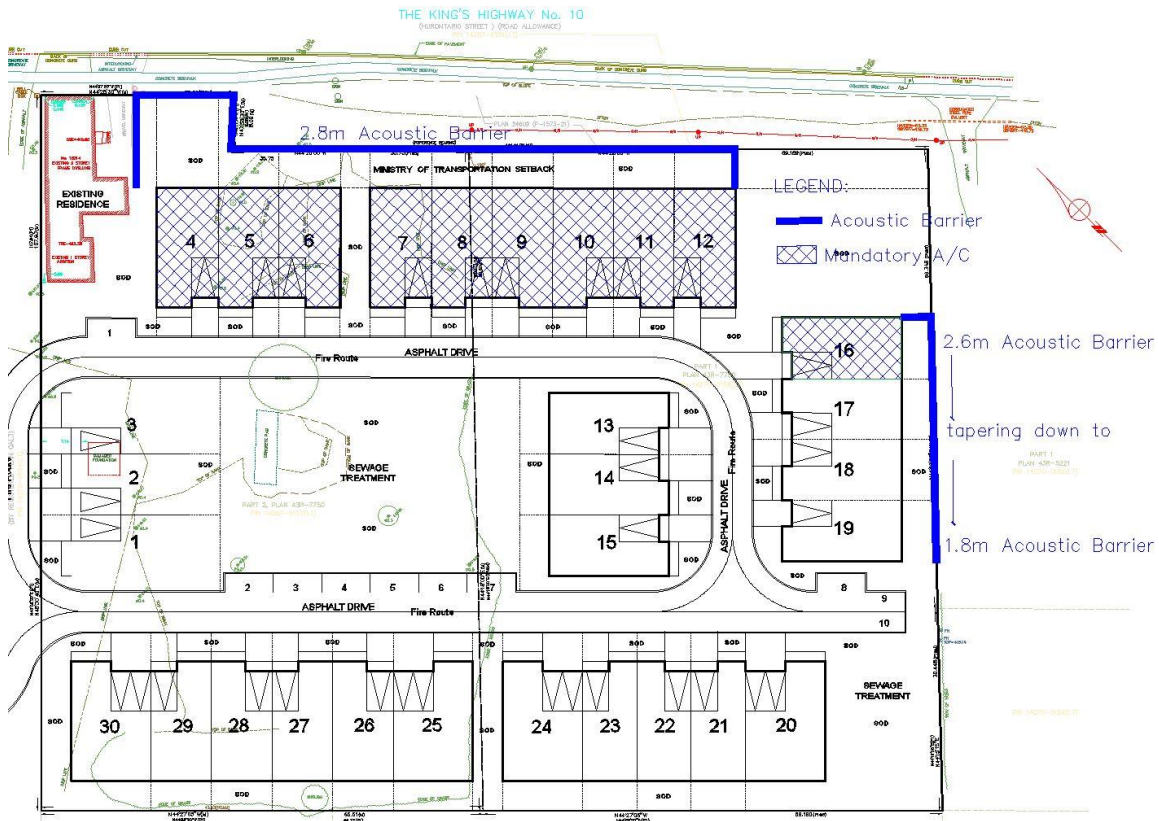
### 5.1 Transportation Noise – Outdoor Living Areas

The road noise level predictions, as listed in Table 3 indicate that the future noise levels at the outdoor point of reception that are directly or partially exposed to road traffic exceed the applicable limits. These outdoor living areas (OLAs) will require acoustic barriers to attenuate noise from Highway 10.

Namely, a 2.8m acoustic barrier as shown in Figure 3 will be required for Units 4 through 12. The road noise will be attenuated to below 60dBA at these locations. To achieve levels below 55dBA, this barrier would have to be 4.5m to 4.85m tall which due to space restrictions, may not be feasible.

Units 16 to 19 will also require an acoustic barrier as shown in Figure 3. The acoustic barrier at Unit 16 should be 2.6m tall and can taper down to 1.8m at Unit 19. This barrier will mitigate road traffic noise at Units 16 to 19 OLAs to below 55dBA. The future occupants of the units that require acoustic barriers for noise control reasons should be made aware of the potential noise problem through appropriate warning clauses. Sample wording of Warning Clauses is provided in Section 7 of this document.

