Noise Impact Study

609-615 Parkview Road, Ottawa, ON

(Revision 01)

Caruso Investment Inc.
Final report

June 27th, 2022
02201451.000-0101

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Distribution

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1 Introduction

Englobe Corp has prepared the following Noise Impact Study (NIS) associated with the proposed residential developments (the Project) to be located at 609-615 Parkview Road in Ottawa, Ontario. The Project consists of four independent, 3-storey buildings which each feature three residential units, for a total of twelve residential units. Existing buildings at 609-615 Parkview Road are to be demolished. The conclusions drawn in this NIS are applicable to all four buildings.

The main objective of the NIS is to assess the noise impact on the proposed residential development from nearby noise sources, and to provide recommendations for noise control to meet the requirements of the City of Ottawa's Environmental Noise Control Guidelines (ENCG).

1.1 Project Description

The Project is located south of the intersection of Parkview Road and Buell Street in Ottawa, Ontario. Immediately east of the project is Hampton Park, and approximately 150m south of the Project is the Hampton Park Plaza shopping mall. Existing residential developments, mainly single-family homes, make up the immediate surroundings north, south and west of the Project. An aerial view of the project site is provided in Figure 1, Appendix A. Furthermore, a zoning map of the surrounding area is provided in Figure 2, Appendix A.

A site visit was undertaken by Englobe staff on February 16th, 2022 in order to identify potentially significant stationary noise sources impacting the Project. No significant stationary noise sources were identified during the site visit. Transportation corridor noise impacts and stationary noise source impacts are addressed in Sections 2 and 3 of this NIS, respectively.

2 Transportation Corridor Noise Assessment

As per the City of Ottawa's ENCG, the following transportation corridor is assessed as part of this NIS due to its roadway classification and proximity to the Project:

— Highway 417

Of note, there are no rail corridors in proximity to the Project.

2.1 Noise Level Criteria - Roads

The ENCG provides guidelines for road traffic noise impacting residential developments, including noise level criteria.

2.1.1 Outdoor Noise Level Criterion

The ENCG noise level criterion for traffic noise impacting an Outdoor Living Area (OLA) is 55 dBA. As shown in Table 1, this criterion is applicable during daytime periods only.

Table 1: ENCG Outdoor Noise Level Limit

Time Period	Noise Level Limit [$L_{eq(16\text{-}hour)}$]
Daytime (07h00 to 23h00)	55 dBA

The ENCG also outlines that a tolerance of not more than 5 dBA above the outdoor noise level criterion shown in Table 1 can be allowed (at the City's discretion), if it is shown that there is no technically or economically feasible way to achieve the City's noise level criterion. If the 5 dBA tolerance is used, warning clauses for OLAs are required in the scenarios listed below, per guidelines from the Ministry of the Environment, Conservation and Parks (MECP) Environmental Noise Guideline – Stationary and Transportation Sources – Approval and Planning (NPC-300):

— Warning Clause Type A is required when the $L_{eq(16\text{-}hour)}$ is greater than 55 dBA and less than or equal to 60 dBA and no mitigation measures are provided.

— Warning Clause Type B is required when the $L_{eq(16\text{-}hour)}$ is greater than 60 dBA and mitigation measures are implemented, resulting in noise levels greater than 55 dBA and less than or equal to 60 dBA (triggering the 5 dBA tolerance outlined above).

2.1.2 Indoor Noise Level Criteria

The indoor noise level criteria adopted by the ENCG for road sources are given in Table 2, below.

Table 2: ENCG Indoor Noise Level Limit – Road Noise

Type of Space	Time Period	Noise Level Limit (L_{eq})
Living/dining area of residences	Daytime (07h00 to 23h00)	45 dBA
	Night-time (23h00 to 07h00)	45 dBA
Sleeping quarters	Daytime (07h00 to 23h00)	45 dBA
	Night-time (23h00 to 07h00)	40 dBA

In addition to the noise level criteria shown in Table 2, the ENCG indicates that noise control measures shall be developed according to NPC-300. The requirements pertaining to noise control measures given in NPC-300 vary depending on the plane-of-window (outdoor) noise level, as shown in Table 3 and Table 4.

Table 3: NPC-300 Minimum Ventilation and Warning Clause Requirements – Road Noise

Point of Assessment	Noise Level (L_{eq})	Ventilation Requirements	Warning Clause
Living room or bedroom plane-of-window Daytime (07h00 to 23h00)	55 dBA < L_{eq} ≤ 65 dBA	Forced-air heating with provision for central air conditioning	Type C
	65 dBA < L_{eq}	Central air conditioning	Type D
Living room or bedroom plane-of-window Night-time (23h00 to 07h00)	50 dBA < L_{eq} ≤ 60 dBA	Forced-air heating with provision for central air conditioning	Type C
	60 dBA < L_{eq}	Central air conditioning	Type D

Table 4: NPC-300 Minimum Building Component Requirements – Road Noise

Point of Assessment	Noise Level (L_{eq})	Building Façade Requirements
Living room or bedroom plane-of-window Daytime (07h00 to 23h00)	$L_{eq} \leq 65$ dBA	Building façade constructions compliant with the Ontario Building Code (OBC)
	65 dBA < L_{eq}	Building façade constructions shall be designed such that the indoor noise level criteria are achieved
Living room or bedroom plane-of-window Night-time (23h00 to 07h00)	$L_{eq} \leq 60$ dBA	Building façade constructions compliant with the Ontario Building Code (OBC)
	60 dBA < L_{eq}	Building façade constructions shall be designed such that the indoor noise level criteria are achieved

2.2 Critical Points of Reception

Critical Points of Reception (POR) are receptors, located either at the building's plane-of-window or at an OLA, which are most impacted by the transportation corridor noise sources identified in this NIS. For this Project, the critical PORs are those with maximum exposure to Highway 417, namely the southeast corner of the proposed building at 615 Parkview Road. The backyard is also considered an OLA. The POR locations are shown in Figures 3 and 4, Appendix A, and summarized in Table 5.

Table 5: Critical Points of Reception – Transportation Corridor Noise

Point of Reception	Location Description	POR Estimated Height Above Grade (m)
POR 1	Southeast corner of proposed building at 615 Parkview Rd. (Ground Floor)	1.5
POR 2	Southeast corner of proposed building at 615 Parkview Rd. (3rd Floor)	7.5
OLA 1	Middle of backyard at 615 Parkview Rd., east of proposed building.	1.5
OLA 2	Middle of backyard at 613 Parkview Rd., east of proposed building.	1.5
OLA 3	Middle of backyard at 611 Parkview Rd., east of proposed building.	1.5
OLA 4	Middle of backyard at 609 Parkview Rd., east of proposed building.	1.5

2.3 Noise Level Predictions

2.3.1 Road Traffic Parameters

Annual Average Daily Traffic (AADT) values for Highway 417 contained in the ENCG were used for this NIS, along with the corresponding day/night traffic split and medium/heavy truck percentages, as summarized in Table 6, below. Construction is currently underway on Highway 417 between Maitland Avenue and Island Park Drive in order to increase the total number of lanes from six to eight (four per direction) – as such, this NIS uses AADT values for an eight-lane highway. For our analysis, the roadway was split into two segments, eastbound and westbound, as recommended by the ENCG for improved calculation accuracy.

Table 6: Road Traffic Data Summary

Road Segment	AADT	Day/Night %	Medium Trucks	Heavy Trucks	Speed Limit	Road Gradient
Highway 417 (Eastbound)	73,332	92 % / 8 %	7 %	5 %	100 km/h	0 %
Highway 417 (Westbound)	73,332	92 % / 8 %	7 %	5 %	100 km/h	0 %

2.3.2 Noise Level Calculations

Noise level calculations were performed using STAMSON v5.04, the traffic noise prediction software package developed by the MECP. The intermediate terrain between the sources and receivers was modelled as absorptive. The effect of the existing noise barrier running along the north side of Highway 417, east of Island Park Drive, was included in the calculations as a 3-metre-tall barrier. The buildings making up the Hampton Park Plaza shopping mall were also included in the calculations for POR 2 as a 6-metre-tall barrier. Figures 5 to 10, Appendix A, shows the source-receiver distances and exposure angles for each POR/OLA. Calculation results are given in Table 7; of note, only daytime results are considered for outdoor living areas, since they are not considered to have night-time usage.

