Phase 1 Noise Control Feasibility Study Requirements

Glenview Homes (Cedarview) Ltd.
3387 Borrisokane Road

Prepared for:
Glenview Homes (Cedarview) Ltd.

Prepared by:
Stantec Consulting Ltd.

April 28, 2017

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1.0 INTRODUCTION

1.1 PURPOSE OF REPORT

Stantec Consulting Ltd. has been retained by Glenview Homes (Cedarview) Ltd. (Glenview) to prepare a preliminary environmental noise assessment for the Glenview development located at 3387 Borrisokane Road, in the City of Ottawa. It should be noted that prior to June 2016, Borrisokane Road was called Cedarview Road. A draft plan application has been submitted and a Phase 1 Noise Control Feasibility Study is required to address City policy regarding residential development adjacent to highways, arterial roads and collector roads.
The purpose of this report is to:

- outline the Ministry's guidelines and criteria for noise levels and residential land use;
- apply the noise level standards of the Ontario Ministry of the Environment and Climate Change to the site in conjunction with the City of Ottawa document "Environmental Noise Control Guidelines" dated January 2016;
- determine the extent to which noise level contours will be of concern to future residents of the proposed development, using the computerized version (STAMSON 5.03) of the MOECC's noise model;
- outline potential locations for noise attenuation, as necessary, to achieve acceptable noise levels for future residents of the proposed development.

1.2 LOCATION & SITE PLAN CONCEPTS

The site is located at 3387 Borrisokane Road, between Cambrian Road and Strandherd Drive and is illustrated in Figure 1. The proposed Glenview site consists of approximately 20.1ha of 208 residential units with a single collector to Borrisokane Road. The report will focus on the noise contours that are expected to be generated by exposure to Borrisokane Road and Street 1, as well as the potential impacts of Highway 416.

Surrounding land uses are as follows:

- north – existing rural/undeveloped;
- east – existing rural/future residential;
- south – existing rural/future residential;
- west – existing rural/undeveloped.

Figure 1 Glenview Development

2.0 NOISE LEVEL CRITERIA

2.1 GUIDELINES

The Ontario Ministry of Environment (MOECC) has produced guidelines for noise levels for use in noise assessment and land use planning. Noise level criteria for residential land use are summarized in **Table 1** below. Noise levels in excess of the guidelines presented are acceptable under certain conditions and with certain provisions.

Table 1 Noise Criteria for Residential Land Use

Location	7 a.m. - 11 p.m.	11 p.m. - 7 a.m.
Outdoor Living Areas	55 dBA	N/A
Indoor Living Areas	45 dBA	40 dBA

Table 2 and **Table 3** set out noise levels in excess of the criteria and the required provisions to allow residential activity in locations where noise level criteria are expected.

Table 2 Combination of Road and Rail Noise Day-Time Outdoor, Ventilation and Warning Clause Requirements

Location	Leq (16 hr) (dBA)	Ventilation Requirements	Outdoor Control Measures	Warning Clause
Outdoor Living Area	Leq16hr less than or equal to 55 dBA	N/A	None required	Not required
	Leq16hr greater than 55 dBA to less than or equal to 60 dBA	N/A	Control measures (barriers) may not be required but should be considered	Required if resultant Leq exceeds 55 dBA Generic Clause or Extensive mitigation of indoor and outdoor amenity area clause
	Leq16hr greater than 60 dBA	N/A	Control measures (barriers) required to reduce the Leq to below 60 dBA and as close to 55 dBA as technically, economically and administratively feasible	Required if resultant Leq exceeds 55 dBA Extensive mitigation of indoor and outdoor amenity area clause(Supplied Central Air Conditioning)
Plane of Living Room Window	Leq16hr less than or equal to 55 dBA	None required	N/A	Not required
	Leq16hr greater than 55 dBA to less than or equal to 65 dBA	Provision for central air conditioning	N/A	Required Extensive mitigation of indoor and outdoor amenity area clause
	Leq16hr greater than 65 dBA	Central air conditioning	N/A	Required Extensive mitigation of indoor and outdoor amenity area clause (Supplied Central Air Conditioning)

(Source: Ministry of the Environment and Climate Change, Environmental Noise Guideline – Stationary and Transportation Sources- Approval and Planning – Publication NPC-300, August 2013 and City of Ottawa, Environmental Noise Control Guidelines, January 2016)

Table 3 Combination of Road and Rail Noise, Night-Time Ventilation and Warning Clause Requirements

Location	Leq (8 hr) (dBA)	Ventilation Requirements	Outdoor Control Measures	Warning Clause
Plane of Bedroom Window	Leq8hr greater than 50 dBA to less or equal to 60 dBA	Provision for central air conditioning	N/A	Required Extensive mitigation of indoor and outdoor amenity area clause
	Leq8hr greater than 60 dBA	Central air conditioning	N/A	Required Extensive mitigation of indoor and outdoor amenity area clause (Supplied Central Air Conditioning)

(Source: Ministry of the Environment and Climate Change, Environmental Noise Guideline – Stationary and Transportation Sources- Approval and Planning – Publication NPC-300, August 2013 and City of Ottawa, Environmental Noise Control Guidelines, January 2016))

The M.O.E. also specifies building component requirements when indoor noise levels exceed the criteria by certain levels. These requirements are summarized in Error! Reference source not found..

Table 4 Road and Rail Noise – Building Component Requirements

Location		Leq (16 hr) (dBA)	Building Component Requirements
Plane of Living Room Window – Daytime	Road	Less than or equal to 65 dBA	Building compliant with the Ontario Building Code
		Greater than 65 dBA	Building components (walls, windows, etc.) must be designed to achieve indoor sound level criteria
	Rail	Less than or equal to 60 dBA	Building compliant with the Ontario Building Code
		Greater than 60 dBA	Building components (walls, windows, etc.) must be designed to achieve indoor sound level criteria
Location		**Leq (8 hr) (dBA)**	**Building Component Requirements**
Plane of Bedroom Window - Nighttime	Road	Less than or equal to 60 dBA	Building compliant with the Ontario Building Code
		Greater than 60 dBA	Building components (walls, windows, etc.) must be designed to achieve indoor sound level criteria
	Rail	Less than or equal to 55 dBA	Building compliant with the Ontario Building Code
		Greater than 55 dBA	Building components (walls, windows, etc.) must be designed to achieve indoor sound level criteria

(Source: Ministry of the Environment and Climate Change, Environmental Noise Guideline – Stationary and Transportation Sources- Approval and Planning – Publication NPC-300, August 2013 and City of Ottawa, Environmental Noise Control Guidelines, January 2016)

3.0 OBSERVATIONS AND CALCULATIONS

3.1 NOISE LEVEL PREDICTIONS

Noise predictions in this report were completed using the computerized version (STAMSON 5.03) of the MOECC noise model, ORNAMENT to calculate noise levels from various sources. The program accepts variables related to noise sources and receivers, road traffic volumes and the nature and extent of noise attenuation barriers, if required.

3.2 ROAD TRAFFIC VOLUMES

Traffic volume data for Borrisokane Road, Street 1 and Highway 416 was provided by the City of Ottawa document "Environmental Noise Control Guidelines" dated January 2016. The document indicates that the average annual daily traffic volume for Borrisokane Road will be 15,000 vehicles per day for a 2-lane rural arterial, Street 1 will be 8,000 vehicles per day and Highway 416 will be 36,666 vehicles per day per 2 lane section. Additional information regarding applicable assumptions and ratios for day/night traffic and car/ truck traffic is summarized as follows:

- heavy truck traffic for this segment is estimated to be 5% of total traffic volume
- medium truck traffic for this segment is estimated to be 7% of total traffic volume; the rest is assumed to be car traffic
- daytime (7 am – 11 pm) traffic is assumed to be 92%, with the remaining 8% at night (11 pm – 7 am)
- speed limit for Borrisokane Road is 80 km/hour, 40 km/hour for Street 1 and Highway 416 is 100 km/hour

Table 5, **Table 6** and **Table 7** summarize the traffic volumes used for calculations in this report.

