

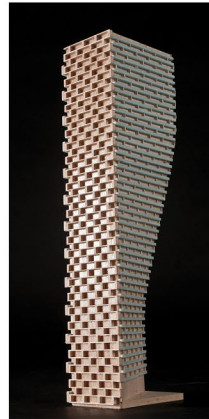
GRADIENTWIND

ENGINEERS & SCIENTISTS

ENVIRONMENTAL NOISE ASSESSMENT

6310 Hazeldean Rd.
Ottawa, Ontario

REPORT: GW20-303-Environmental Noise



December 12th, 2023

PREPARED FOR

9441-6302 Quebec Inc.
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PREPARED BY

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EXECUTIVE SUMMARY

This report describes an environmental noise assessment performed for the proposed residential development, located 6310 Hazeldean Road, in the Stittsville community of Ottawa, Ontario. The proposed development comprises of two, unique multi-storey buildings. The major sources of roadway traffic noise are Hazeldean and Carp Roads. Figure 1 illustrates a complete site plan with surrounding context.

The assessment is based on (i) theoretical noise prediction methods that conform to the Ministry of the Environment, Conservation and Parks (MECP) and City of Ottawa requirements; (ii) noise level criteria as specified by the City of Ottawa's Environmental Noise Control Guidelines (ENCG); (iii) architectural drawings provided by Figurr Collectif D'architectes in August 2023; (iv) future roadway traffic volumes corresponding to the City of Ottawa's Official Plan (OP) roadway classifications; and (vi) satellite imagery of the surrounding properties.

The results of the current analysis indicate that noise levels will range between 48 and 72 dBA during the daytime period (07:00-23:00) and between 44 and 64 dBA during the nighttime period (23:00-07:00). The highest noise level (72 dBA) occurs along the front façade of buildings A and B, which is nearest and most exposed to Hazeldean Rd. Building components with a higher Sound Transmission Class (STC) rating will be required where exterior noise levels exceed 65 dBA, as indicated in Figure 3.

Results of the calculations also indicate that buildings A and B will require forced air heating systems with central air conditioning, or similar mechanical system, which will allow occupants to keep windows closed and maintain a comfortable living/working environment. The following Type D Warning Clause¹ will be required on all Lease, Purchase and Sale Agreements, as summarized in Section 6.

Noise levels at select amenity areas are expected to exceed the 55 dBA OLA noise criterion during the daytime period. If these areas are to be used as outdoor living areas, noise control measures are required to reduce noise levels as close as possible to 55 dBA. Further analysis investigated the noise mitigating

¹ MECP, Environmental Noise Guidelines, NPC 300 – Part C, Section 8



impact of adding a 1.1m perimeter noise guard along the sides of the walking surface would successfully reduce the noise levels below the 55 dBA OLA noise criterion.

Regarding stationary noise impacts from the development on the surroundings, these can be minimized by judicious placement mechanical equipment such as its placement on a roof or in a mechanical penthouse, or the incorporation of silencers and noise screens as necessary. Due to the size and nature of the development, the HVAC equipment is expected to be located in the mechanical penthouses and comply with the ENCG Sound Level Limits and City of Ottawa Noise By-Law No. 2017-255.

TABLE OF CONTENTS

1. INTRODUCTION	1
2. TERMS OF REFERENCE	1
3. OBJECTIVES	2
4. METHODOLOGY.....	2
4.1 Background.....	2
4.2 Roadway Traffic Noise.....	2
4.2.1 Criteria for Roadway Traffic Noise	2
4.2.2 Roadway Traffic Volumes.....	4
4.2.3 Theoretical Traffic Noise Predictions.....	4
4.3 Indoor Noise Calculations	5
5. RESULTS	7
5.1 Roadway Traffic Noise Levels.....	7
5.2 Noise Control Measures	7
5.3 Noise Barrier Calculation	8
6. CONCLUSIONS AND RECOMMENDATIONS	9

FIGURES

APPENDICES

Appendix A – STAMSON 5.04 Input and Output Data

1. INTRODUCTION

Gradient Wind Engineering Inc. (Gradient Wind) was retained by 9441-6302 Quebec Inc. to undertake an environmental noise assessment for the proposed residential development, located 6310 Hazeldean Road, in the Stittsville community of Ottawa, Ontario. This report summarizes the methodology, results, and recommendations related to an environmental noise assessment.