Table 7: Calculated Noise Levels Due to Transportation Corridor Noise Sources

Point of Reception	Calculated Sound Pressure Level (dBA) - Road Noise	
	Daytime (07h00 to 23h00)	Night-time (23h00 to 07h00)
POR 1	61	53
POR 2	65	58
OLA 1	61	N/A
OLA 2	61	N/A
OLA 3	61	N/A
OLA 4	60	N/A

2.4 Noise Control Recommendations – Transportation Corridors

Given the calculated noise levels in Table 7, noise control measures are recommended in order to comply with the noise level criteria given in Section 2.1. The noise control measures are discussed in the following section and summarized in Table 8.

Table 8: Summary of Recommended Noise Control Measures

Point of Reception	Noise Barrier?	Ventilation Requirements	Building Component Requirements	Warning Clause
POR 1	N/A	Forced-air heating w/ provision for central air conditioning	Compliant with OBC	Type C
POR 2	N/A	Forced-air heating w/ provision for central air conditioning	Compliant with OBC	Type C

Point of Reception	Noise Barrier?	Ventilation Requirements	Building Component Requirements	Warning Clause
OLA 1	Yes	N/A	N/A	None[1]
OLA 2	Yes	N/A	N/A	None[1]
OLA 3	Yes	N/A	N/A	Type B
OLA 4	Yes	N/A	N/A	Type B

[1] No warning clause is necessary if noise barrier height is equal to, or exceeds, the height specification outlined in Section 2.4.1.

2.4.1 Outdoor Living Area Noise Control Measures

Per Table 7, noise levels at OLAs 1 to 4 are expected to exceed 55 dBA. Therefore, as outlined in Section 2.1.1, noise mitigation measures are required in order to lower the calculated noise levels at outdoor living areas associated with the Project. It is recommended that a noise barrier with a minimum 2.4 metre height be erected along a portion of the southern and eastern backyard property lines associated with the Project, as shown in Figure 11, Appendix A. This noise barrier reduces the calculated noise levels at OLA 1 and OLA 2 to 55 dBA – thus, no warning clause is required for these OLAs. Of note, the City of Ottawa has requested that the noise barrier not extend to the backyards of 611 and 609 Parkview Road (represented by OLA 3 and OLA 4, respectively) in order to help preserve some existing trees. This report was prepared in light of the City's request regarding the barrier geometry; however, Englobe's preferred position remains that, if possible, the noise barrier extend to the northeast corner of 609 Parkview Road. While OLA 3 and OLA 4 do marginally benefit from the proposed noise barrier in the backyards of 615 and 613 Parkview Road, the calculated noise levels at OLA 3 and OLA 4 are 60 dBA for both reception points, which exceeds the 55 dBA noise criterion, but is within the tolerance outlined in Section 2.1.1. As such, a Type B warning clause is required for OLA 3 and OLA 4. Noise barriers must have a minimum surface density of 20 kg/m^2. Additionally, noise barriers must be structurally sound, appropriately designed to withstand wind and snow loads, and constructed without cracks or surface gaps. Any gaps under the barrier that are necessary for drainage purposes should be minimized and localized so that the acoustical performance of the barrier is maintained.

2.4.2 Ventilation Requirements

Per Table 7, noise levels at both PORs are expected to be between 55 dBA and 65 dBA during daytime hours, and between 50 dBA and 60 dBA during night-time hours. Therefore, as outlined in Table 3, Forced-air heating with provision for central air conditioning and a warning clause Type C are required for all residential units.

2.4.3 Building Component Requirements

Per Table 7, noise levels at both PORs are expected to be less than (or equal to) 65 dBA during daytime hours, and less than (or equal to) 60 dBA during night-time hours. Therefore, as outlined in Table 4, building façade constructions (including exterior walls and windows) compliant with the OBC are expected to achieve the indoor noise levels required for all residential units.

2.4.4 Warning Clause Requirements

Warning clauses are required to be incorporated into all development agreements, registrations on title and inclusion in Agreement of Purchase and Sale associated with this Project. The warning clauses shall be drafted by a legal expert based on Section C8 of NPC-300 and/or Part 4, Appendix A of the ENCG, with wording adapted as applicable to this Project.

3 Stationary Noise Source Assessment

3.1 Noise Level Criteria – Stationary Noise Sources

The ENCG provides noise level criteria for stationary noise sources consistent with Part C of NPC-300. The noise criteria are either the exclusionary limits given in Table 9, or the minimum hourly background noise level ($L_{eq(1\text{-hour})}$), whichever is higher. The Project is considered to be located in a Class 1 Area, which is characterized as having an acoustical environment typical of a major population centre.

Table 9: Exclusion Limit Values for Stationary Noise Sources

Time Period	One-Hour Equivalent Sound Level Limits ($L_{eq(1\text{-hour})}$) - Class 1 Area	
	Plane of Window of Noise Sensitive Spaces	Outdoor Points of Reception
Daytime (07h00 to 19h00)	50 dBA	50 dBA
Evening (19h00 to 23h00)	50 dBA	50 dBA
Night-time (23h00 to 07h00)	45 dBA	N/A

3.2 Existing Stationary Noise Sources

Based on a site visit performed on February 16th, 2022, no significant stationary noise sources were observed in the area surrounding the Project.

3.3 Future Stationary Noise Sources

At this stage of the Project, potential stationary noise sources associated with the Project are unknown. Any future stationary noise sources associated with the Project must be selected to ensure compliance with the ENCG noise level limits at nearby points of reception.

4 Concluding Comments

With the inclusion of the noise control measures presented in Section 2.4 of this report, the noise impact of the transportation noise sources on the proposed development are expected to meet the City of Ottawa's ENCG noise guideline limits. The proposed development should therefore be approved from a noise perspective.

We trust the foregoing will satisfy your present requirements. If you have any questions regarding this matter, please do not hesitate to contact us.