The common use outdoor living area located between the townhouse blocks and shielded with Units 4-16 from Highway 10 does not require any additional noise control measures as the unmitigated road traffic noise has been calculated to be 52dBA.



**Figure 3: Noise Control Measures**

It is our understanding that there will not be any terraces with a depth greater than 4 m associated with the proposed dwellings.

It should be noted that this report is based on a concept site plan, and the above recommendations will have to be verified when the grading plan becomes available. Cross sections showing the topography/configuration of the acoustic barriers will also be prepared at a later date.

## 5.2 Transportation Noise – Indoor Living Spaces

Indoor sound levels were examined with respect to MECP Guidelines as summarized in Section 2 of this report. It should be noted that the design of the dwellings has not been developed yet, and the recommendations of this report should be verified when the final design becomes available. Table 4 below provides the recommended STC ratings for window glazing, central air conditioning requirements as well as acoustic barriers discussed in Section 5.1 of this document.

Table 4: Summary of Noise Control Recommendations

Location	Façade	Window STC	Exterior Wall STC	Warning Clauses	A/C	Acoustic Barrier Height
Units 4 to 12	All	OBC*	OBC*	1, 3, 4	Mandatory	2.8m Acoustic Barrier**
Unit 16	All	OBC*	OBC*	1, 3, 4	Mandatory	2.6m Acoustic Barrier
Units 17 to 19	All	OBC*	OBC*	1, 2, 4,	Provisions	2.1m at Lot 17 tapering down to 1.8m at Lot 19
Units 1-3, 13-15, 20-30	All	OBC*	OBC*	2, 4	Provisions	Barrier not required

\*Exterior wall components meeting the minimum requirements of the Ontario Building Code (OBC) will provide adequate acoustical protection for the future indoor daytime living spaces

\*\* 2.8m acoustic barrier will mitigate noise levels to below 60dBA

The above listed Sound Transmission Class (STC) rating should be reviewed and confirmed once the final layouts and architectural drawings are available.

The worst-case impact of the daytime and nighttime road traffic is predicted to be 68 dBA and 65dBA respectively at the north-east façade of Units 4-12. At this noise level, window construction meeting the Ontario Building Code (OBC) will be sufficient. Similarly, walls meeting OBC requirements will also suffice for noise control purposes.

Based on the sound level predictions, central air conditioning is mandatory for Units 4 through 16. Warning Clause 3 as found in Section 7 is required for these particular units. Remaining units will require Warning Clause 2 and provisions for future installation of central air conditioning systems.

## 6 Conclusions

The results of this study indicate that standard window and wall construction meeting the requirements of the Ontario Building Code (OBC) will suffice for this project. However, some of the dwelling units, as discussed in Section 5.2, will require central air conditioning in order to comply with the applicable noise control guidelines.

Also, as discussed in Section 5.1, noise barriers are required for some of the outdoor amenities.

With the incorporation of the noise controls discussed in this report, the sound levels at the sensitive receptors of the proposed residential development will comply with the noise guidelines of the MECP. As indicated in MECP implementation guidelines, where

mitigation is required or where noise may be a concern, future occupants will be advised through warning clauses. Sample wording for the warning clauses is provided in Section 7 of this report.

Further analysis should be conducted to confirm the noise controls recommended in this report when the final grading and architectural design of the dwellings becomes available.

## 7 Warning Clauses

Purchase, rental and lease agreements for all units in the proposed residential buildings are recommended to include the following warning clauses:

### **Clause 1:**

*"Purchasers are advised that despite of 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 of activities of the dwelling occupants as the sound levels exceed the sound level limits of the Municipality and the Ministry of the Environment."*

### **Clause 2:**

*"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."*

### **Clause 3:**

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

### **Clause 4:**

*"Purchasers/tenants are advised that due to the proximity of Caledon Fairgrounds, noise from this facility may at times be audible."*

## 8 References

1. ORNAMENT – “Ontario Road Noise Analysis Method for Environmental and Transportation”, Ontario Ministry of the Environment, October 1989.
2. “Environmental Noise Guideline, Stationery and Transportation Sources – Approval and Planning”, Ontario Ministry of the Environment and Climate Change, Publication NPC-300, August 2013 (updated final version #22).
3. “Policies & Guidelines, Town of Caledon, Prepared by the Town of Caledon, Public Works & Engineering Department, Version 4” dated January 2009
4. “General Guidelines for the Preparation of Acoustical Reports in the Region of Peel” dated November 2012

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## **Appendix A**

### Road Traffic Data & Sample Calculations

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RE: Ultimate Traffic for Highway 10 in Caledon



Tuen, Matthew (MTO) <Matthew.Tuen@ontario.ca>  
To: Iwona Stasiewicz  
Cc: Zivkovic, Branko (MTO); Lau, Wes (MTO)  
You replied to this message on 11/19/2019 10:22 AM.