Table 5 Traffic Volumes – Borrisokane Road, 2-Lane Rural Arterial

	Day	**Night**	**Total**
Car	12144	1056	13200
Medium Truck	966	84	1050
Heavy Truck	690	60	750
TOTAL	**13800**	**1200**	**15000**
Speed Limit	80 km/hr		
Gradient	0%		
Surface	Asphalt		

Table 6 Traffic Volumes – Street 1, 2-Lane Urban Collector

	Day	Night	Total
Car	6477	563	7040
Medium Truck	515	45	560
Heavy Truck	368	32	400
TOTAL	**7360**	**640**	**8000**
Speed Limit	40 km/hr		
Gradient	0%		
Surface	Asphalt		

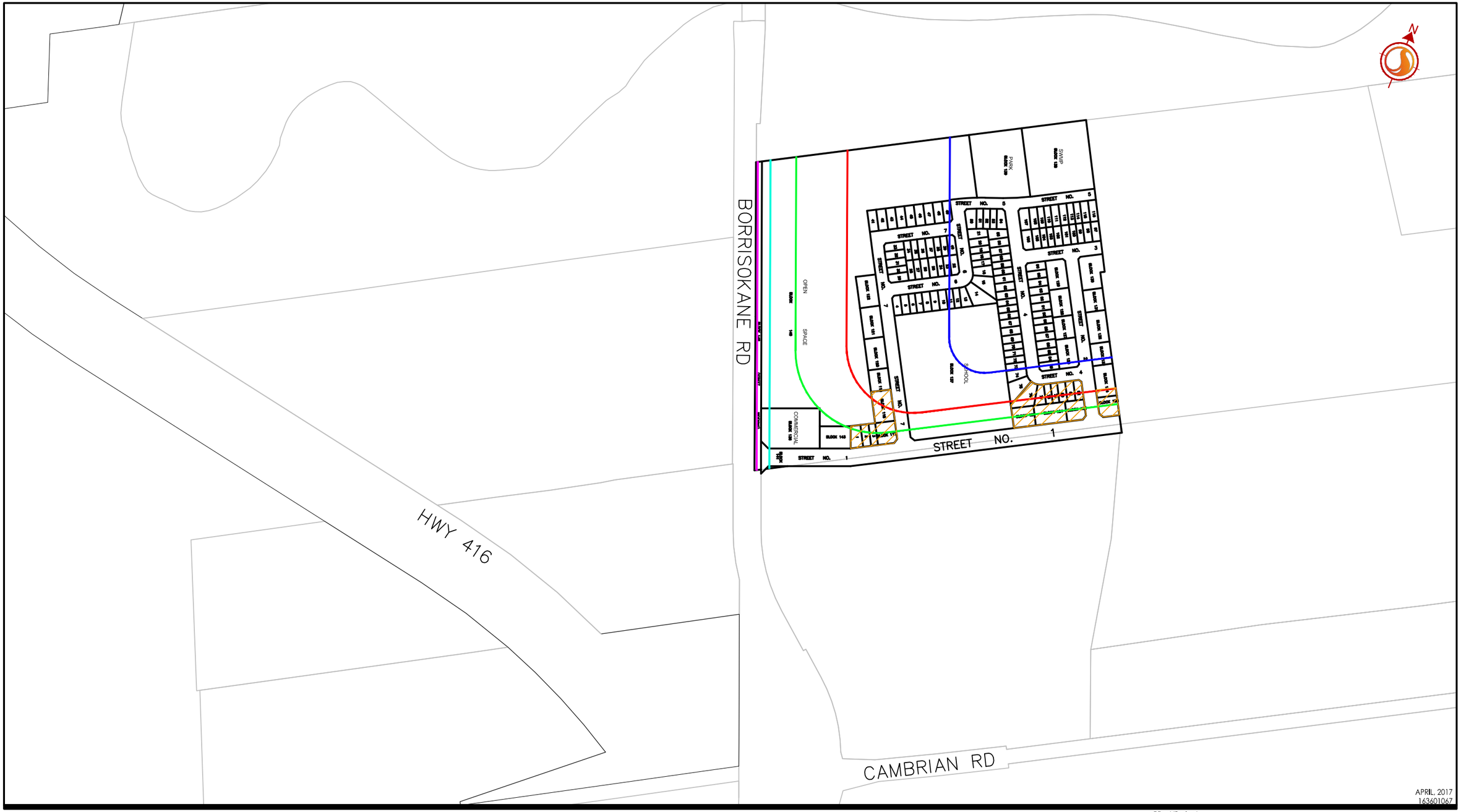
Table 7 Traffic Volumes - Highway 416, 2 Lane Section (northbound and southbound)

	Day	Night	Total
Car	29685	2581	32266
Medium Truck	2361	205	2567
Heavy Truck	1687	147	1833
TOTAL	**33733**	**2933**	**36666**
Speed Limit	100 km/hr		
Gradient	0%		
Surface	Asphalt		

3.3 PROJECTED NOISE LEVELS

Using the MOECC noise model, ORNAMENT via Stamson, noise level contours were calculated for daytime and nighttime conditions at the point representing the anticipated centerline of Borrisokane Road, Street 1 and Highway 416, based on the preliminary draft plan prepared by Stantec Geomatics Ltd. The resulting noise contours, clause ranges and potential attenuation locations are illustrated in **Figure 2**, **Figure 3**, and **Figure 4**. Additionally, to simulate conditions where multiple noise sources must be considered in concert (regions within the 500m area of influence of Highway 416), a 2-D noise contour model was created using the US Federal Highway Administration's Traffic Noise Model 2.5. Resultant noise contours are demonstrated within **Figure 6** and **Figure 7.** Noise contours produced via Stamson output were then adjusted to ensure the more conservative of the two results are demonstrated within **Figures 2-4** below.

The receiver heights for indoor daytime and nighttime noise level calculations for the future buildings were completed at an assumed ground level (2.5m above road grade) and at the