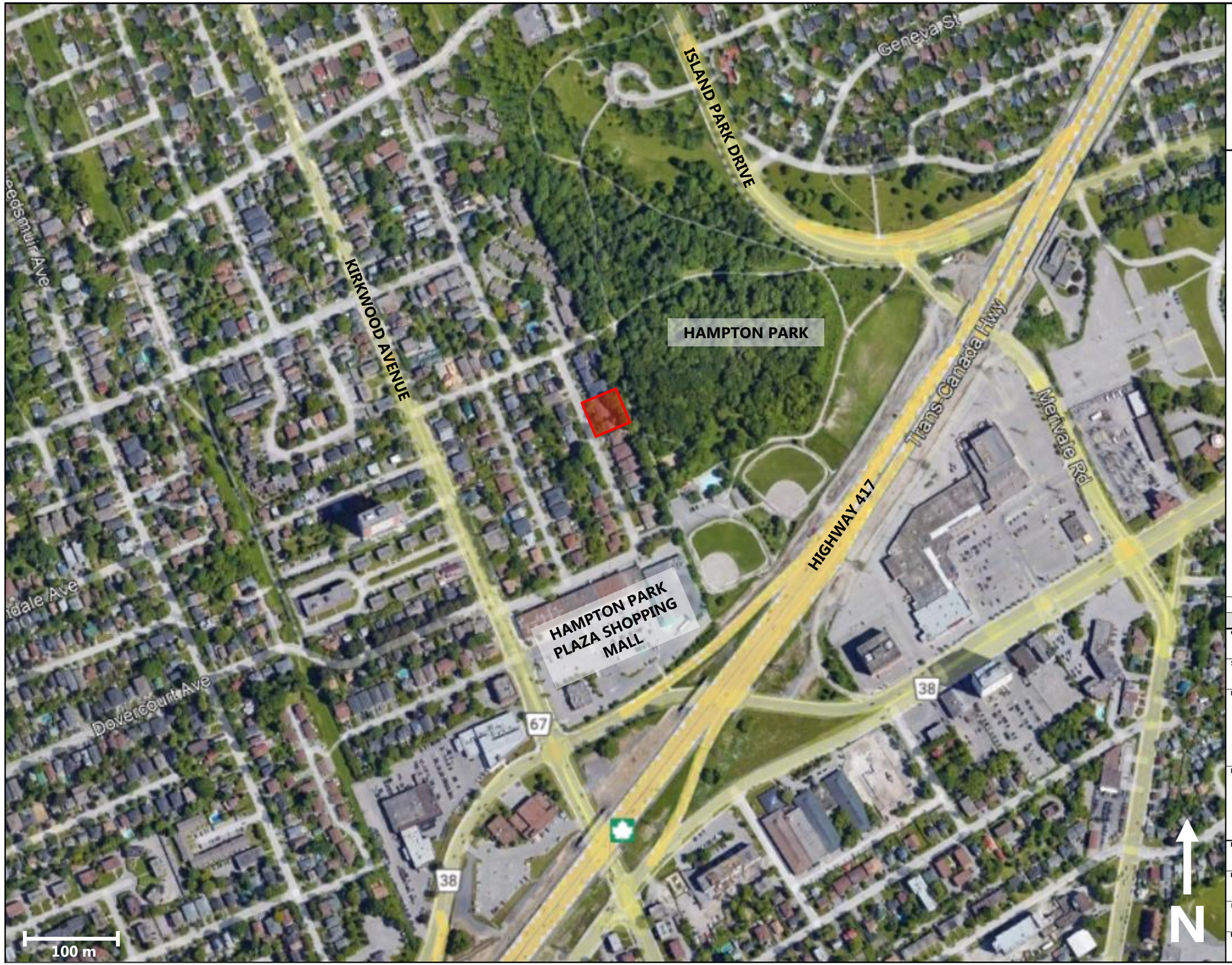
5 References

— City of Ottawa, Environmental Noise Control Guidelines (ENCG), 2016.

— Ontario Ministry of the Environment, Conservation and Parks (MECP), Environmental Noise Guideline - Stationary and Transportation Sources - Approval and Planning (NPC-300), Queen's Printer for Ontario, Published: 2016. Updated: 2021

Appendix A
Supporting Figures

ENGLOBE



ENGLOBE

Legend

: Site Location

Revision	Date	Issue	Approval
1	24/02/2022	-	--

Client: -

Site: **609-615 PARKVIEW ROAD**

Report Title: **NOISE IMPACT STUDY**

Drawing Title: **AERIAL VIEW OF SITE**

Designed By: MV	Scale: NOT TO SCALE
Drawn By: MV	Date: 24/02/2022
Reviewed By: SG	Project No.: 02201451.000-0101
Figure No.: 1	

Legend

: Site Location

AM :Arterial Mainstreet Zone
EP :Environmental Protection Zone
I1 :Minor Institutional Zone
O1 :Parks and Open Space Zone
R3 :Residential Third Density
R4 :Residential Fourth Density
R5 :Residential Fifth Density