Hi Iwona

I have attached in the email, our latest AADT and truck percentage which we have available at the location which you requested.

LHRS	Year	Hwy#	Location Description	AADT	% Trucks
16470	2016	10	S JCT HWY 24-MAIN ST	22200	9.0

Thanks

**Matthew Tuen**  
Traffic Analyst  
Ministry of Transportation | Central Region Traffic Office  
Area 2 | Peel & Halton  
159 Sir William Hearst Avenue, 6<sup>th</sup> Floor | Toronto, ON | M3M 0B7  
Tel: (416) 235-4762 | Fax: (416) 235-4097



STAMSON 5.0      NORMAL REPORT      Date: 08-12-2020 14:04:37

MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 19307a-unmitigated.te      Time Period: Day/Night 16/8 hours

Description: Front/OLA unmitigated

Road data, segment # 1: Hwy 10at 25m (day/night)

-----

Car traffic volume : 25995/6499 veh/TimePeriod \*

Medium truck volume : 1285/321 veh/TimePeriod \*

Heavy truck volume : 1285/321 veh/TimePeriod \*

Posted speed limit : 60 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): 22200

Percentage of Annual Growth : 2.00

Number of Years of Growth : 24.00

Medium Truck % of Total Volume : 4.50

Heavy Truck % of Total Volume : 4.50

Day (16 hrs) % of Total Volume : 80.00

Data for Segment # 1: Hwy 10at 25m (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 : 25.00 / 25.00 m

Receiver height : 1.50 / 4.50 m  
 Topography : 4 (Elevated; with barrier)  
 Barrier angle1 : -90.00 deg Angle2 : 90.00 deg  
 Barrier height : 0.00 m  
 Elevation : 2.70 m  
 Barrier receiver distance : 3.00 / 3.00 m  
 Source elevation : 418.00 m  
 Receiver elevation : 415.30 m  
 Barrier elevation : 415.30 m  
 Reference angle : 0.00

Results segment # 1: Hwy 10at 25m (day)

Source height = 1.46 m

Barrier height for grazing incidence

-----  
 Source ! Receiver ! Barrier ! Elevation of  
 Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)  
 -----+-----+-----+-----  
 1.46 ! 1.50 ! 1.82 ! 417.12

ROAD (0.00 + 67.73 + 0.00) = 67.73 dBA

Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-----  
 -90 90 0.58 72.55 0.00 -3.51 -1.32 0.00 0.00 -0.14 67.59\*  
 -90 90 0.58 72.55 0.00 -3.51 -1.32 0.00 0.00 0.00 67.73

\* Bright Zone !

Segment Leq : 67.73 dBA

Total Leq All Segments: 67.73 dBA

Results segment # 1: Hwy 10at 25m (night)

Source height = 1.46 m

Barrier height for grazing incidence

-----											
Source	! Receiver	! Barrier	! Elevation of								
Height (m)	! Height (m)	! Height (m)	! Barrier Top (m)								
-----+-----+-----+-----											
1.46 !	4.50 !	4.46 !	419.76								
ROAD (0.00 + 65.08 + 0.00) = 65.08 dBA											
Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq	
-----											
-90	90	0.49	69.54	0.00	-3.31	-1.16	0.00	0.00	-0.03	65.05*	
-90	90	0.49	69.54	0.00	-3.31	-1.16	0.00	0.00	0.00	65.08	

\* Bright Zone !