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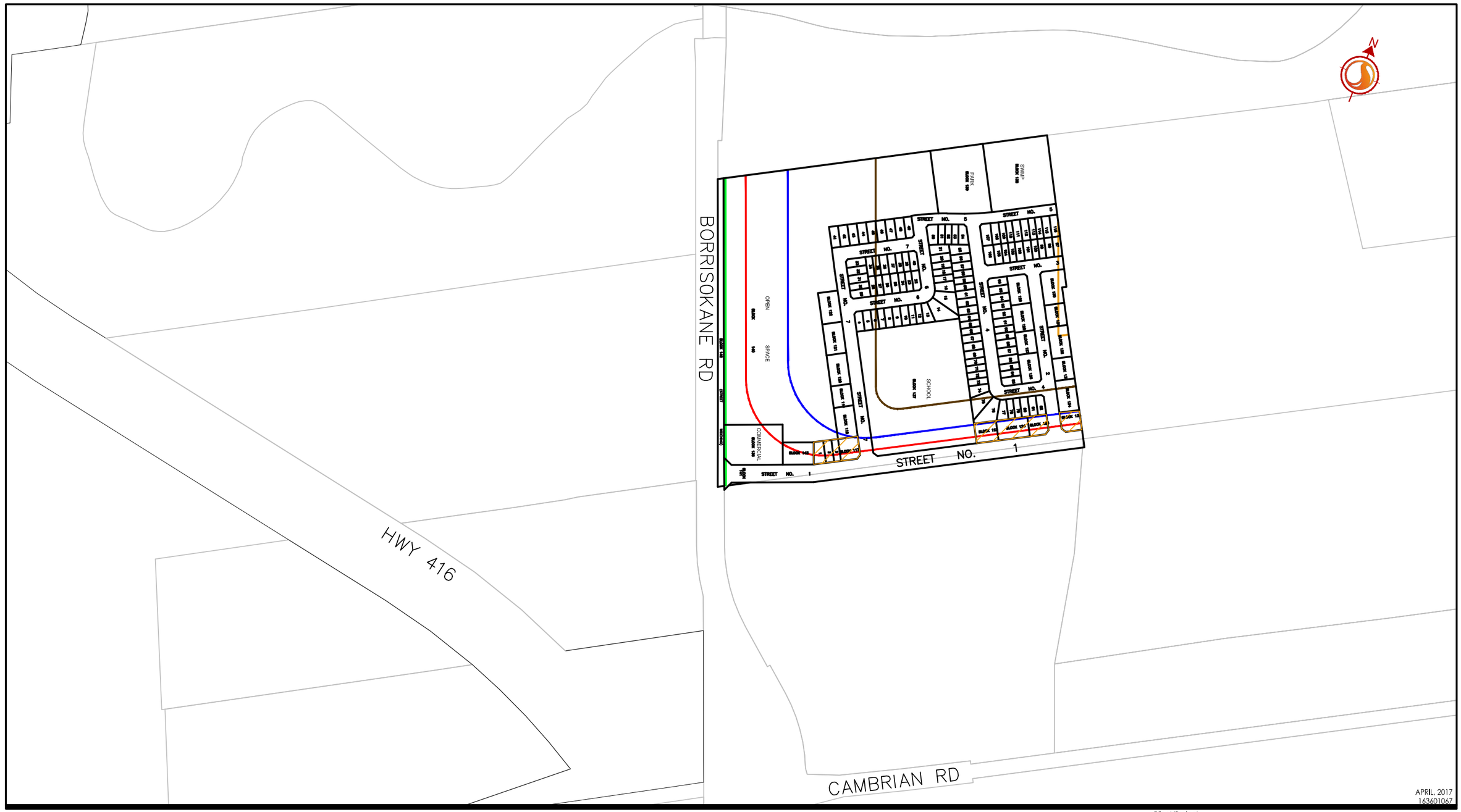
40 dBA
45 dBA
50 dBA
55 dBA
60 dBA
65 dBA
70 dBA
GENERIC INDOOR (GI)

Client/Project
GLENVIEW
3387 BORRISKANE ROAD
NOISE ASSESSMENT

Figure No.
2.0

Title
INDOOR - DAYTIME



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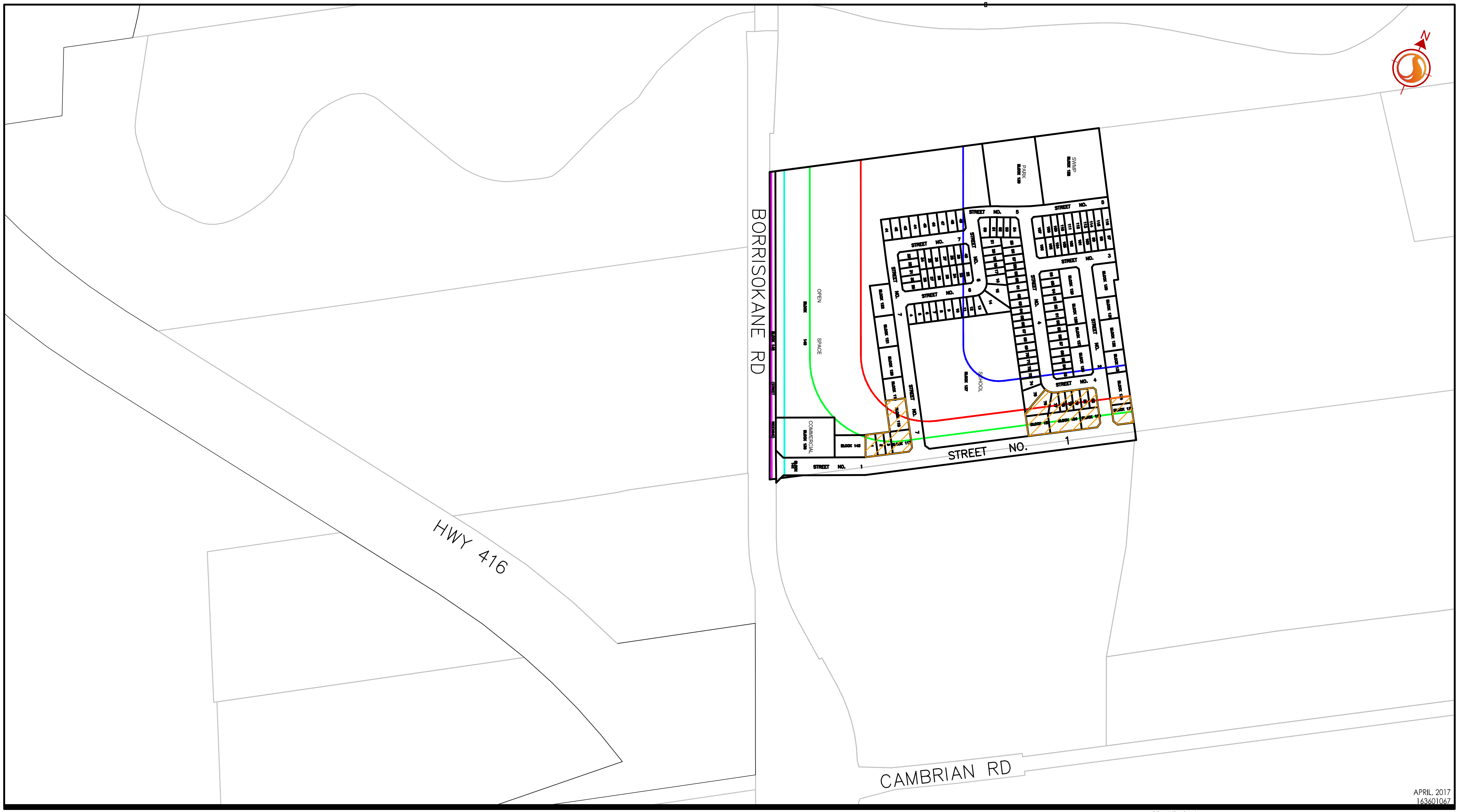
40 dBA
45 dBA
50 dBA
55 dBA
60 dBA
65 dBA
70 dBA
GENERIC INDOOR (GI)

Client/Project
GLENVIEW
3387 BORRISKANE ROAD
NOISE ASSESSMENT

Figure No.
3.0

Title
INDOOR - NIGHTTIME



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40 dBA
45 dBA
50 dBA
55 dBA
60 dBA
65 dBA
70 dBA
GENERIC OUTDOOR (GO)
EXTENSIVE MITIGATION OUTDOOR (MO)