The present scope of work involves assessing exterior and interior noise levels generated by local roadway traffic and existing stationary sources. The assessment was performed on the basis of theoretical noise calculation methods conforming to the City of Ottawa² and Ministry of the Environment, Conservation and Parks (MECP)³ guidelines. Noise calculations were based on architectural drawings provided by Figurr Collectif D'architectes in August 2023, with future roadway traffic volumes corresponding to the City of Ottawa's Official Plan (OP) roadway classifications.

2. TERMS OF REFERENCE

The proposed development comprises of 2 unique multi-storey buildings. The larger, building A, comprises of an angular (L) design with an above ground parking structure inside. The taller, building B, is a rectilinear tower extending 25 floors up. The multi-level parking structure incorporates an amenity greenspace on its roof for the use of residents.

The major sources of roadway traffic noise are Hazeldean Road and Carp Road. Across the street from the study site is a small retail development containing grocery stores and fast-food places, while the back of the site encompasses existing residential properties. Figure 1 illustrates a complete site plan with surrounding context.

The nearby Highway 417 was deemed an insignificant noise source due to the large distance between it and the site ($\approx 1\text{km}$). The local roads behind the property such as Kyle Avenue, and Crantham Crescent are also deemed insignificant due to their low traffic volumes.

² City of Ottawa Environmental Noise Control Guidelines, January 2016

³ Ontario Ministry of the Environment, Conservation and Parks – Environmental Noise Guidelines, Publication NPC-300, Queens Printer for Ontario, Toronto, 2013



Regarding stationary noise impacts from the development on the surroundings, these can be minimized by judicious placement mechanical equipment such as its placement on a roof or in a mechanical penthouse, or the incorporation of silencers and noise screens as necessary. Due to the size and nature of the development, the HVAC equipment is expected to be located in the mechanical penthouses and comply with the ENCG Sound Level Limits and City of Ottawa Noise By-Law No. 2017-255.

3. OBJECTIVES

The main goals of this work are to (i) calculate the future noise levels on the study site produced by local transportation, (ii) ensure that interior noise levels do not exceed the allowable limits specified by the City of Ottawa's Environmental Noise Control Guidelines as outlined in Section 4 of this report.

4. METHODOLOGY

4.1 Background

Noise can be defined as any obtrusive sound. It is created at a source, transmitted through a medium, such as air, and intercepted by a receiver. Noise may be characterized in terms of the power of the source or the sound pressure at a specific distance. While the power of a source is characteristic of that particular source, the sound pressure depends on the location of the receiver and the path that the noise takes to reach the receiver. Measurement of noise is based on the decibel unit, dBA, which is a logarithmic ratio referenced to a standard noise level (2×10^{-5} Pascals). The 'A' suffix refers to a weighting scale, which better represents how the noise is perceived by the human ear. With this scale, a doubling of power results in a 3 dBA increase in measured noise levels and is just perceptible to most people. An increase of 10 dBA is often perceived to be twice as loud.

4.2 Roadway Traffic Noise

4.2.1 Criteria for Roadway Traffic Noise

For vehicle traffic, the equivalent sound energy level, L_{eq} , provides a measure of the time varying noise levels, which is well correlated with the annoyance of sound. It is defined as the continuous sound level, which has the same energy as a time varying noise level over a period of time. For roadways, the L_{eq} is commonly calculated on the basis of a 16-hour (L_{eq16}) daytime (07:00-23:00)/8-hour (L_{eq8}) nighttime (23:00-07:00) split to assess its impact on residential buildings. The NPC-300 guidelines specify that the



recommended indoor noise limit range (that is relevant to this study) is 45 and 40 dBA for residence living rooms and sleeping quarters, respectively, as listed in Table 1.