Segment Leq : 65.08 dBA

Total Leq All Segments: 65.08 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 67.73

(NIGHT): 65.08

STAMSON 5.0      NORMAL REPORT      Date: 08-12-2020 14:03:50

MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 19307a\_fence.te      Time Period: Day/Night 16/8 hours

Description: OLA with 2.8m fence

Road data, segment # 1: Hwy 10at 25m (day/night)

-----  
Car traffic volume : 25995/6499 veh/TimePeriod \*

Medium truck volume : 1285/321 veh/TimePeriod \*

Heavy truck volume : 1285/321 veh/TimePeriod \*

Posted speed limit : 60 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): 22200

Percentage of Annual Growth : 2.00

Number of Years of Growth : 24.00

Medium Truck % of Total Volume : 4.50

Heavy Truck % of Total Volume : 4.50

Day (16 hrs) % of Total Volume : 80.00

Data for Segment # 1: Hwy 10at 25m (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 : 25.00 / 25.00 m

Receiver height : 1.50 / 4.50 m

Topography : 4 (Elevated; with barrier)

Barrier angle1 : -90.00 deg Angle2 : 90.00 deg

Barrier height : 2.80 m

Elevation : 2.70 m

Barrier receiver distance : 3.00 / 3.00 m

Source elevation : 418.00 m

Receiver elevation : 415.30 m

Barrier elevation : 415.30 m

Reference angle : 0.00

Results segment # 1: Hwy 10at 25m (day)

Source height = 1.46 m

Barrier height for grazing incidence

-----

Source ! Receiver ! Barrier ! Elevation of  
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)

-----+-----+-----+-----

1.46 ! 1.50 ! 1.82 ! 417.12

ROAD (0.00 + 59.90 + 0.00) = 59.90 dBA

Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-----

-90 90 0.41 72.55 0.00 -3.13 -1.01 0.00 0.00 -8.51 59.90

Segment Leq : 59.90 dBA

Total Leq All Segments: 59.90 dBA

Results segment # 1: Hwy 10at 25m (night)

Source height = 1.46 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of

Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)

-----+-----+-----+-----

1.46 !    4.50 !    4.46 !    419.76

ROAD (0.00 + 65.08 + 0.00) = 65.08 dBA

Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-----

-90    90    0.32    69.54    0.00    -2.93    -0.82    0.00    0.00    -0.17    65.62\*

-90    90    0.49    69.54    0.00    -3.31    -1.16    0.00    0.00    0.00    65.08

\* Bright Zone !

Segment Leq : 65.08 dBA

Total Leq All Segments: 65.08 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 59.90

(NIGHT): 65.08

STAMSON 5.0      NORMAL REPORT      Date: 08-12-2020 14:05:55

MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 19307b-side.te      Time Period: Day/Night 16/8 hours

Description: side/flanking

Road data, segment # 1: house at 30m (day/night)

-----

Car traffic volume : 25995/6499 veh/TimePeriod \*

Medium truck volume : 1285/321 veh/TimePeriod \*

Heavy truck volume : 1285/321 veh/TimePeriod \*

Posted speed limit : 60 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): 22200

Percentage of Annual Growth : 2.00

Number of Years of Growth : 24.00

Medium Truck % of Total Volume : 4.50

Heavy Truck % of Total Volume : 4.50

Day (16 hrs) % of Total Volume : 80.00

Data for Segment # 1: house at 30m (day/night)

-----

Angle1 Angle2 : -90.00 deg 0.00 deg

Wood depth : 0 (No woods.)

No of house rows : 0 / 0

Surface : 1 (Absorptive ground surface)

Receiver source distance : 30.00 / 30.00 m

Receiver height : 1.50 / 4.50 m



Topography : 4 (Elevated; with barrier)

Barrier angle1 : -90.00 deg Angle2 : 0.00 deg

Barrier height : 7.50 m

Elevation : 2.70 m

Barrier receiver distance : 0.50 / 0.50 m

Source elevation : 418.00 m

Receiver elevation : 415.30 m

Barrier elevation : 415.30 m

Reference angle : 0.00

Road data, segment # 2: open at 30m (day/night)

Car traffic volume : 25995/6499 veh/TimePeriod \*

Medium truck volume : 1285/321 veh/TimePeriod \*

Heavy truck volume : 1285/321 veh/TimePeriod \*

Posted speed limit : 60 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): 22200

Percentage of Annual Growth : 2.00

Number of Years of Growth : 24.00

Medium Truck % of Total Volume : 4.50

Heavy Truck % of Total Volume : 4.50

Day (16 hrs) % of Total Volume : 80.00

Data for Segment # 2: open at 30m (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 : 30.00 / 30.00 m

Receiver height : 1.50 / 4.50 m

Topography : 3 (Elevated; no barrier)