Client/Project
GLENVIEW
3387 BORRISKANE ROAD
NOISE ASSESSMENT

Figure No.
4.0

Title
OUTDOOR

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Permanent Noise Wall

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Figure No.
5.0

Title
POTENTIAL NOISE WALL LOCATIONS

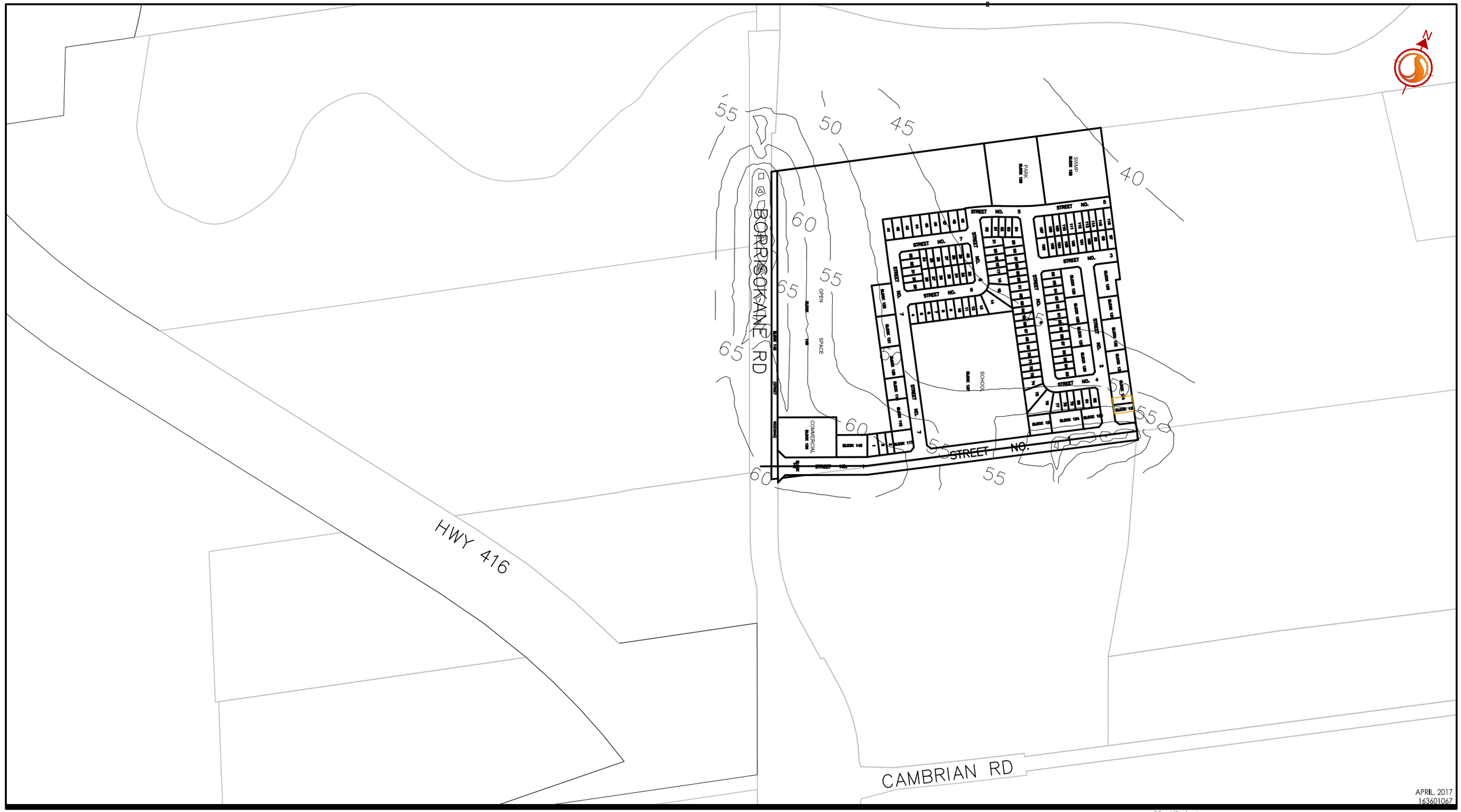

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Figure No.
6.0

Title
DAYTIME CONTOUR MAPPING (TNM 2.5)

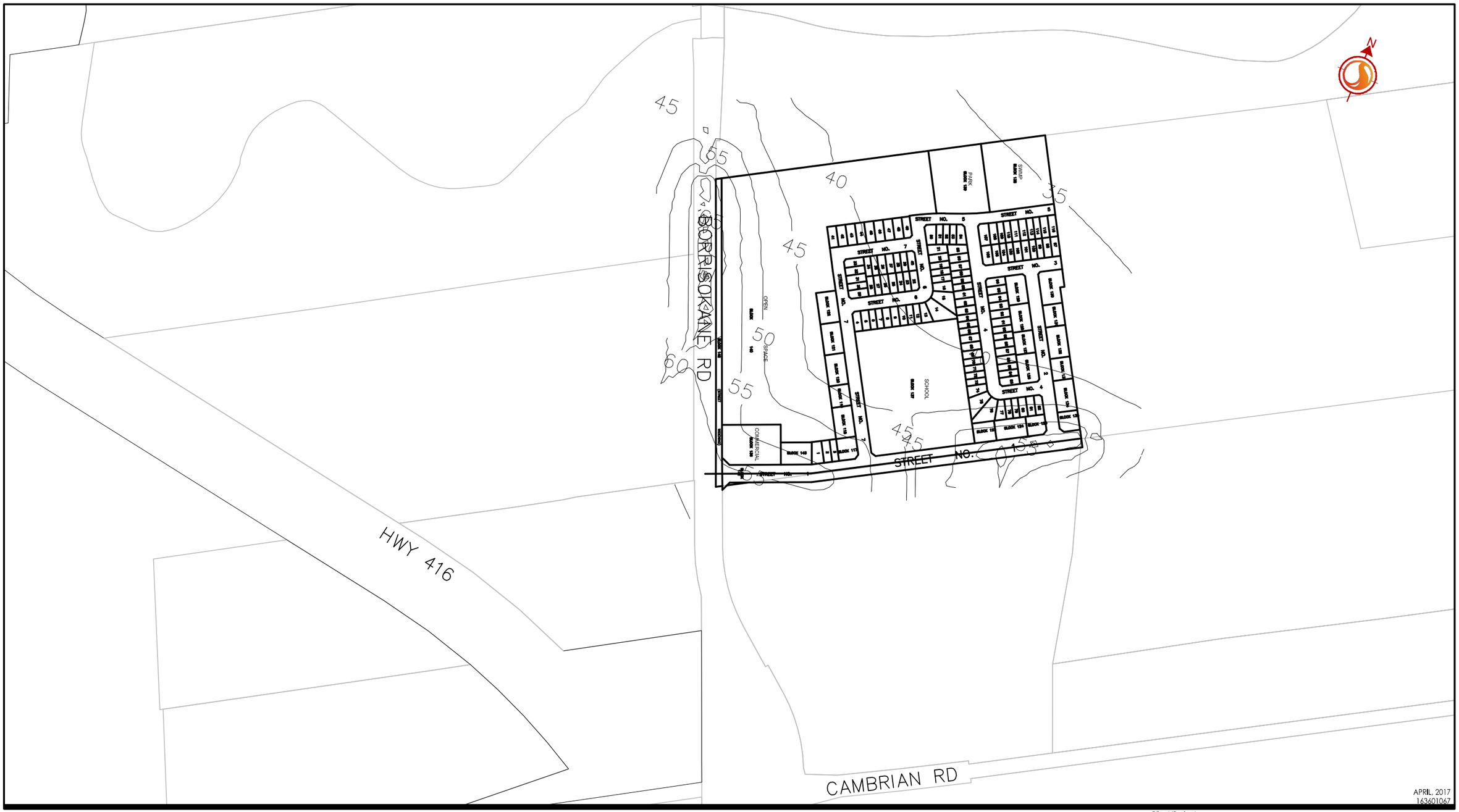

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Figure No.
7.0

Title
NIGHTTIME CONTOUR MAPPING (TNM 2.5)

second level (4.5m above road grade). The outdoor living areas were assumed at 1.5 m above road grade.