Revision	Date	Issue	Approval
1	24/02/2022	-	--

Client: -

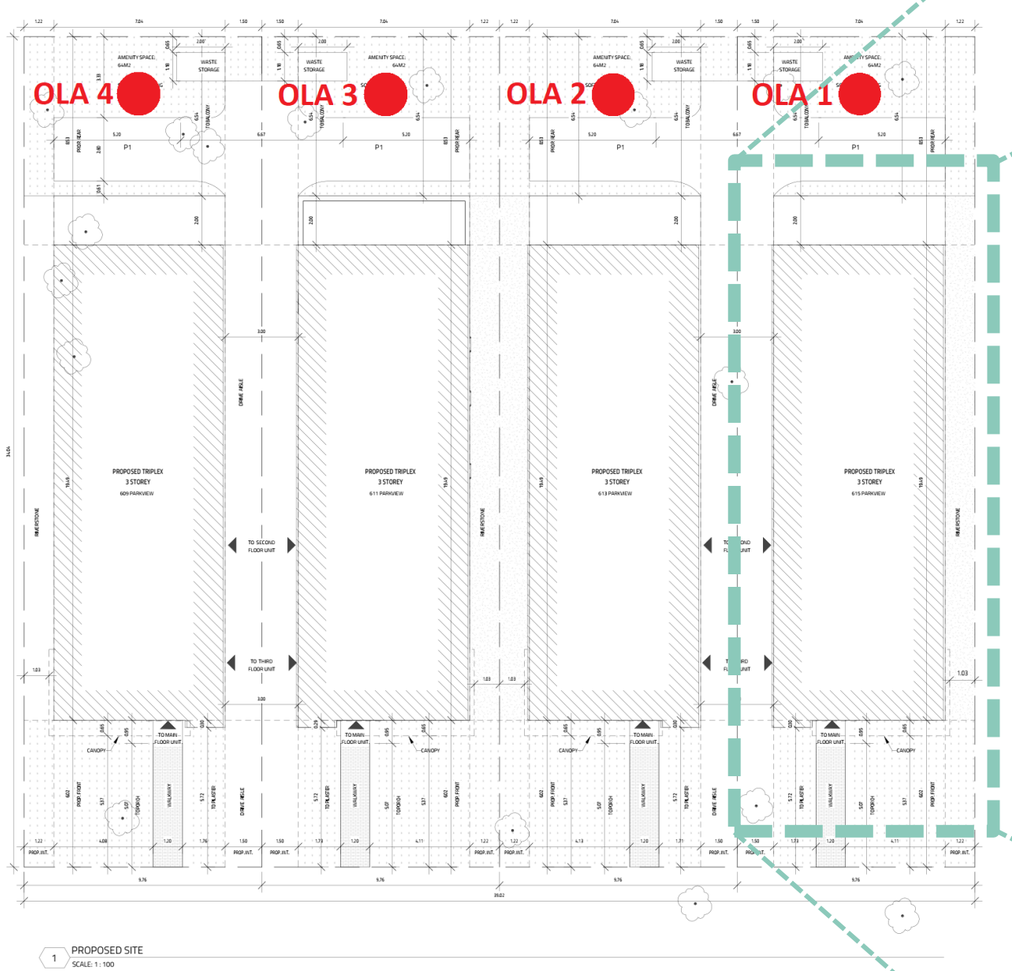
Site: **609-615 PARKVIEW ROAD**

Report Title: **NOISE IMPACT STUDY**

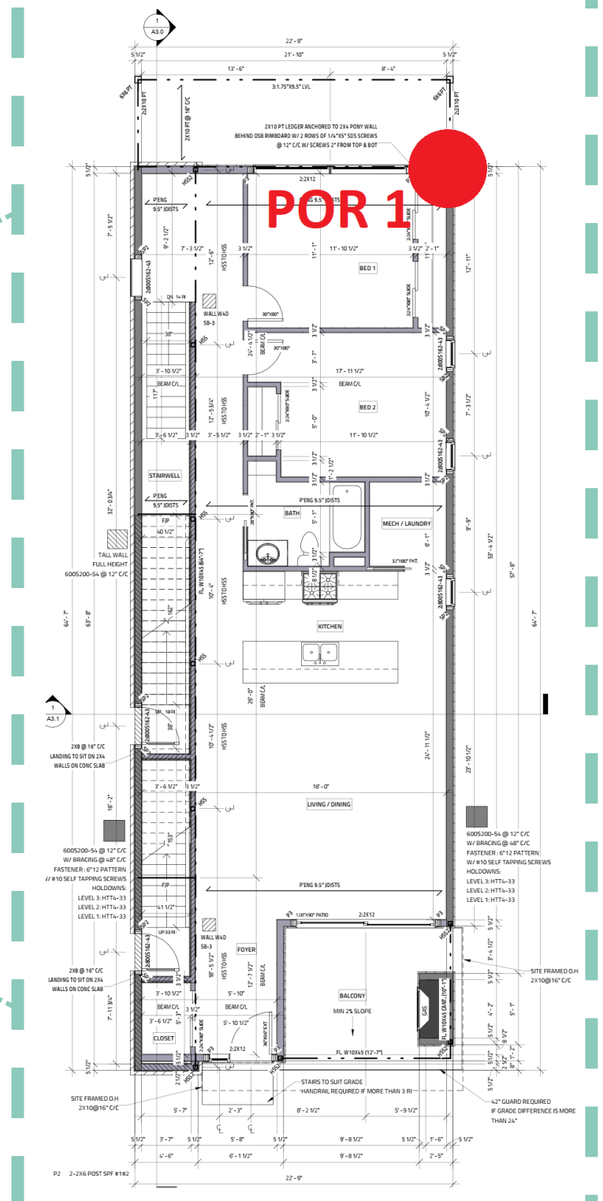
Drawing Title: **ZONING MAP OF AREA AROUND SITE**

Designed By: MV	Scale: NOT TO SCALE
Drawn By: MV	Date: 24/02/2022
Reviewed By: SG	Project No.: 02201451.000-0101

Figure No.: 2



SITE PLAN



GROUND FLOOR PLAN (615 PARKVIEW RD)

N

Legend

: POR / OLA Location

Revision	Date	Issue	Approval
2	23/06/2022	-	--
1	24/02/2022	-	--

Client
-

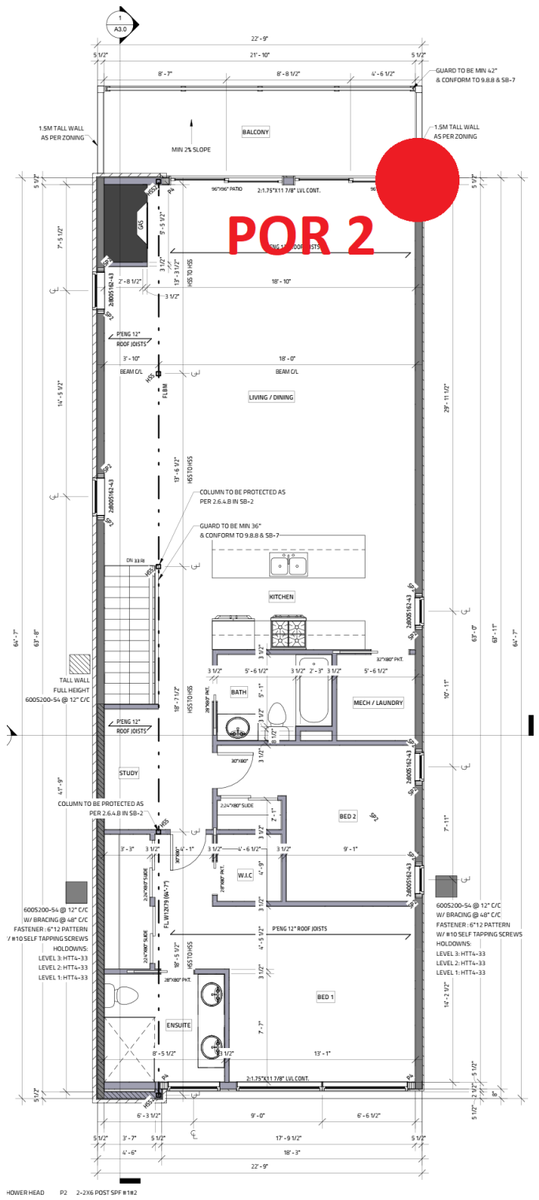
Site
609-615 PARKVIEW ROAD

Report Title
NOISE IMPACT STUDY

Drawing Title
POINTS OF RECEPTION (GROUND FLOOR)

Designed By	Scale
MV	NOT TO SCALE
Drawn By	**Date**
MV	24/02/2022
Reviewed By	**Project No.**
SG	02201451.000-0101

Figure No. 3



3RD FLOOR PLAN
(615 PARKVIEW RD)

N

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Legend

: POR / OLA Location

Revision	Date	Issue	Approval
1	24/02/2022	-	--

Client
-

Site
609-615 PARKVIEW ROAD

Report Title
NOISE IMPACT STUDY

Drawing Title
POINTS OF RECEPTION (3RD FLOOR)

Designed By	Scale
MV	NOT TO SCALE
Drawn By	**Date**
MV	24/02/2022
Reviewed By	**Project No.**
SG	02201451.000-0101

Figure No.
4

ENGLOBE

Legend

Revision	Date	Issue	Approval
1	24/02/2022	-	--

Client: -

Site: 609-615 PARKVIEW ROAD

Report Title: NOISE IMPACT STUDY

Drawing Title: POR 1 SOURCE-RECEIVER DISTANCES AND EXPOSURE ANGLES

Designed By: MV	Scale: NOT TO SCALE
Drawn By: MV	Date: 24/02/2022
Reviewed By: SG	Project No.: 02201451.000-0101

Figure No.: 5

ENGLOBE

Legend

Revision	Date	Issue	Approval
1	24/02/2022	-	--

Client: -

Site: 609-615 PARKVIEW ROAD

Report Title: NOISE IMPACT STUDY

Drawing Title: POR 2 SOURCE-RECEIVER DISTANCES AND EXPOSURE ANGLES

Designed By: MV	Scale: NOT TO SCALE
Drawn By: MV	Date: 24/02/2022
Reviewed By: SG	Project No.: 02201451.000-0101

Figure No.: 6

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Legend

Revision	Date	Issue	Approval
1	24/02/2022	-	--

Client: -

Site: 609-615 PARKVIEW ROAD

Report Title: NOISE IMPACT STUDY

Drawing Title: OLA 1 SOURCE-RECEIVER DISTANCES AND EXPOSURE ANGLES

Designed By: MV	Scale: NOT TO SCALE
Drawn By: MV	Date: 24/02/2022
Reviewed By: SG	Project No.: 02201451.000-0101

Figure No.: 7

ENGLOBE

Legend

Revision	Date	Issue	Approval
1	23/06/2022	-	--

Client: -

Site: **609-615 PARKVIEW ROAD**

Report Title: **NOISE IMPACT STUDY**

Drawing Title: **OLA 2 SOURCE-RECEIVER DISTANCES AND EXPOSURE ANGLES**

Designed By: MV	Scale: NOT TO SCALE
Drawn By: MV	Date: 23/06/2022
Reviewed By: SG	Project No.: 02201451.000-0101
Figure No.: 8	

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Legend

Revision	Date	Issue	Approval
1	23/06/2022	-	--

Client: -

Site: **609-615 PARKVIEW ROAD**

Report Title: **NOISE IMPACT STUDY**

Drawing Title: **OLA 3 SOURCE-RECEIVER DISTANCES AND EXPOSURE ANGLES**

Designed By: MV	Scale: NOT TO SCALE
Drawn By: MV	Date: 23/06/2022
Reviewed By: SG	Project No.: 02201451.000-0101