Elevation : 2.70 m

Reference angle : 0.00

Results segment # 1: house at 30m (day)

Source height = 1.46 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of

Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)

-----+-----+-----+-----

1.46 ! 1.50 ! 1.54 ! 416.84

ROAD (0.00 + 47.72 + 0.00) = 47.72 dBA

Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-----

-90 0 0.13 72.55 0.00 -3.40 -3.37 0.00 0.00 -18.05 47.72

Segment Leq : 47.72 dBA

Results segment # 2: open at 30m (day)

Source height = 1.46 m

ROAD (0.00 + 63.46 + 0.00) = 63.46 dBA

Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-----

0 90 0.58 72.55 0.00 -4.76 -4.33 0.00 0.00 0.00 63.46

Total Leq All Segments: 63.57 dBA

Results segment # 1: house at 30m (night)

Source height = 1.46 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of

Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)

-----+-----+-----+-----

1.46 ! 4.50 ! 4.49 ! 419.79

ROAD (0.00 + 46.64 + 0.00) = 46.64 dBA

Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-----

-90 0 0.04 69.54 0.00 -3.13 -3.13 0.00 0.00 -16.64 46.64

Segment Leq : 46.64 dBA

Results segment # 2: open at 30m (night)

Source height = 1.46 m

ROAD (0.00 + 60.88 + 0.00) = 60.88 dBA

Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-----

0 90 0.49 69.54 0.00 -4.49 -4.17 0.00 0.00 0.00 60.88

Segment Leq : 60.88 dBA

Total Leq All Segments: 61.04 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 63.57

(NIGHT): 61.04

STAMSON 5.0      NORMAL REPORT      Date: 08-12-2020 14:07:25

MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 19307c-unmitigated.te      Time Period: Day/Night 16/8 hours

Description: Side/OLA

Road data, segment # 1: house at 50m (day/night)

Car traffic volume : 25995/6499 veh/TimePeriod \*

Medium truck volume : 1285/321 veh/TimePeriod \*

Heavy truck volume : 1285/321 veh/TimePeriod \*

Posted speed limit : 60 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): 22200

Percentage of Annual Growth : 2.00

Number of Years of Growth : 24.00

Medium Truck % of Total Volume : 4.50

Heavy Truck % of Total Volume : 4.50

Day (16 hrs) % of Total Volume : 80.00

Data for Segment # 1: house at 50m (day/night)

-----  
Angle1 Angle2 : -90.00 deg -45.00 deg

Wood depth : 0 (No woods.)

No of house rows : 0 / 0

Surface : 1 (Absorptive ground surface)

Receiver source distance : 50.00 / 50.00 m

Receiver height : 1.50 / 4.50 m

Topography : 4 (Elevated; with barrier)

Barrier angle1 : -90.00 deg Angle2 : -45.00 deg

Barrier height : 7.50 m

Elevation : 2.50 m

Barrier receiver distance : 3.00 / 3.00 m

Source elevation : 418.00 m

Receiver elevation : 415.50 m

Barrier elevation : 415.50 m

Reference angle : 0.00

Road data, segment # 2: open at 50m (day/night)

-----

Car traffic volume : 25995/6499 veh/TimePeriod \*

Medium truck volume : 1285/321 veh/TimePeriod \*

Heavy truck volume : 1285/321 veh/TimePeriod \*

Posted speed limit : 60 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): 22200

Percentage of Annual Growth : 2.00

Number of Years of Growth : 24.00

Medium Truck % of Total Volume : 4.50

Heavy Truck % of Total Volume : 4.50

Day (16 hrs) % of Total Volume : 80.00

Data for Segment # 2: open at 50m (day/night)

-----

Angle1 Angle2 : -45.00 deg 90.00 deg

Wood depth : 0 (No woods.)