Unattenuated noise level calculations are provided in **Table 8** for daytime and nighttime building face noise levels, as well as, outdoor living area noise levels and have been summarized below.

Table 8 Summary of Projected Unattenuated Noise Contours

Road(s)	Contour (dBA)	Daytime-Building Face Distance (m)	Nighttime-Building Face Distance (m)	Outdoor Living Area Distance (m)
Borrisokane Road	40	-	476.8	-
	45	-	229.1	-
	50	294.4	110.0	277.4
	55	145.5	52.8	138.6
	60	71.7	25.4	69.2
	65	35.4	-	34.6
	70	17.5	-	17.3
Street 1	40	362.7	136.5	339.9
	45	178.9	65.6	169.9
	50	88.3	31.5	84.9
	55	43.6	15.1	42.5
	60	21.5	-	21.2
Highway 416 (northbound)	55	334.7	125.6	314.3

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1 CONCLUSIONS

Predicted noise level contours are expected to be above City of Ottawa and M.O.E. criteria at the daytime building face, the nighttime building face and outdoor living area for potential units facing Street 1.

Noise sensitive areas have been managed by orienting units along Street 1 to shield outdoor living areas from noise sources. Additionally, a commercial block (use non-sensitive to noise) occupies an elevated noise area near the intersection of Street 1 and Borrisokane Road, and may potentially provide shielding to the OLA of Units 1-3 and Block 118. The open space along Borrisokane Road provides sufficient setback as to negate requirements for noise attenuation measures along the parallel Street 7. Noise barriers may be required at lot flankages to ensure sound does not penetrate to OLAs along side streets.

The following summarizes the measures required by the City of Ottawa and MOECC criteria for the development to occur within accepted standards:

- Blocks 117, 123 to 125, 135, and portions of Blocks 118, and 134 as well as units 1 to 3, and 76 to 82 may be subject to Noise Warning Clause Generic Outdoor (GO), potentially requiring noise wall mitigation.

- Blocks 117, 123 to 125, 135, and portions of Blocks 118, and 134 as well as units 1 to 3, and 76 to 82 may be subject to Noise Warning Clause Generic Indoor (GI), requiring provisions for central air conditioning.

Noise warning clauses are provided in Appendix B.

The consideration of these measures will allow the residential development to proceed in accordance with City of Ottawa's planning approval process and form the basis for meeting the MOECC criteria with respect to environmental noise.

Respectfully Submitted By:

Darren Scott, P.Eng.,
Project Manager

Dustin Thiffault, P.Eng.,
Project Engineer

Appendix A NOISE LEVEL CALCULATIONS

A.1 INDOOR RECEIVER STAMSON REPORTS

STAMSON 5.0 NORMAL REPORT Date: 03-01-2017 14:51:56
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 40DBAIN.te Time Period: Day/Night 16/8 hours
Description: INDOOR 40 dBA Noise Contour - Indoor Receivers

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

Car traffic volume : 12144/1056 veh/TimePeriod *
Medium truck volume : 966/84 veh/TimePeriod *
Heavy truck volume : 690/60 veh/TimePeriod *
Posted speed limit : 80 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): 15000
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: Cedarview (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 : 500.00 / 476.79 m
Receiver height : 2.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Cedarview (day)

Source height = 1.50 m

ROAD (0.00 + 46.26 + 0.00) = 46.26 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj
SubLeq

-90 90 0.63 72.49 0.00 -24.83 -1.41 0.00 0.00 0.00
46.26

Segment Leq : 46.26 dBA

Total Leq All Segments: 46.26 dBA

Results segment # 1: Cedarview (night)

Source height = 1.50 m

ROAD (0.00 + 40.00 + 0.00) = 40.00 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj
SubLeq

-90 90 0.57 64.89 0.00 -23.59 -1.30 0.00 0.00 0.00
40.00

Segment Leq : 40.00 dBA

Total Leq All Segments: 40.00 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 46.26
(NIGHT): 40.00

STAMSON 5.0 NORMAL REPORT Date: 04-01-2017 12:55:14
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 45DBAIN.te Time Period: Day/Night 16/8 hours
Description: INDOOR 45 dBA Noise Contour - Indoor Receivers

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

Car traffic volume : 12144/1056 veh/TimePeriod *
Medium truck volume : 966/84 veh/TimePeriod *
Heavy truck volume : 690/60 veh/TimePeriod *
Posted speed limit : 80 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): 15000
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: Cedarview (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 : 500.00 / 229.08 m
Receiver height : 2.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Cedarview (day)

Source height = 1.50 m

ROAD (0.00 + 46.26 + 0.00) = 46.26 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj
SubLeq

-90 90 0.63 72.49 0.00 -24.83 -1.41 0.00 0.00 0.00
46.26

Segment Leq : 46.26 dBA

Total Leq All Segments: 46.26 dBA

Results segment # 1: Cedarview (night)

Source height = 1.50 m

ROAD (0.00 + 45.00 + 0.00) = 45.00 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj
SubLeq

-90 90 0.57 64.89 0.00 -18.59 -1.30 0.00 0.00 0.00
45.00

Segment Leq : 45.00 dBA

Total Leq All Segments: 45.00 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 46.26
(NIGHT): 45.00

STAMSON 5.0 NORMAL REPORT Date: 11-04-2016 15:59:49
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 50dbain.te Time Period: Day/Night 16/8 hours
Description: 50 dBA Noise Contour - Indoor Receivers

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

Car traffic volume : 12144/1056 veh/TimePeriod *
Medium truck volume : 966/84 veh/TimePeriod *
Heavy truck volume : 690/60 veh/TimePeriod *
Posted speed limit : 80 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): 15000
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: Cedarview (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 : 294.44 / 109.96 m
Receiver height : 2.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Cedarview (day)

Source height = 1.50 m

ROAD (0.00 + 50.00 + 0.00) = 50.00 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.63 72.49 0.00 -21.08 -1.41 0.00 0.00 0.00 50.00

Segment Leq : 50.00 dBA

Total Leq All Segments: 50.00 dBA

Results segment # 1: Cedarview (night)

Source height = 1.50 m

ROAD (0.00 + 50.00 + 0.00) = 50.00 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.57 64.89 0.00 -13.58 -1.30 0.00 0.00 0.00 50.00

Segment Leq : 50.00 dBA

Total Leq All Segments: 50.00 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 50.00
(NIGHT): 50.00

STAMSON 5.0 NORMAL REPORT Date: 11-04-2016 15:59:57
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 55dbain.te Time Period: Day/Night 16/8 hours
Description: 55 dBA Noise Contour - Indoor Receivers

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

Car traffic volume : 12144/1056 veh/TimePeriod *
Medium truck volume : 966/84 veh/TimePeriod *
Heavy truck volume : 690/60 veh/TimePeriod *
Posted speed limit : 80 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): 15000
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: Cedarview (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 : 145.49 / 52.83 m
Receiver height : 2.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Cedarview (day)

Source height = 1.50 m

ROAD (0.00 + 55.00 + 0.00) = 55.00 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.63 72.49 0.00 -16.09 -1.41 0.00 0.00 0.00 55.00

Segment Leq : 55.00 dBA

Total Leq All Segments: 55.00 dBA

Results segment # 1: Cedarview (night)

Source height = 1.50 m

ROAD (0.00 + 55.00 + 0.00) = 55.00 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.57 64.89 0.00 -8.59 -1.30 0.00 0.00 0.00 55.00

Segment Leq : 55.00 dBA

Total Leq All Segments: 55.00 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 55.00
(NIGHT): 55.00

STAMSON 5.0 NORMAL REPORT Date: 11-04-2016 16:01:55
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 60dbain.te Time Period: Day/Night 16/8 hours
Description: 60 dBA Noise Contour - Indoor Receivers