Figure No.: 9

ENGLOBE

Legend

Revision	Date	Issue	Approval
1	23/06/2022	-	--

Client: -

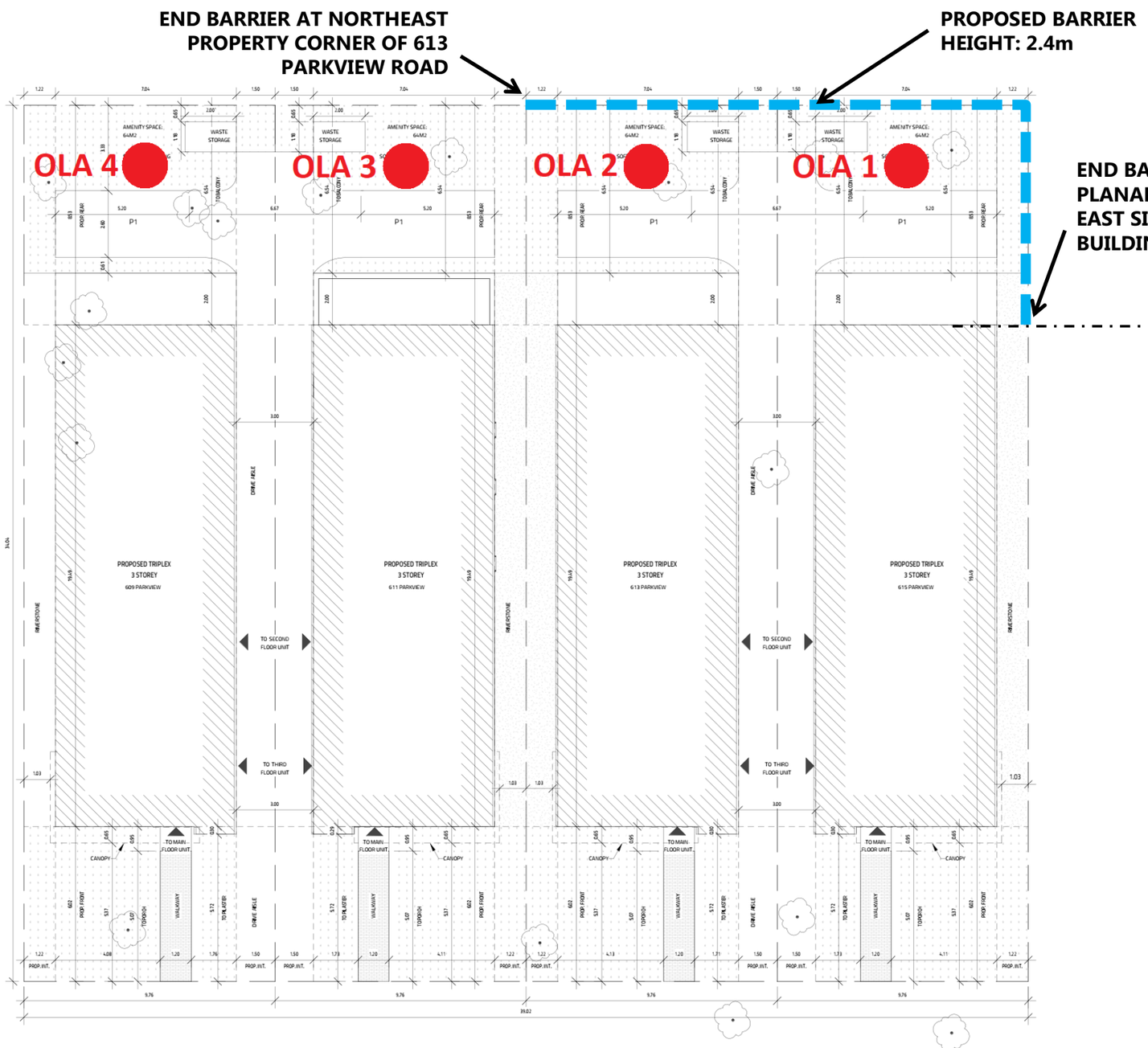
Site: **609-615 PARKVIEW ROAD**

Report Title: **NOISE IMPACT STUDY**

Drawing Title: **OLA 4 SOURCE-RECEIVER DISTANCES AND EXPOSURE ANGLES**

Designed By: MV	Scale: NOT TO SCALE
Drawn By: MV	Date: 23/06/2022
Reviewed By: SG	Project No.: 02201451.000-0101

Figure No.: 10



1 PROPOSED SITE
SCALE: 1 : 100

SITE PLAN

N

ENGLOBE

Legend

: Noise Barrier Location

Revision	Date	Issue	Approval
2	23/06/2022	-	--
1	24/02/2022	-	--

Client
-

Site
609-615 PARKVIEW ROAD

Report Title
NOISE IMPACT STUDY

Drawing Title
PROPOSED NOISE BARRIER LOCATION

Designed By	Scale
MV	NOT TO SCALE
Drawn By	**Date**
MV	24/02/2022
Reviewed By	**Project No.**
SG	02201451.000-0101

Figure No.
11

Appendix B
STAMSON Calculations

ENGLOBE

STAMSON 5.0 SUMMARY REPORT Date: 23-02-2022 09:57:43
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 615pa_p1.te Time Period: Day/Night 16/8 hours
Description: **Noise level prediction at POR 1.**

Road data, segment # 1: Hwy417_WB (day/night)

Car traffic volume : 59370/5163 veh/TimePeriod *
Medium truck volume : 4723/411 veh/TimePeriod *
Heavy truck volume : 3373/293 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): 73332
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: Hwy417_WB (day/night)

Angle1 Angle2 : -90.00 deg 30.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 248.00 / 248.00 m
Receiver height : 1.50 / 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : -70.00 deg
Barrier height : 3.00 m
Barrier receiver distance : 236.00 / 236.00 m
Source elevation : 3.00 m
Receiver elevation : 0.00 m
Barrier elevation : 3.00 m
Reference angle : 0.00

Road data, segment # 2: Hwy417_EB (day/night)

Car traffic volume : 59370/5163 veh/TimePeriod *
Medium truck volume : 4723/411 veh/TimePeriod *
Heavy truck volume : 3373/293 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): 73332
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 # 2: Hwy417_EB (day/night)

Angle1 Angle2	: -90.00 deg	30.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 0 / 0	
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 262.00 / 262.00 m	
Receiver height	: 1.50 / 1.50 m	
Topography	: 2	(Flat/gentle slope; with barrier)
Barrier angle1	: -90.00 deg	Angle2 : -70.00 deg
Barrier height	: 3.00 m	
Barrier receiver distance	: 236.00 / 236.00 m	
Source elevation	: 3.00 m	
Receiver elevation	: 0.00 m	
Barrier elevation	: 3.00 m	
Reference angle	: 0.00	

Result summary (day)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Hwy417_WB	1.50	58.20	58.20
2.Hwy417_EB	1.50	57.82	57.82
Total			61.02 dBA

Result summary (night)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Hwy417_WB	1.49	50.61	50.61
2.Hwy417_EB	1.49	50.23	50.23
Total			53.43 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 61.02
(NIGHT): 53.43

STAMSON 5.0 SUMMARY REPORT Date: 23-02-2022 09:56:15
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 615pa_p2.te Time Period: Day/Night 16/8 hours
Description: **Noise level prediction at POR 2.**

Road data, segment # 1: Hwy417_WB (day/night)

Car traffic volume : 59370/5163 veh/TimePeriod *
Medium truck volume : 4723/411 veh/TimePeriod *
Heavy truck volume : 3373/293 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): 73332
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: Hwy417_WB (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 : 248.00 / 248.00 m
Receiver height : 7.50 / 7.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 30.00 deg Angle2 : 90.00 deg
Barrier height : 6.00 m
Barrier receiver distance : 130.00 / 130.00 m
Source elevation : 3.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

Road data, segment # 2: Hwy417_EB (day/night)

Car traffic volume : 59370/5163 veh/TimePeriod *
Medium truck volume : 4723/411 veh/TimePeriod *
Heavy truck volume : 3373/293 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): 73332
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 # 2: Hwy417_EB (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  : 262.00 / 262.00 m
Receiver height           :   7.50 / 7.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  30.00 deg   Angle2 : 90.00 deg
Barrier height            :   6.00 m
Barrier receiver distance : 130.00 / 130.00 m
Source elevation          :   3.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

Result summary (day)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Hwy417_WB	1.50	62.42	62.42
2.Hwy417_EB	1.50	61.87	61.87 *
Total			65.16 dBA

* Bright Zone !