TABLE 1: INDOOR SOUND LEVEL CRITERIA (ROAD) ⁴

Type of Space	Time Period	L _{eq} (dBA)
General offices, reception areas, retail stores, etc.	07:00 – 23:00	50
Living/dining/den areas of residences , hospitals, schools, nursing/retirement homes, day-care centers, theatres, places of worship, libraries, individual or semi-private offices, conference rooms, etc.	07:00 – 23:00	45
Sleeping quarters of hotels/motels	23:00 - 07:00	45
Sleeping quarters of residences , hospitals, nursing/retirement homes, etc.	23:00 – 07:00	40

Predicted noise levels at the plane of window (POW) dictate the action required to achieve the recommended sound levels. An open window is considered to provide a 10 dBA reduction in noise while a standard closed window is capable of providing a minimum 20 dBA noise reduction⁵. Therefore, where noise levels exceed 55 dBA daytime and 50 dBA nighttime, the ventilation for the building should consider the need for having windows and doors closed, which normally triggers the need for central air conditioning (or similar systems). Where noise levels exceed 65 dBA daytime and 60 dBA nighttime building components will require higher levels of sound attenuation⁶.

For designated Outdoor Living Areas (OLAs), the sound level limit is 55 dBA during the daytime period. An excess above the limit is acceptable only in cases where the required noise control measures are not feasible for technical, economic or administrative reasons.

⁴ Adapted from Table C-2, Part C, Section 3.2.3 of NPC-300

⁵ Burberry, P.B. (2014). Mitchell's Environment and Services. Routledge, Page 125

⁶ MECP, Environmental Noise Guidelines, NPC 300 – Part C, Section 7.1.3



4.2.2 Roadway Traffic Volumes

The ENCG dictates that noise calculations should consider future sound levels based on a roadway's classification at the mature state of development. Therefore, traffic volumes are based on the roadway classifications outlined in the City of Ottawa's Official Plan (OP) and Transportation Master Plan⁷ which provide additional details on future roadway expansions. Average Annual Daily Traffic (AADT) volumes are then based on data in Table B1 of the ENCG for each roadway classification. Table 2 (below) summarizes the AADT values used for each roadway included in this assessment.

TABLE 2: ROADWAY TRAFFIC DATA

Segment	Roadway Class	Speed Limit (km/h)	Ultimate AADT	Day/Night Split	Truck Volume Percentages	
					Medium Truck	Heavy Truck
Hazeldean Rd.	4-Lane Urban Arterial	60	35,000	92/8	7	5
Carp Rd.	4-Lane Urban Arterial	60	35,000	92/8	7	5

4.2.3 Theoretical Traffic Noise Predictions

Noise predictions were performed with the aid of the MECP computerized noise assessment program, STAMSON 5.04, for road analysis. Appendix A includes the STAMSON 5.04 input and output data.

Roadway traffic noise calculations were performed by treating each roadway segment as a separate line source of noise, and by using proposed and existing building locations as noise barriers. In addition to the traffic volumes summarized in Table 2, theoretical noise predictions were based on the following parameters:

- Vehicle parameters such as truck traffic volume percentages, posted speed limit, and day/night split are summarized in Table 2.
- Default ground surfaces were taken to be reflective due to the presence of hard (paved) ground.
- Topography was assumed to be a flat/gentle slope surrounding the study building.

⁷ City of Ottawa Transportation Master Plan, November 2013



- Noise receptors were strategically placed at 10 locations around the study area (see Figure 2).
- For select sources where appropriate, receptors considered the proposed and existing building as a barrier partially or fully obstructing exposure to the source.
- Receptor distances and exposure angles are illustrated in Figures 4-5.
- Receptor heights were calculated under the assumption that the 1st level is 5m tall, and 3m for every additional floor.

4.3 Indoor Noise Calculations

The difference between outdoor and indoor noise levels is the noise attenuation provided by the building envelope. According to common industry practice, complete walls and individual wall elements are rated according to the Sound Transmission Class (STC). The STC ratings of common residential walls built in conformance with the Ontario Building Code (2012) typically exceed STC 35, depending on exterior cladding, thickness, and interior finish details. For example, concrete and masonry walls can achieve STC 50 or more. Curtainwall systems typically provide around STC 35, depending on the glazing elements. Standard good quality double-glazed non-operable windows can have STC ratings ranging from 25 to 40 depending on the window manufacturer, pane thickness and inter-pane spacing. As previously mentioned, the windows are the known weak point in a partition.