No of house rows : 0 / 0

Surface : 1 (Absorptive ground surface)

Receiver source distance : 50.00 / 50.00 m

Receiver height : 1.50 / 4.50 m  
 Topography : 4 (Elevated; with barrier)  
 Barrier angle1 : -45.00 deg Angle2 : 90.00 deg  
 Barrier height : 0.00 m  
 Elevation : 2.50 m  
 Barrier receiver distance : 3.00 / 3.00 m  
 Source elevation : 418.00 m  
 Receiver elevation : 415.50 m  
 Barrier elevation : 415.50 m  
 Reference angle : 0.00

Results segment # 1: house at 50m (day)

Source height = 1.46 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of  
 Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)

-----+-----+-----+-----  
 1.46 ! 1.50 ! 1.65 ! 417.15

ROAD (0.00 + 44.15 + 0.00) = 44.15 dBA

Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-----  
 -90 -45 0.14 72.55 0.00 -5.94 -6.74 0.00 0.00 -15.72 44.15

Segment Leq : 44.15 dBA

Results segment # 2: open at 50m (day)

Source height = 1.46 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of  
 Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)

-----+-----+-----+-----  
 1.46 ! 1.50 ! 1.65 ! 417.15

ROAD (0.00 + 62.06 + 0.00) = 62.06 dBA

Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-----

-45 90 0.59 72.55 0.00 -8.29 -2.20 0.00 0.00 -0.12 61.94\*

-45 90 0.59 72.55 0.00 -8.29 -2.20 0.00 0.00 0.00 62.06

\* Bright Zone !

Segment Leq : 62.06 dBA

Total Leq All Segments: 62.13 dBA

Results segment # 1: house at 50m (night)

Source height = 1.46 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of

Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)

-----+-----+-----+-----

1.46 ! 4.50 ! 4.47 ! 419.97

ROAD (0.00 + 45.22 + 0.00) = 45.22 dBA

Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-----

-90 -45 0.05 69.54 0.00 -5.47 -6.27 0.00 0.00 -12.57 45.22

Segment Leq : 45.22 dBA

Results segment # 2: open at50m (night)

Source height = 1.46 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of

Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)

-----+-----+-----+-----

1.46 ! 4.50 ! 4.47 ! 419.97

ROAD (0.00 + 59.63 + 0.00) = 59.63 dBA



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

-----

-45	90	0.50	69.54	0.00	-7.82	-2.08	0.00	0.00	-0.02	59.61*
-----	----	------	-------	------	-------	-------	------	------	-------	--------

-45	90	0.50	69.54	0.00	-7.82	-2.08	0.00	0.00	0.00	59.63
-----	----	------	-------	------	-------	-------	------	------	------	-------

\* Bright Zone !

Segment Leq : 59.63 dBA

Total Leq All Segments: 59.78 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 62.13

(NIGHT): 59.78

STAMSON 5.0      NORMAL REPORT      Date: 08-12-2020 14:08:06

MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 19307c-fence.te      Time Period: Day/Night 16/8 hours

Description:    OLA with 2.6m fence

Road data, segment # 1: house at 50m (day/night)

-----

Car traffic volume : 25995/6499 veh/TimePeriod \*

Medium truck volume : 1285/321 veh/TimePeriod \*

Heavy truck volume : 1285/321 veh/TimePeriod \*

Posted speed limit : 60 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): 22200

Percentage of Annual Growth : 2.00

Number of Years of Growth : 24.00

Medium Truck % of Total Volume : 4.50

Heavy Truck % of Total Volume : 4.50

Day (16 hrs) % of Total Volume : 80.00

Data for Segment # 1: house at 50m (day/night)

-----

Angle1 Angle2 : -90.00 deg -45.00 deg

Wood depth : 0 (No woods.)

No of house rows : 0 / 0

Surface : 1 (Absorptive ground surface)

Receiver source distance : 50.00 / 50.00 m

Receiver height : 1.50 / 4.50 m

Topography : 4 (Elevated; with barrier)

Barrier angle1 : -90.00 deg Angle2 : -45.00 deg

Barrier height : 7.50 m

Elevation : 2.50 m

Barrier receiver distance : 3.00 / 3.00 m

Source elevation : 418.00 m

Receiver elevation : 415.50 m

Barrier elevation : 415.50 m

Reference angle : 0.00

Road data, segment # 2: open at50m (day/night)

Car traffic volume : 25995/6499 veh/TimePeriod \*

Medium truck volume : 1285/321 veh/TimePeriod \*

Heavy truck volume : 1285/321 veh/TimePeriod \*

Posted speed limit : 60 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): 22200

Percentage of Annual Growth : 2.00

Number of Years of Growth : 24.00

Medium Truck % of Total Volume : 4.50

Heavy Truck % of Total Volume : 4.50

Day (16 hrs) % of Total Volume : 80.00

Data for Segment # 2: open at50m (day/night)

Angle1 Angle2 : -45.00 deg 90.00 deg

Wood depth : 0 (No woods.)