Result summary (night)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Hwy417_WB	1.49	54.83	54.83
2.Hwy417_EB	1.49	54.27	54.27 *
Total			57.57 dBA

* Bright Zone !

TOTAL Leq FROM ALL SOURCES (DAY): 65.16
(NIGHT): 57.57

STAMSON 5.0 SUMMARY REPORT Date: 23-02-2022 09:59:01
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 615pa_o1.te Time Period: Day/Night 16/8 hours
Description: **Noise level prediction at OLA 1. No Barrier.**

Road data, segment # 1: Hwy417_WB (day/night)

Car traffic volume : 59370/5163 veh/TimePeriod *
Medium truck volume : 4723/411 veh/TimePeriod *
Heavy truck volume : 3373/293 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): 73332
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: Hwy417_WB (day/night)

Angle1 Angle2 : -90.00 deg 32.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 248.00 / 248.00 m
Receiver height : 1.50 / 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : -70.00 deg
Barrier height : 3.00 m
Barrier receiver distance : 236.00 / 236.00 m
Source elevation : 3.00 m
Receiver elevation : 0.00 m
Barrier elevation : 3.00 m
Reference angle : 0.00

Road data, segment # 2: Hwy417_EB (day/night)

Car traffic volume : 59370/5163 veh/TimePeriod *
Medium truck volume : 4723/411 veh/TimePeriod *
Heavy truck volume : 3373/293 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): 73332
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 # 2: Hwy417_EB (day/night)

```
Angle1   Angle2           : -90.00 deg   32.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 262.00 / 262.00 m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -70.00 deg
Barrier height            :   3.00 m
Barrier receiver distance : 236.00 / 236.00 m
Source elevation          :   3.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   3.00 m
Reference angle           :   0.00
```

Result summary (day)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Hwy417_WB	1.50	58.29	58.29
2.Hwy417_EB	1.50	57.91	57.91
Total			61.11 dBA

Result summary (night)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Hwy417_WB	1.49	50.69	50.69
2.Hwy417_EB	1.49	50.31	50.31
Total			53.51 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 61.11
(NIGHT): 53.51

STAMSON 5.0 SUMMARY REPORT Date: 23-02-2022 10:18:09
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 615p_o1m.te Time Period: Day/Night 16/8 hours
Description: **Noise level prediction at OLA 1. 2.4m Barrier.**

Road data, segment # 1: Hwy417_WB(E) (day/night)

Car traffic volume : 59370/5163 veh/TimePeriod *
Medium truck volume : 4723/411 veh/TimePeriod *
Heavy truck volume : 3373/293 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): 73332
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: Hwy417_WB(E) (day/night)

Angle1 Angle2 : -90.00 deg -70.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 248.00 / 248.00 m
Receiver height : 1.50 / 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : -70.00 deg
Barrier height : 3.00 m
Barrier receiver distance : 236.00 / 236.00 m
Source elevation : 3.00 m
Receiver elevation : 0.00 m
Barrier elevation : 3.00 m
Reference angle : 0.00

Road data, segment # 2: Hwy417_EB(E) (day/night)

Car traffic volume : 59370/5163 veh/TimePeriod *
Medium truck volume : 4723/411 veh/TimePeriod *
Heavy truck volume : 3373/293 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): 73332
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 # 2: Hwy417_EB(E) (day/night)
----------------------------------------------
Angle1   Angle2           : -90.00 deg   -70.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 262.00 / 262.00 m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -70.00 deg
Barrier height            :   3.00 m
Barrier receiver distance : 236.00 / 236.00 m
Source elevation          :   3.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   3.00 m
Reference angle           :   0.00


Road data, segment # 3: Hwy417_WB(W) (day/night)
------------------------------------------------
Car traffic volume  : 59370/5163  veh/TimePeriod  *
Medium truck volume :  4723/411   veh/TimePeriod  *
Heavy truck volume  :  3373/293   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):  73332
    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 # 3: Hwy417_WB(W) (day/night)
----------------------------------------------
Angle1   Angle2           : -70.00 deg   32.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 248.00 / 248.00 m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -70.00 deg   Angle2 : 32.00 deg
Barrier height            :   2.40 m
Barrier receiver distance :   4.00 / 4.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00


Road data, segment # 4: Hwy417_EB(W) (day/night)
------------------------------------------------
Car traffic volume  : 59370/5163  veh/TimePeriod  *
Medium truck volume :  4723/411   veh/TimePeriod  *
Heavy truck volume  :  3373/293   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):  73332
    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 # 4: Hwy417_EB(W) (day/night)
-----------------------------------------------
Angle1   Angle2           : -70.00 deg   32.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 262.00 / 262.00 m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -70.00 deg   Angle2 : 32.00 deg
Barrier height            :   2.40 m
Barrier receiver distance :   4.00 / 4.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00


Result summary (day)
--------------------

                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+----------+----------+----------
 1.Hwy417_WB(E)     !     1.50 !    43.96 !    43.96
 2.Hwy417_EB(E)     !     1.50 !    43.97 !    43.97
 3.Hwy417_WB(W)     !     1.50 !    51.75 !    51.75
 4.Hwy417_EB(W)     !     1.50 !    51.39 !    51.39
--------------------+----------+----------+----------
                      Total                  55.28 dBA


Result summary (night)
----------------------

                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+----------+----------+----------
 1.Hwy417_WB(E)     !     1.49 !    36.36 !    36.36
 2.Hwy417_EB(E)     !     1.49 !    36.37 !    36.37
 3.Hwy417_WB(W)     !     1.49 !    44.15 !    44.15
 4.Hwy417_EB(W)     !     1.49 !    43.79 !    43.79
--------------------+----------+----------+----------
                      Total                  47.68 dBA
```

TOTAL Leq FROM ALL SOURCES (DAY): 55.28
(NIGHT): 47.68

STAMSON 5.0 SUMMARY REPORT Date: 01-04-2022 13:59:25
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 615p_o2.te Time Period: Day/Night 16/8 hours
Description: **Noise level prediction at OLA 2. No Barrier.**

Road data, segment # 1: Hwy417_WB (day/night)

Car traffic volume : 59370/5163 veh/TimePeriod *
Medium truck volume : 4723/411 veh/TimePeriod *
Heavy truck volume : 3373/293 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): 73332
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: Hwy417_WB (day/night)

Angle1 Angle2 : -90.00 deg 32.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 257.00 / 257.00 m
Receiver height : 1.50 / 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : -70.00 deg
Barrier height : 3.00 m
Barrier receiver distance : 245.00 / 245.00 m
Source elevation : 3.00 m
Receiver elevation : 0.00 m
Barrier elevation : 3.00 m
Reference angle : 0.00

Road data, segment # 2: Hwy417_EB (day/night)

Car traffic volume : 59370/5163 veh/TimePeriod *
Medium truck volume : 4723/411 veh/TimePeriod *
Heavy truck volume : 3373/293 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): 73332
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 # 2: Hwy417_EB (day/night)

```
Angle1   Angle2           : -90.00 deg   32.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 271.00 / 271.00 m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -70.00 deg
Barrier height            :   3.00 m
Barrier receiver distance : 245.00 / 245.00 m
Source elevation          :   3.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   3.00 m
Reference angle           :   0.00
```

Result summary (day)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Hwy417_WB	1.50	58.03	58.03
2.Hwy417_EB	1.50	57.67	57.67
Total			60.86 dBA

Result summary (night)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Hwy417_WB	1.49	50.44	50.44
2.Hwy417_EB	1.49	50.07	50.07
Total			53.27 dBA