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

Car traffic volume : 12144/1056 veh/TimePeriod *
Medium truck volume : 966/84 veh/TimePeriod *
Heavy truck volume : 690/60 veh/TimePeriod *
Posted speed limit : 80 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): 15000
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: Cedarview (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 : 71.72 / 25.39 m
Receiver height : 2.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Cedarview (day)

Source height = 1.50 m

ROAD (0.00 + 60.00 + 0.00) = 60.00 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.63 72.49 0.00 -11.08 -1.41 0.00 0.00 0.00 60.00

Segment Leq : 60.00 dBA

Total Leq All Segments: 60.00 dBA

Results segment # 1: Cedarview (night)

Source height = 1.50 m

ROAD (0.00 + 60.00 + 0.00) = 60.00 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.57 64.89 0.00 -3.59 -1.30 0.00 0.00 0.00 60.00

Segment Leq : 60.00 dBA

Total Leq All Segments: 60.00 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 60.00
(NIGHT): 60.00

STAMSON 5.0 NORMAL REPORT Date: 11-04-2016 16:02:01
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 65dbain.te Time Period: Day/Night 16/8 hours
Description: 65 dBA Noise Contour - Indoor Receivers

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

Car traffic volume : 12144/1056 veh/TimePeriod *
Medium truck volume : 966/84 veh/TimePeriod *
Heavy truck volume : 690/60 veh/TimePeriod *
Posted speed limit : 80 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): 15000
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: Cedarview (day)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 35.43 m
Receiver height : 2.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Cedarview (day)

Source height = 1.50 m

ROAD (0.00 + 65.00 + 0.00) = 65.00 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.63 72.49 0.00 -6.08 -1.41 0.00 0.00 0.00 65.00

Segment Leq : 65.00 dBA

Total Leq All Segments: 65.00 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 65.00

STAMSON 5.0 NORMAL REPORT Date: 11-04-2016 16:02:07
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 70dbain.te Time Period: Day/Night 16/8 hours
Description: 70 dBA Noise Contour - Indoor Receivers

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

Car traffic volume : 12144/1056 veh/TimePeriod *
Medium truck volume : 966/84 veh/TimePeriod *
Heavy truck volume : 690/60 veh/TimePeriod *
Posted speed limit : 80 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): 15000
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: Cedarview (day)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 17.47 m
Receiver height : 2.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Cedarview (day)

Source height = 1.50 m

ROAD (0.00 + 70.00 + 0.00) = 70.00 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.63 72.49 0.00 -1.08 -1.41 0.00 0.00 0.00 70.00

Segment Leq : 70.00 dBA

Total Leq All Segments: 70.00 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 70.00

STAMSON 5.0 NORMAL REPORT Date: 12-04-2016 15:24:19
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 416in55.te Time Period: Day/Night 16/8 hours
Description: 55 dBA Noise Contour - Indoor Highway 416

Road data, segment # 1: Highway 416 (day/night)

Car traffic volume : 29685/2581 veh/TimePeriod *
Medium truck volume : 2361/205 veh/TimePeriod *
Heavy truck volume : 1687/147 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): 36666
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: Highway 416 (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 : 334.70 / 125.60 m
Receiver height : 2.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Highway 416 (day)

Source height = 1.50 m

ROAD (0.00 + 55.00 + 0.00) = 55.00 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.63 78.39 0.00 -21.98 -1.41 0.00 0.00 0.00 55.00

Segment Leq : 55.00 dBA

Total Leq All Segments: 55.00 dBA

Results segment # 1: Highway 416 (night)

Source height = 1.50 m

ROAD (0.00 + 55.00 + 0.00) = 55.00 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.57 70.79 0.00 -14.49 -1.30 0.00 0.00 0.00 55.00

Segment Leq : 55.00 dBA

Total Leq All Segments: 55.00 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 55.00
(NIGHT): 55.00

```
STAMSON 5.0        NORMAL REPORT        Date: 03-01-2017 14:49:46
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: S640.te              Time Period: Day/Night 16/8 hours
Description: 40 dBA Noise Contour - Indoor Receivers


Road data, segment # 1:  (day/night)
-----------------------------------
Car traffic volume  :  6477/563   veh/TimePeriod  *
Medium truck volume :   515/45    veh/TimePeriod  *
Heavy truck volume  :   368/32    veh/TimePeriod  *
Posted speed limit  :    40 km/h
Road gradient       :     0 %
Road pavement       :     1 (Typical asphalt or concrete)

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

    24 hr Traffic Volume (AADT or SADT):   8000
    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:  (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  : 362.65 / 136.49 m
Receiver height           :   2.50 / 4.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

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

Source height = 1.50 m

ROAD (0.00 + 40.00 + 0.00) = 40.00 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -90     90   0.63  63.96   0.00 -22.55  -1.41   0.00   0.00   0.00
40.00
-------------------------------------------------------------------------
---

Segment Leq : 40.00 dBA

Total Leq All Segments: 40.00 dBA

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

Source height = 1.50 m

ROAD (0.00 + 40.00 + 0.00) = 40.00 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
---
   -90     90   0.57  56.36   0.00 -15.06  -1.30   0.00   0.00   0.00
40.00
-------------------------------------------------------------------------
---

Segment Leq : 40.00 dBA

Total Leq All Segments: 40.00 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 40.00
                           (NIGHT): 40.00
```

STAMSON 5.0 NORMAL REPORT Date: 04-01-2017 12:59:10
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: S645.te Time Period: Day/Night 16/8 hours
Description: 45 dBA Noise Contour - Indoor Receivers

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

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 8000
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: (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 : 178.88 / 65.56 m
Receiver height : 2.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: (day)

Source height = 1.50 m

ROAD (0.00 + 45.00 + 0.00) = 45.00 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.63 63.96 0.00 -17.55 -1.41 0.00 0.00 0.00 45.00

Segment Leq : 45.00 dBA

Total Leq All Segments: 45.00 dBA

Results segment # 1: (night)

Source height = 1.50 m

ROAD (0.00 + 45.00 + 0.00) = 45.00 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.57 56.36 0.00 -10.06 -1.30 0.00 0.00 0.00 45.00

Segment Leq : 45.00 dBA

Total Leq All Segments: 45.00 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 45.00
(NIGHT): 45.00

STAMSON 5.0 NORMAL REPORT Date: 07-09-2016 13:15:02
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s650.te Time Period: Day/Night 16/8 hours
Description: 50 dBA Noise Contour - Indoor Receivers

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

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 8000
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: (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 : 88.30 / 31.50 m
Receiver height : 2.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: (day)

Source height = 1.50 m

ROAD (0.00 + 50.00 + 0.00) = 50.00 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.63 63.96 0.00 -12.55 -1.41 0.00 0.00 0.00 50.00

Segment Leq : 50.00 dBA

Total Leq All Segments: 50.00 dBA

Results segment # 1: (night)

Source height = 1.50 m

ROAD (0.00 + 50.00 + 0.00) = 50.00 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.57 56.36 0.00 -5.06 -1.30 0.00 0.00 0.00 50.00

Segment Leq : 50.00 dBA

Total Leq All Segments: 50.00 dBA

STAMSON 5.0 NORMAL REPORT Date: 07-09-2016 13:17:28
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s655.te Time Period: Day/Night 16/8 hours
Description: 55 dBA Noise Contour - Indoor Receivers

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

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 8000
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: (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 : 43.60 / 15.10 m
Receiver height : 2.50 / 4.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: (day)

Source height = 1.50 m

ROAD (0.00 + 55.00 + 0.00) = 55.00 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.63 63.96 0.00 -7.55 -1.41 0.00 0.00 0.00 55.00