According to the ENCG, when daytime noise levels (from road and rail sources) at the plane of the window exceed 65 dBA, calculations must be performed to evaluate the sound transmission quality of the building components to ensure acceptable indoor noise levels. The calculation procedure⁸ considers:

- Window type and total area as a percentage of total room floor area
- Exterior wall type and total area as a percentage of the total room floor area
- Acoustic absorption characteristics of the room
- Outdoor noise source type and approach geometry
- Indoor sound level criteria, which varies according to the intended use of a space

⁸ Building Practice Note: Controlling Sound Transmission into Buildings by J.D. Quirt, National Research Council of Canada, September 1985



Based on published research⁹, exterior walls possess specific sound attenuation characteristics that are used as a basis for calculating the required STC ratings of windows in the same partition. Due to the limited information available at the time of the study, which was prepared for site plan approval, final detailed floor layouts and building elevations were unavailable and therefore detailed STC calculations could not be performed at this time. As a guideline, the anticipated STC requirements for windows have been estimated based on the overall noise reduction required for each intended use of space ($STC = \text{outdoor noise level} - \text{targeted indoor noise levels} + \text{safety factor}$).

⁹ CMHC, Road & Rail Noise: Effects on Housing

5. RESULTS

5.1 Roadway Traffic Noise Levels

The results of the current analysis indicate that noise levels will range between 48 and 72 dBA during the daytime period (07:00-23:00) and between 44 and 64 dBA during the nighttime period (23:00-07:00). The highest noise level (72 dBA) occurs along the front façade of buildings A and B, which is nearest and most exposed to Hazeldean Rd.

TABLE 5: EXTERIOR NOISE LEVELS DUE TO ROADWAY TRAFFIC SOURCES

Receptor Number	Receptor Height Above Grade (m)	Receptor Location	STAMSON Roadway Noise Level (dBA)	
			Day	Night
Outdoor Living Areas				
1	15.5	OLA – Garage Amenity Roof	48	N/A*
2	15.5	OLA – Building A: Level 4 Terrace	55	N/A*
3	33.5	OLA – Building B: Level 10 Terrace	56	N/A*
Pane of Window				
4	21.5	POW – Building A: Level 6 West	66	58
5	21.5	POW – Building A: Level 6 Front	70	63
6	30.5	POW – Building A: Level 9 West	66	59
7	30.5	POW – Building A: Level 9 Front	71	63
8	30.5	POW – Building A: Level 9 East	67	59
9	78.5	POW – Building B: Penthouse (L25) West	66	58
10	78.5	POW – Building B: Penthouse (L25) Front	72	64
11	78.5	POW – Building B: Penthouse (L25) East	67	60
12	78.5	POW – Building B: Penthouse (L25) Back	52	44

**Noise levels during the nighttime are not considered for OLAs*

5.2 Noise Control Measures

The noise levels predicted due to roadway traffic exceed the criteria listed in Section 4.2 for building components for the development. As discussed in Section 4.2, the anticipated STC requirements for windows have been estimated based on the overall noise reduction required for each intended use of space (STC = outdoor noise level – targeted indoor noise levels). As per NPC-300 requirements, detailed STC calculations will be required to be completed prior to building permit application for each unit type.



The STC requirements for the windows are summarized below for various units within the development (see Figure 3). Where specific updated building components are not identified, bedroom/living room/retail windows are to satisfy Ontario Building Code (OBC 2012) requirements.