No of house rows : 0 / 0

Surface : 1 (Absorptive ground surface)

Receiver source distance : 50.00 / 50.00 m

Receiver height : 1.50 / 4.50 m

Topography : 4 (Elevated; with barrier)

Barrier angle1 : -45.00 deg Angle2 : 90.00 deg

Barrier height : 2.60 m

Elevation : 2.50 m

Barrier receiver distance : 3.00 / 3.00 m

Source elevation : 418.00 m

Receiver elevation : 415.50 m

Barrier elevation : 415.50 m

Reference angle : 0.00

Results segment # 1: house at 50m (day)

Source height = 1.46 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of

Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)

-----+-----+-----+-----

1.46 ! 1.50 ! 1.65 ! 417.15

ROAD (0.00 + 44.15 + 0.00) = 44.15 dBA

Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-----

-90 -45 0.14 72.55 0.00 -5.94 -6.74 0.00 0.00 -15.72 44.15

Segment Leq : 44.15 dBA

Results segment # 2: open at50m (day)

Source height = 1.46 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of

Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)

-----+-----+-----+-----

1.46 ! 1.50 ! 1.65 ! 417.15

ROAD (0.00 + 54.35 + 0.00) = 54.35 dBA

Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-----

-45 90 0.43 72.55 0.00 -7.48 -1.99 0.00 0.00 -8.73 54.35

Segment Leq : 54.35 dBA

Total Leq All Segments: 54.75 dBA

Results segment # 1: house at 50m (night)

Source height = 1.46 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of

Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)

-----+-----+-----+-----

1.46 ! 4.50 ! 4.47 ! 419.97

ROAD (0.00 + 45.22 + 0.00) = 45.22 dBA

Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 -45 0.05 69.54 0.00 -5.47 -6.27 0.00 0.00 -12.57 45.22

Segment Leq : 45.22 dBA

Results segment # 2: open at50m (night)

Source height = 1.46 m

Barrier height for grazing incidence

source ! Receiver ! Barrier ! Elevation of

Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)

-----+-----+-----+-----

1.46 ! 4.50 ! 4.47 ! 419.97

ROAD (0.00 + 59.63 + 0.00) = 59.63 dBA

Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-45 90 0.34 69.54 0.00 -7.01 -1.86 0.00 0.00 -0.10 60.57\*

-45 90 0.50 69.54 0.00 -7.82 -2.08 0.00 0.00 0.00 59.63

-----

\* Bright Zone !

Segment Leq : 59.63 dBA

Total Leq All Segments: 59.78 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 54.75

(NIGHT): 59.78

STAMSON 5.0      NORMAL REPORT      Date: 08-12-2020 14:09:21

MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 19307f-unmitigated.te      Time Period: Day/Night 16/8 hours

Description: OLA, no mitigation required

Road data, segment # 1: house at 65m (day/night)

-----

Car traffic volume : 25995/6499 veh/TimePeriod \*

Medium truck volume : 1285/321 veh/TimePeriod \*

Heavy truck volume : 1285/321 veh/TimePeriod \*

Posted speed limit : 60 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): 22200

Percentage of Annual Growth : 2.00

Number of Years of Growth : 24.00

Medium Truck % of Total Volume : 4.50

Heavy Truck % of Total Volume : 4.50

Day (16 hrs) % of Total Volume : 80.00

Data for Segment # 1: house at 65m (day/night)

-----

Angle1 Angle2 : -90.00 deg -35.00 deg

Wood depth : 0 (No woods.)

No of house rows : 0 / 0

Surface : 1 (Absorptive ground surface)

Receiver source distance : 65.00 / 65.00 m

Receiver height : 1.50 / 4.50 m

Topography : 4 (Elevated; with barrier)



Barrier angle1 : -90.00 deg Angle2 : -35.00 deg

Barrier height : 7.50 m

Elevation : 2.00 m

Barrier receiver distance : 3.00 / 3.00 m

Source elevation : 419.00 m

Receiver elevation : 417.00 m

Barrier elevation : 417.00 m

Reference angle : 0.00

Road data, segment # 2: open at 65m (day/night)

Car traffic volume : 25995/6499 veh/TimePeriod \*

Medium truck volume : 1285/321 veh/TimePeriod \*

Heavy truck volume : 1285/321 veh/TimePeriod \*

Posted speed limit : 60 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): 22200

Percentage of Annual Growth : 2.00

Number of Years of Growth : 24.00

Medium Truck % of Total Volume : 4.50

Heavy Truck % of Total Volume : 4.50

Day (16 hrs) % of Total Volume : 80.00

Data for Segment # 2: open at 65m (day/night)

Angle1 Angle2 : -35.00 deg -25.00 deg

Wood depth : 0 (No woods.)