Segment Leq : 55.00 dBA

Total Leq All Segments: 55.00 dBA

Results segment # 1: (night)

Source height = 1.50 m

ROAD (0.00 + 55.00 + 0.00) = 55.00 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.57 56.36 0.00 -0.05 -1.30 0.00 0.00 0.00 55.00

Segment Leq : 55.00 dBA

Total Leq All Segments: 55.00 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 55.00
(NIGHT): 55.00

STAMSON 5.0 NORMAL REPORT Date: 07-09-2016 13:18:26
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s660.te Time Period: Day/Night 16/8 hours
Description: 60 dBA Noise Contour - Indoor Receivers

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

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 8000
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: (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 21.50
Receiver height : 2.50
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: (day)

Source height = 1.50 m

ROAD (0.00 + 60.00 + 0.00) = 60.00 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.63 63.96 0.00 -2.55 -1.41 0.00 0.00 0.00 60.00

Segment Leq : 60.00 dBA

Total Leq All Segments: 60.00 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 60.00

A.2 OUTDOOR RECEIVER STAMSON REPORTS

STAMSON 5.0 NORMAL REPORT Date: 11-04-2016 15:59:00
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 50dba.te Time Period: Day/Night 16/8 hours
Description: 50 dBA Noise Contour - Outdoor Receiver

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

Car traffic volume : 12144/1056 veh/TimePeriod *
Medium truck volume : 966/84 veh/TimePeriod *
Heavy truck volume : 690/60 veh/TimePeriod *
Posted speed limit : 80 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): 15000
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: Cedarview (day)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 277.39 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Cedarview (day)

Source height = 1.50 m

ROAD (0.00 + 50.00 + 0.00) = 50.00 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.66 72.49 0.00 -21.03 -1.46 0.00 0.00 0.00 50.00

Segment Leq : 50.00 dBA

Total Leq All Segments: 50.00 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 50.00

STAMSON 5.0 NORMAL REPORT Date: 11-04-2016 15:59:07
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 55dba.te Time Period: Day/Night 16/8 hours
Description: 55 dBA Noise Contour - Outdoor Receiver

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

Car traffic volume : 12144/1056 veh/TimePeriod *
Medium truck volume : 966/84 veh/TimePeriod *
Heavy truck volume : 690/60 veh/TimePeriod *
Posted speed limit : 80 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): 15000
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: Cedarview (day)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 138.62 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Cedarview (day)

Source height = 1.50 m

ROAD (0.00 + 55.00 + 0.00) = 55.00 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.66 72.49 0.00 -16.03 -1.46 0.00 0.00 0.00 55.00

Segment Leq : 55.00 dBA

Total Leq All Segments: 55.00 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 55.00

STAMSON 5.0 NORMAL REPORT Date: 11-04-2016 15:59:18
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 60dba.te Time Period: Day/Night 16/8 hours
Description: 60 dBA Noise Contour - Outdoor Receiver

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

Car traffic volume : 12144/1056 veh/TimePeriod *
Medium truck volume : 966/84 veh/TimePeriod *
Heavy truck volume : 690/60 veh/TimePeriod *
Posted speed limit : 80 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): 15000
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: Cedarview (day)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 69.23 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Cedarview (day)

Source height = 1.50 m

ROAD (0.00 + 60.00 + 0.00) = 60.00 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.66 72.49 0.00 -11.03 -1.46 0.00 0.00 0.00 60.00

Segment Leq : 60.00 dBA

Total Leq All Segments: 60.00 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 60.00

STAMSON 5.0 NORMAL REPORT Date: 11-04-2016 15:59:24
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 65dba.te Time Period: Day/Night 16/8 hours
Description: 65 dBA Noise Contour - Outdoor Receiver

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

Car traffic volume : 12144/1056 veh/TimePeriod *
Medium truck volume : 966/84 veh/TimePeriod *
Heavy truck volume : 690/60 veh/TimePeriod *
Posted speed limit : 80 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): 15000
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: Cedarview (day)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 34.63 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Cedarview (day)

Source height = 1.50 m

ROAD (0.00 + 65.00 + 0.00) = 65.00 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.66 72.49 0.00 -6.03 -1.46 0.00 0.00 0.00 65.00

Segment Leq : 65.00 dBA

Total Leq All Segments: 65.00 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 65.00

STAMSON 5.0 NORMAL REPORT Date: 11-04-2016 15:59:38
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 70dba.te Time Period: Day/Night 16/8 hours
Description: 70 dBA Noise Contour - Outdoor Receiver

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

Car traffic volume : 12144/1056 veh/TimePeriod *
Medium truck volume : 966/84 veh/TimePeriod *
Heavy truck volume : 690/60 veh/TimePeriod *
Posted speed limit : 80 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): 15000
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: Cedarview (day)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 17.31 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Cedarview (day)

Source height = 1.50 m

ROAD (0.00 + 70.00 + 0.00) = 70.00 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.66 72.49 0.00 -1.03 -1.46 0.00 0.00 0.00 70.00

Segment Leq : 70.00 dBA

Total Leq All Segments: 70.00 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 70.00

STAMSON 5.0 NORMAL REPORT Date: 12-04-2016 15:24:47
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: 416out55.te Time Period: Day/Night 16/8 hours
Description: 55 dBA Noise Contour - Outdoor Highway 416

Road data, segment # 1: Highway 416 (day/night)

Car traffic volume : 29685/2581 veh/TimePeriod *
Medium truck volume : 2361/205 veh/TimePeriod *
Heavy truck volume : 1687/147 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): 36666
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: Highway 416 (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 314.30 m
Receiver height : 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Highway 416 (day)

Source height = 1.50 m

ROAD (0.00 + 55.00 + 0.00) = 55.00 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.66 78.39 0.00 -21.93 -1.46 0.00 0.00 0.00 55.00

Segment Leq : 55.00 dBA

Total Leq All Segments: 55.00 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 55.00

STAMSON 5.0 NORMAL REPORT Date: 03-01-2017 14:48:56
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: S640OUT.te Time Period: Day/Night 16/8 hours
Description: 40 dBA Noise Contour - Outdoor Receiver

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

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 8000
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: (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 339.90
Receiver height : 1.50
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: (day)

Source height = 1.50 m

ROAD (0.00 + 40.00 + 0.00) = 40.00 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.66 63.96 0.00 -22.50 -1.46 0.00 0.00 0.00 40.00

Segment Leq : 40.00 dBA

Total Leq All Segments: 40.00 dBA
TOTAL Leq FROM ALL SOURCES (DAY): 40.00

STAMSON 5.0 NORMAL REPORT Date: 04-01-2017 13:01:01
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: S645OUT.te Time Period: Day/Night 16/8 hours
Description: 45 dBA Noise Contour - Outdoor Receiver

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

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 8000
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: (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 : 169.88
Receiver height : 1.50
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: (day)

Source height = 1.50 m

ROAD (0.00 + 45.00 + 0.00) = 45.00 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.66 63.96 0.00 -17.50 -1.46 0.00 0.00 0.00 45.00

Segment Leq : 45.00 dBA

Total Leq All Segments: 45.00 dBA
TOTAL Leq FROM ALL SOURCES (DAY): 45.00

STAMSON 5.0 NORMAL REPORT Date: 07-09-2016 13:33:48
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s650out.te Time Period: Day/Night 16/8 hours
Description: 50 dBA Noise Contour - Outdoor Receivers

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

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 8000
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: (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 84.90
Receiver height : 1.50
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: (day)

Source height = 1.50 m

ROAD (0.00 + 50.00 + 0.00) = 50.00 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.66 63.96 0.00 -12.50 -1.46 0.00 0.00 0.00 50.00