```
TOTAL Leq FROM ALL SOURCES (DAY): 60.86
                           (NIGHT): 53.27
```

STAMSON 5.0 SUMMARY REPORT Date: 23-06-2022 09:56:10
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 615p_o2m.te Time Period: Day/Night 16/8 hours
Description: **Noise level prediction at OLA 2. 2.4m barrier.**

Road data, segment # 1: Hwy417_WB(E) (day/night)

Car traffic volume : 59370/5163 veh/TimePeriod *
Medium truck volume : 4723/411 veh/TimePeriod *
Heavy truck volume : 3373/293 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): 73332
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: Hwy417_WB(E) (day/night)

Angle1 Angle2 : -90.00 deg -70.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 257.00 / 257.00 m
Receiver height : 1.50 / 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : -70.00 deg
Barrier height : 3.00 m
Barrier receiver distance : 245.00 / 245.00 m
Source elevation : 3.00 m
Receiver elevation : 0.00 m
Barrier elevation : 3.00 m
Reference angle : 0.00

Road data, segment # 2: Hwy417_EB(E) (day/night)

Car traffic volume : 59370/5163 veh/TimePeriod *
Medium truck volume : 4723/411 veh/TimePeriod *
Heavy truck volume : 3373/293 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): 73332
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 # 2: Hwy417_EB(E) (day/night)
----------------------------------------------
Angle1   Angle2           : -90.00 deg   -70.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 271.00 / 271.00 m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -70.00 deg
Barrier height            :   3.00 m
Barrier receiver distance : 245.00 / 245.00 m
Source elevation          :   3.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   3.00 m
Reference angle           :   0.00


Road data, segment # 3: Hwy417_WB(W) (day/night)
------------------------------------------------
Car traffic volume  : 59370/5163  veh/TimePeriod  *
Medium truck volume :  4723/411   veh/TimePeriod  *
Heavy truck volume  :  3373/293   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):  73332
    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 # 3: Hwy417_WB(W) (day/night)
----------------------------------------------
Angle1   Angle2           : -70.00 deg   32.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 257.00 / 257.00 m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -70.00 deg   Angle2 : 32.00 deg
Barrier height            :   2.40 m
Barrier receiver distance :   4.00 / 4.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00


Road data, segment # 4: Hwy417_EB(W) (day/night)
------------------------------------------------
Car traffic volume  : 59370/5163  veh/TimePeriod  *
Medium truck volume :  4723/411   veh/TimePeriod  *
Heavy truck volume  :  3373/293   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):  73332
    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 # 4: Hwy417_EB(W) (day/night)
-----------------------------------------------
Angle1   Angle2           : -70.00 deg   32.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 271.00 / 271.00 m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -70.00 deg   Angle2 : 32.00 deg
Barrier height            :   2.40 m
Barrier receiver distance :   4.00 / 4.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00


Result summary (day)
--------------------

                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+----------+----------+----------
 1.Hwy417_WB(E)     !     1.50 !    43.74 !    43.74
 2.Hwy417_EB(E)     !     1.50 !    43.76 !    43.76
 3.Hwy417_WB(W)     !     1.50 !    51.51 !    51.51
 4.Hwy417_EB(W)     !     1.50 !    51.17 !    51.17
--------------------+----------+----------+----------
                      Total                   55.05 dBA


Result summary (night)
----------------------

                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+----------+----------+----------
 1.Hwy417_WB(E)     !     1.49 !    36.14 !    36.14
 2.Hwy417_EB(E)     !     1.49 !    36.16 !    36.16
 3.Hwy417_WB(W)     !     1.49 !    43.91 !    43.91
 4.Hwy417_EB(W)     !     1.49 !    43.57 !    43.57
--------------------+----------+----------+----------
                      Total                   47.45 dBA
```

TOTAL Leq FROM ALL SOURCES (DAY): 55.05
(NIGHT): 47.45

STAMSON 5.0 SUMMARY REPORT Date: 01-04-2022 14:00:25
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 615p_o3.te Time Period: Day/Night 16/8 hours
Description: **Noise level prediction at OLA 3. No Barrier.**

Road data, segment # 1: Hwy417_WB (day/night)

Car traffic volume : 59370/5163 veh/TimePeriod *
Medium truck volume : 4723/411 veh/TimePeriod *
Heavy truck volume : 3373/293 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): 73332
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: Hwy417_WB (day/night)

Angle1 Angle2 : -90.00 deg 32.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 265.00 / 265.00 m
Receiver height : 1.50 / 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : -70.00 deg
Barrier height : 3.00 m
Barrier receiver distance : 253.00 / 253.00 m
Source elevation : 3.00 m
Receiver elevation : 0.00 m
Barrier elevation : 3.00 m
Reference angle : 0.00

Road data, segment # 2: Hwy417_EB (day/night)

Car traffic volume : 59370/5163 veh/TimePeriod *
Medium truck volume : 4723/411 veh/TimePeriod *
Heavy truck volume : 3373/293 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): 73332
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 # 2: Hwy417_EB (day/night)

Angle1 Angle2	: -90.00 deg	32.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 0 / 0	
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 279.00 / 279.00 m	
Receiver height	: 1.50 / 1.50 m	
Topography	: 2	(Flat/gentle slope; with barrier)
Barrier angle1	: -90.00 deg	Angle2 : -70.00 deg
Barrier height	: 3.00 m	
Barrier receiver distance	: 253.00 / 253.00 m	
Source elevation	: 3.00 m	
Receiver elevation	: 0.00 m	
Barrier elevation	: 3.00 m	
Reference angle	: 0.00	

Result summary (day)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Hwy417_WB	1.50	57.81	57.81
2.Hwy417_EB	1.50	57.46	57.46
Total			60.65 dBA

Result summary (night)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Hwy417_WB	1.49	50.22	50.22
2.Hwy417_EB	1.49	49.86	49.86
Total			53.05 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 60.65
(NIGHT): 53.05

STAMSON 5.0 SUMMARY REPORT Date: 23-06-2022 10:01:01
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 615p_o3m.te Time Period: Day/Night 16/8 hours
Description: **Noise level prediction at OLA 3. 2.4m barrier.**

Road data, segment # 1: Hwy417_WB(E) (day/night)

Car traffic volume : 59370/5163 veh/TimePeriod *
Medium truck volume : 4723/411 veh/TimePeriod *
Heavy truck volume : 3373/293 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): 73332
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: Hwy417_WB(E) (day/night)

Angle1 Angle2 : -90.00 deg -70.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 265.00 / 265.00 m
Receiver height : 1.50 / 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : -70.00 deg
Barrier height : 3.00 m
Barrier receiver distance : 253.00 / 253.00 m
Source elevation : 3.00 m
Receiver elevation : 0.00 m
Barrier elevation : 3.00 m
Reference angle : 0.00

Road data, segment # 2: Hwy417_EB(E) (day/night)

Car traffic volume : 59370/5163 veh/TimePeriod *
Medium truck volume : 4723/411 veh/TimePeriod *
Heavy truck volume : 3373/293 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): 73332
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 # 2: Hwy417_EB(E) (day/night)
----------------------------------------------
Angle1   Angle2           : -90.00 deg   -70.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 279.00 / 279.00 m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -70.00 deg
Barrier height            :   3.00 m
Barrier receiver distance : 253.00 / 253.00 m
Source elevation          :   3.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   3.00 m
Reference angle           :   0.00


Road data, segment # 3: Hwy417_WB(W) (day/night)
------------------------------------------------
Car traffic volume  : 59370/5163  veh/TimePeriod  *
Medium truck volume :  4723/411   veh/TimePeriod  *
Heavy truck volume  :  3373/293   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):  73332
    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 # 3: Hwy417_WB(W) (day/night)
----------------------------------------------
Angle1   Angle2           : -70.00 deg   32.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 265.00 / 265.00 m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :   5.00 deg   Angle2 : 32.00 deg
Barrier height            :   2.40 m
Barrier receiver distance :  15.00 / 15.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00