No of house rows : 0 / 0

Surface : 1 (Absorptive ground surface)

Receiver source distance : 65.00 / 65.00 m

Receiver height : 1.50 / 4.50 m

Topography : 3 (Elevated; no barrier)

Elevation : 2.00 m

Reference angle : 0.00

Road data, segment # 3: house at 65m (day/night)

Car traffic volume : 25995/6499 veh/TimePeriod \*

Medium truck volume : 1285/321 veh/TimePeriod \*

Heavy truck volume : 1285/321 veh/TimePeriod \*

Posted speed limit : 60 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): 22200

Percentage of Annual Growth : 2.00

Number of Years of Growth : 24.00

Medium Truck % of Total Volume : 4.50

Heavy Truck % of Total Volume : 4.50

Day (16 hrs) % of Total Volume : 80.00

Data for Segment # 3: house at 65m (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 : 65.00 / 65.00 m

Receiver height : 1.50 / 4.50 m

Topography : 4 (Elevated; with barrier)

Barrier angle1 : -25.00 deg Angle2 : 90.00 deg

Barrier height : 7.50 m

Elevation : 2.00 m

Barrier receiver distance : 17.00 / 17.00 m

Source elevation : 419.00 m

Receiver elevation : 417.00 m

Barrier elevation : 417.00 m

Reference angle : 0.00

Results segment # 1: house at 65m (day)

Source height = 1.46 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of

Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)

-----+-----+-----+-----

1.46 ! 1.50 ! 1.59 ! 418.59

ROAD (0.00 + 43.13 + 0.00) = 43.13 dBA

Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-----

-90 -35 0.15 72.55 0.00 -7.33 -5.82 0.00 0.00 -16.27 43.13

Segment Leq : 43.13 dBA

Results segment # 2: open at 65m (day)

Source height = 1.46 m

ROAD (0.00 + 49.42 + 0.00) = 49.42 dBA

Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-----

-35 -25 0.60 72.55 0.00 -10.20 -12.93 0.00 0.00 0.00 49.42

Segment Leq : 49.42 dBA

Results segment # 3: house at 65m (day)

Source height = 1.46 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of

Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)

-----+-----+-----+-----

1.46 ! 1.50 ! 2.01 ! 419.01

ROAD (0.00 + 48.25 + 0.00) = 48.25 dBA

Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-25 90 0.15 72.55 0.00 -7.33 -2.27 0.00 0.00 -14.69 48.25

Segment Leq : 48.25 dBA

Total Leq All Segments: 52.43 dBA

Results segment # 1: house at 65m (night)

Source height = 1.46 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of

Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)

-----+-----+-----+-----

1.46 ! 4.50 ! 4.45 ! 421.45

ROAD (0.00 + 44.20 + 0.00) = 44.20 dBA

Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-90 -35 0.06 69.54 0.00 -6.76 -5.43 0.00 0.00 -13.15 44.20

Segment Leq : 44.20 dBA

Results segment # 2: open at 65m (night)

Source height = 1.46 m

ROAD (0.00 + 47.04 + 0.00) = 47.04 dBA

Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-35 -25 0.51 69.54 0.00 -9.62 -12.88 0.00 0.00 0.00 47.04

Segment Leq : 47.04 dBA

Results segment # 3: house at 65m (night)

Source height = 1.46 m

Barrier height for grazing incidence

Source ! Receiver ! Barrier ! Elevation of

Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)

-----+-----+-----+-----

1.46 !    4.50 !    4.23 !    421.23

ROAD (0.00 + 49.31 + 0.00) = 49.31 dBA

Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq

-25    90    0.06    69.54    0.00    -6.76    -2.09    0.00    0.00    -11.39    49.31

Segment Leq : 49.31 dBA

Total Leq All Segments: 52.10 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 52.43

(NIGHT): 52.10

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**End of Report**

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