Segment Leq : 50.00 dBA
Total Leq All Segments: 50.00 dBA
TOTAL Leq FROM ALL SOURCES (DAY): 50.00

STAMSON 5.0 NORMAL REPORT Date: 07-09-2016 13:33:14
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s655out.te Time Period: Day/Night 16/8 hours
Description: 55 dBA Noise Contour - Outdoor Receivers

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

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 8000
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: (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 42.50
Receiver height : 1.50
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: (day)

Source height = 1.50 m

ROAD (0.00 + 55.00 + 0.00) = 55.00 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.66 63.96 0.00 -7.51 -1.46 0.00 0.00 0.00 54.99

Segment Leq : 55.00 dBA
Total Leq All Segments: 55.00 dBA
TOTAL Leq FROM ALL SOURCES (DAY): 55.00

STAMSON 5.0 NORMAL REPORT Date: 07-09-2016 13:30:14
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: s660out.te Time Period: Day/Night 16/8 hours
Description: 60 dBA Noise Contour - Outdoor Receivers

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

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 veh/TimePeriod *
Posted speed limit : 40 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 8000
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: (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 21.20
Receiver height : 1.50
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: (day)

Source height = 1.50 m

ROAD (0.00 + 60.00 + 0.00) = 60.00 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 90 0.66 63.96 0.00 -2.49 -1.46 0.00 0.00 0.00 60.00

Segment Leq : 60.00 dBA
Total Leq All Segments: 60.00 dBA
TOTAL Leq FROM ALL SOURCES (DAY): 60.00

A.3 SAMPLE TNM 2.5 INPUT PARAMETERS

Stantec Consulting Ltd.					**2 May 2017**							
Dustin Thiffault					**TNM 2.5**							
INPUT: ROADWAYS								**Average pavement type shall be used unless**				
PROJECT/CONTRACT:	**163601067**							**a State highway agency substantiates the use**				
RUN:	**Borrisokane Noise Assessment**							**of a different type with the approval of FHWA**				
Roadway		**Points**										
Name	**Width**	**Name**	**No.**	**Coordinates (pavement)**				**Flow Control**			**Segment**	
				X	**Y**	**Z**	**Control Device**	**Speed Constraint**	**Percent Vehicles Affected**	**Pvmt Type**	**On Struct?**
	m			m	m	m		km/h	%		
HWY416	12.0	point1	1	362,370.0	11,948.9	100.00				Average	
		point2	2	362,407.0	11,941.9	100.00				Average	
		point3	3	362,486.0	11,926.1	100.00				Average	
		point4	4	362,562.0	11,902.9	100.00				Average	
		point5	5	362,636.0	11,874.9	100.00				Average	
		point6	6	362,850.0	11,783.1	100.00					
Borrisokane	11.0	point7	7	362,579.0	12,564.0	100.00				Average	
		point8	8	362,732.0	12,193.1	100.00					
Street 1	8.5	point9	9	362,732.0	12,193.1	100.00				Average	
		point10	10	362,865.0	12,248.9	100.00				Average	
		point11	11	363,186.0	12,432.0	100.00					
HWY416_S	12.0	point17	17	362,830.0	11,737.0	100.00				Average	
		point18	18	362,617.0	11,829.0	100.00				Average	
		point19	19	362,546.0	11,856.0	100.00				Average	
		point20	20	362,473.0	11,877.0	100.00				Average	
		point21	21	362,398.0	11,893.0	100.00				Average	
		point22	22	362,361.0	11,899.0	100.00					

Stantec Consulting Ltd. 2 May 2017
Dustin Thiffault TNM 2.5

INPUT: TRAFFIC FOR LAeq1h Percentages
PROJECT/CONTRACT: 163601067
RUN: Borrisokane Noise Assessment

Roadway	Points		Segment											
Name	Name	No.	Total	Autos		MTrucks		HTrucks		Buses		Motorcycles	
			Volume	P	S	P	S	P	S	P	S	P	S
			veh/hr	%	km/h	%	km/h	%	km/h	%	km/h	%	km/h
HWY416	point1	1	2108	88	100	7	100	5	100	0	0	0	0
	point2	2	2108	88	100	7	100	5	100	0	0	0	0
	point3	3	2108	88	100	7	100	5	100	0	0	0	0
	point4	4	2108	88	100	7	100	5	100	0	0	0	0
	point5	5	2108	88	100	7	100	5	100	0	0	0	0
	point6	6											
Borrisokane	point7	7	863	88	80	7	80	5	80	0	0	0	0
	point8	8											
Street 1	point9	9	460	88	40	7	40	5	40	0	0	0	0
	point10	10	460	88	40	7	40	5	40	0	0	0	0
	point11	11											
HWY416_S	point17	17	2108	88	100	7	100	5	100	0	0	0	0
	point18	18	2108	88	100	7	100	5	100	0	0	0	0
	point19	19	2108	88	100	7	100	5	100	0	0	0	0
	point20	20	2108	88	100	7	100	5	100	0	0	0	0
	point21	21	2108	88	100	7	100	5	100	0	0	0	0
	point22	22											

Stantec Consulting Ltd.				**2 May 2017**	
Dustin Thiffault				**TNM 2.5**	
INPUT: GROUND ZONES					
PROJECT/CONTRACT:	**163601067**				
RUN:	**Borrisokane Noise Assessment**				
Ground Zone			**Points**		
Name	**Type**	**Flow**	**No.**	**Coordinates**	
		Resistivity		**X**	**Y**
		cgs rayls		m	m
Ground Zone1	Lawn	300	1	362,290.3	12,017.5
			2	363,382.9	11,943.9
			3	363,434.8	12,878.6
			4	362,199.4	12,900.2

Stantec Consulting Ltd.				**2 May 2017**		
Dustin Thiffault				**TNM 2.5**		
INPUT: CONTOUR ZONES						
PROJECT/CONTRACT:	**163601067**					
RUN:	**Borrisokane Noise Assessment**					
Contour Zone				**Points**		
Name	**Grid**	**Minimum**	**Contour**	**No.**	**Coordinates**	
	Height	**Grid**	**Tolerance**		**X**	**Y**
		Spacing				
	m	m	dB		m	m
Contour Zone2	1.50	5.00	1	1	362,476.6	12,630.5
				2	362,703.1	12,118.1
				3	363,283.7	12,421.7
				4	363,041.8	12,894.4

Appendix B NOISE WARNING CLAUSES

PHASE 1 NOISE CONTROL FEASIBILITY STUDY REQUIREMENTS

Appendix B Noise Warning Clauses
April 28, 2017

WARNING CLAUSES

The following warning clauses may be used individually or in combination:

Generic Indoor (GI):

Indoor environment - $L_{eq}(16)$ greater than 55 dBA and less than or equal to 65 dBA or ($L_{eq}(8)$ greater than 50dBA and less than or equal to 60 dBA

To help address the need for sound attenuation this development has been designed so as to provide an indoor environment that is within provincial guidelines. Measures for sound attenuation include:

- a setback of buildings from the noise source;
- the provision for adding central air conditioning at the occupant's discretion.

Installation of central air conditioning will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the City of Ottawa and the Ministry of the Environment and Climate Change.

Generic Outdoor (GO):

Outdoor amenity areas- $L_{eq}(16)$ in the OLA greater than 55 dBA and less than 60dBA.

Purchasers/tenants are advised that sound levels due to increasing road traffic (rail traffic) may occasionally interfere with some outdoor activities as the sound level limits of the City and the Ministry of the Environment.

Source: City of Ottawa - Environmental Noise Control Guidelines, January 2016 and Ontario Ministry of the Environment, Environmental Noise Guideline Stationary and Transportation Sources – Approval and Planning Publication NPC-300, Queen's Printer for Ontario, 2013