Road data, segment # 4: Hwy417_EB(W) (day/night)
------------------------------------------------
Car traffic volume  : 59370/5163  veh/TimePeriod  *
Medium truck volume :  4723/411   veh/TimePeriod  *
Heavy truck volume  :  3373/293   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):  73332
    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 # 4: Hwy417_EB(W) (day/night)
-----------------------------------------------
Angle1   Angle2           : -70.00 deg   32.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 279.00 / 279.00 m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :   5.00 deg   Angle2 : 32.00 deg
Barrier height            :   2.40 m
Barrier receiver distance :  15.00 / 15.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00


Result summary (day)
--------------------

                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+----------+----------+----------
 1.Hwy417_WB(E)     !     1.50 !    43.55 !    43.55
 2.Hwy417_EB(E)     !     1.50 !    43.58 !    43.58
 3.Hwy417_WB(W)     !     1.50 !    56.75 !    56.75
 4.Hwy417_EB(W)     !     1.50 !    56.39 !    56.39
--------------------+----------+----------+----------
                      Total                  59.80 dBA


Result summary (night)
----------------------

                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+----------+----------+----------
 1.Hwy417_WB(E)     !     1.49 !    35.95 !    35.95
 2.Hwy417_EB(E)     !     1.49 !    35.98 !    35.98
 3.Hwy417_WB(W)     !     1.49 !    49.16 !    49.16
 4.Hwy417_EB(W)     !     1.49 !    48.79 !    48.79
--------------------+----------+----------+----------
                      Total                  52.20 dBA
```

TOTAL Leq FROM ALL SOURCES (DAY): 59.80
(NIGHT): 52.20

STAMSON 5.0 SUMMARY REPORT Date: 01-04-2022 13:51:11
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 615p_o4.te Time Period: Day/Night 16/8 hours
Description: **Noise level prediction at OLA 4. No Barrier.**

Road data, segment # 1: Hwy417_WB (day/night)

Car traffic volume : 59370/5163 veh/TimePeriod *
Medium truck volume : 4723/411 veh/TimePeriod *
Heavy truck volume : 3373/293 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): 73332
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: Hwy417_WB (day/night)

Angle1 Angle2 : -90.00 deg 32.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 275.00 / 275.00 m
Receiver height : 1.50 / 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : -70.00 deg
Barrier height : 3.00 m
Barrier receiver distance : 263.00 / 263.00 m
Source elevation : 3.00 m
Receiver elevation : 0.00 m
Barrier elevation : 3.00 m
Reference angle : 0.00

Road data, segment # 2: Hwy417_EB (day/night)

Car traffic volume : 59370/5163 veh/TimePeriod *
Medium truck volume : 4723/411 veh/TimePeriod *
Heavy truck volume : 3373/293 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): 73332
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 # 2: Hwy417_EB (day/night)

Angle1 Angle2	: -90.00 deg	32.00 deg
Wood depth	: 0	(No woods.)
No of house rows	: 0 / 0	
Surface	: 1	(Absorptive ground surface)
Receiver source distance	: 289.00 / 289.00 m	
Receiver height	: 1.50 / 1.50 m	
Topography	: 2	(Flat/gentle slope; with barrier)
Barrier angle1	: -90.00 deg	Angle2 : -70.00 deg
Barrier height	: 3.00 m	
Barrier receiver distance	: 263.00 / 263.00 m	
Source elevation	: 3.00 m	
Receiver elevation	: 0.00 m	
Barrier elevation	: 3.00 m	
Reference angle	: 0.00	

Result summary (day)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Hwy417_WB	1.50	57.55	57.55
2.Hwy417_EB	1.50	57.21	57.21
Total			60.39 dBA

Result summary (night)
---

	source height (m)	Road Leq (dBA)	Total Leq (dBA)
1.Hwy417_WB	1.49	49.95	49.95
2.Hwy417_EB	1.49	49.61	49.61
Total			52.79 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 60.39
(NIGHT): 52.79

STAMSON 5.0 SUMMARY REPORT Date: 23-06-2022 10:06:56
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 615p_o4m.te Time Period: Day/Night 16/8 hours
Description: **Noise level prediction at OLA 4. 2.4m barrier.**

Road data, segment # 1: Hwy417_WB(E) (day/night)

Car traffic volume : 59370/5163 veh/TimePeriod *
Medium truck volume : 4723/411 veh/TimePeriod *
Heavy truck volume : 3373/293 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): 73332
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: Hwy417_WB(E) (day/night)

Angle1 Angle2 : -90.00 deg -70.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 275.00 / 275.00 m
Receiver height : 1.50 / 1.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : -70.00 deg
Barrier height : 3.00 m
Barrier receiver distance : 263.00 / 263.00 m
Source elevation : 3.00 m
Receiver elevation : 0.00 m
Barrier elevation : 3.00 m
Reference angle : 0.00

Road data, segment # 2: Hwy417_EB(E) (day/night)

Car traffic volume : 59370/5163 veh/TimePeriod *
Medium truck volume : 4723/411 veh/TimePeriod *
Heavy truck volume : 3373/293 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): 73332
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 # 2: Hwy417_EB(E) (day/night)
----------------------------------------------
Angle1   Angle2           : -90.00 deg   -70.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 289.00 / 289.00 m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -90.00 deg   Angle2 : -70.00 deg
Barrier height            :   3.00 m
Barrier receiver distance : 263.00 / 263.00 m
Source elevation          :   3.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   3.00 m
Reference angle           :   0.00


Road data, segment # 3: Hwy417_WB(W) (day/night)
------------------------------------------------
Car traffic volume  : 59370/5163  veh/TimePeriod  *
Medium truck volume :  4723/411   veh/TimePeriod  *
Heavy truck volume  :  3373/293   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):  73332
    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 # 3: Hwy417_WB(W) (day/night)
----------------------------------------------
Angle1   Angle2           : -70.00 deg   32.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 275.00 / 275.00 m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  20.00 deg   Angle2 : 32.00 deg
Barrier height            :   2.40 m
Barrier receiver distance :  25.00 / 25.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00


Road data, segment # 4: Hwy417_EB(W) (day/night)
------------------------------------------------
Car traffic volume  : 59370/5163  veh/TimePeriod  *
Medium truck volume :  4723/411   veh/TimePeriod  *
Heavy truck volume  :  3373/293   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):  73332
    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 # 4: Hwy417_EB(W) (day/night)
-----------------------------------------------
Angle1   Angle2           : -70.00 deg   32.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  : 289.00 / 289.00 m
Receiver height           :   1.50 / 1.50   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  20.00 deg   Angle2 : 32.00 deg
Barrier height            :   2.40 m
Barrier receiver distance :  25.00 / 25.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00


Result summary (day)
--------------------

                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+----------+----------+----------
 1.Hwy417_WB(E)     !     1.50 !    43.31 !    43.31
 2.Hwy417_EB(E)     !     1.50 !    43.36 !    43.36
 3.Hwy417_WB(W)     !     1.50 !    57.05 !    57.05
 4.Hwy417_EB(W)     !     1.50 !    56.69 !    56.69
--------------------+----------+----------+----------
                      Total                  60.07 dBA


Result summary (night)
----------------------

                    !  source  !   Road   !  Total
                    !  height  !   Leq    !   Leq
                    !   (m)    !  (dBA)   !  (dBA)
--------------------+----------+----------+----------
 1.Hwy417_WB(E)     !     1.49 !    35.72 !    35.72
 2.Hwy417_EB(E)     !     1.49 !    35.76 !    35.76
 3.Hwy417_WB(W)     !     1.49 !    49.45 !    49.45
 4.Hwy417_EB(W)     !     1.49 !    49.09 !    49.09
--------------------+----------+----------+----------
                      Total                  52.47 dBA
```

TOTAL Leq FROM ALL SOURCES (DAY): 60.07
(NIGHT): 52.47