TABLE 6: NOISE CONTROL REQUIREMENTS

Location	Façade	Floor Number	Window STC (Bedroom/Living Room/Retail)	Exterior Wall STC
Building A, B	Front	1-25	35, 30, 25	45
Building A, B	Sides	1-25	30, 25, 20	45

5.3 Noise Barrier Calculation

Noise levels at select amenity areas are expected to exceed the 55 dBA OLA noise criterion at receptor 3. If this area is to be used as outdoor living areas, noise control measures are required to reduce noise levels as close as possible to 55 dBA. Further analysis investigated the noise mitigating impact of adding a 1.1m perimeter noise guard along the sides of the walking surface. Table 7 (below) summarizes the results of the barrier investigation. Results of the investigation proved that noise levels at the level 10 terrace on building B can be reduced to below 55 dBA with 1.1 m perimeter guards.

Regarding the level 3 terrace on building A, noise levels are predicted to be equal to the 55 dBA OLA noise criterion. Thus, mitigation is not required. However, if desired the same 1.1 m perimeter guard would have the following noise impact to the outdoor living area. However, since noise levels are below 60 dBA, a noise screen is only recommended. If a noise screen is not provided a Type A warning clause will be required.

TABLE 7: RESULTS OF NOISE BARRIER INVESTIGATION

Receptor Number	Receptor Height	Receptor Location	Daytime L_{eq} Noise Levels (dBA)	
			No Barrier	1.1m Barrier
2	15.5	OLA – Building A: Level 4 Terrace	55	53
3	33.5	OLA – Building B: Level 10 Terrace	56	54



6. CONCLUSIONS AND RECOMMENDATIONS

The results of the current analysis indicate that noise levels will range between 48 and 72 dBA during the daytime period (07:00-23:00) and between 44 and 64 dBA during the nighttime period (23:00-07:00). The highest noise level (72 dBA) occurs along the front façade of buildings A and B, which is nearest and most exposed to Hazeldean Rd. Building components with a higher Sound Transmission Class (STC) rating will be required where exterior noise levels exceed 65 dBA, as indicated in Figure 3.

Results of the calculations also indicate that buildings A and B will require forced air heating systems with central air conditioning, or similar mechanical system, which will allow occupants to keep windows closed and maintain a comfortable living/working environment. The following Type D Warning Clause¹⁰ will also be required on all Lease, Purchase and Sale Agreements, as summarized below:

Type D:

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

Noise levels at select amenity areas are expected to exceed the 55 dBA OLA noise criterion during the daytime period. If these areas are to be used as outdoor living areas, noise control measures are required to reduce noise levels as close as possible to 55 dBA. Further analysis investigated the noise mitigating impact of adding a 1.1m perimeter noise guard along the sides of the walking surface would successfully reduce the noise levels below the 55 dBA OLA noise criterion. However, since noise levels are below 60 dBA, a noise screen is only recommended. If a noise screen is not provided a Type A warning clause will be required on all Lease, Purchase and Sale Agreements, as summarized below:

¹⁰ MECP, Environmental Noise Guidelines, NPC 300 – Part C, Section 8



Type A:

"Purchasers/tenants are advised that sound levels due to increasing road traffic may occasionally interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the Municipality and the Ministry of the Environment."

Furthermore, Gradient Wind investigated the potential stationary noise impacts from existing nearby commercial properties surrounding the study site. The analysis confirmed noise levels on the proposed development from the existing nearby properties will fall below NPC-300 criteria during the daytime and nighttime periods. It should be noted that noise generated from these existing sources typically fall below ambient noise levels generated from nearby roadway traffic along Hazeldean, and Carp Roads. Based on the findings of the stationary noise analysis, the proposed development is expected to be compatible with the existing stationary sources of noise.

Regarding stationary noise impacts from the development on the surroundings, these can be minimized by judicious placement mechanical equipment such as its placement on a roof or in a mechanical penthouse, or the incorporation of silencers and noise screens as necessary. Due to the size and nature of the development, the HVAC equipment is expected to be located in the mechanical penthouses and comply with the ENCG Sound Level Limits and City of Ottawa Noise By-Law No. 2017-255.

This concludes our assessment and report. If you have any questions or wish to discuss our findings, please advise us. In the interim, we thank you for the opportunity to be of service.

Sincerely,

Gradient Wind Engineering Inc.

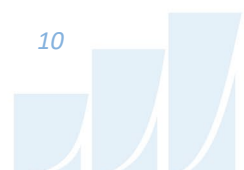


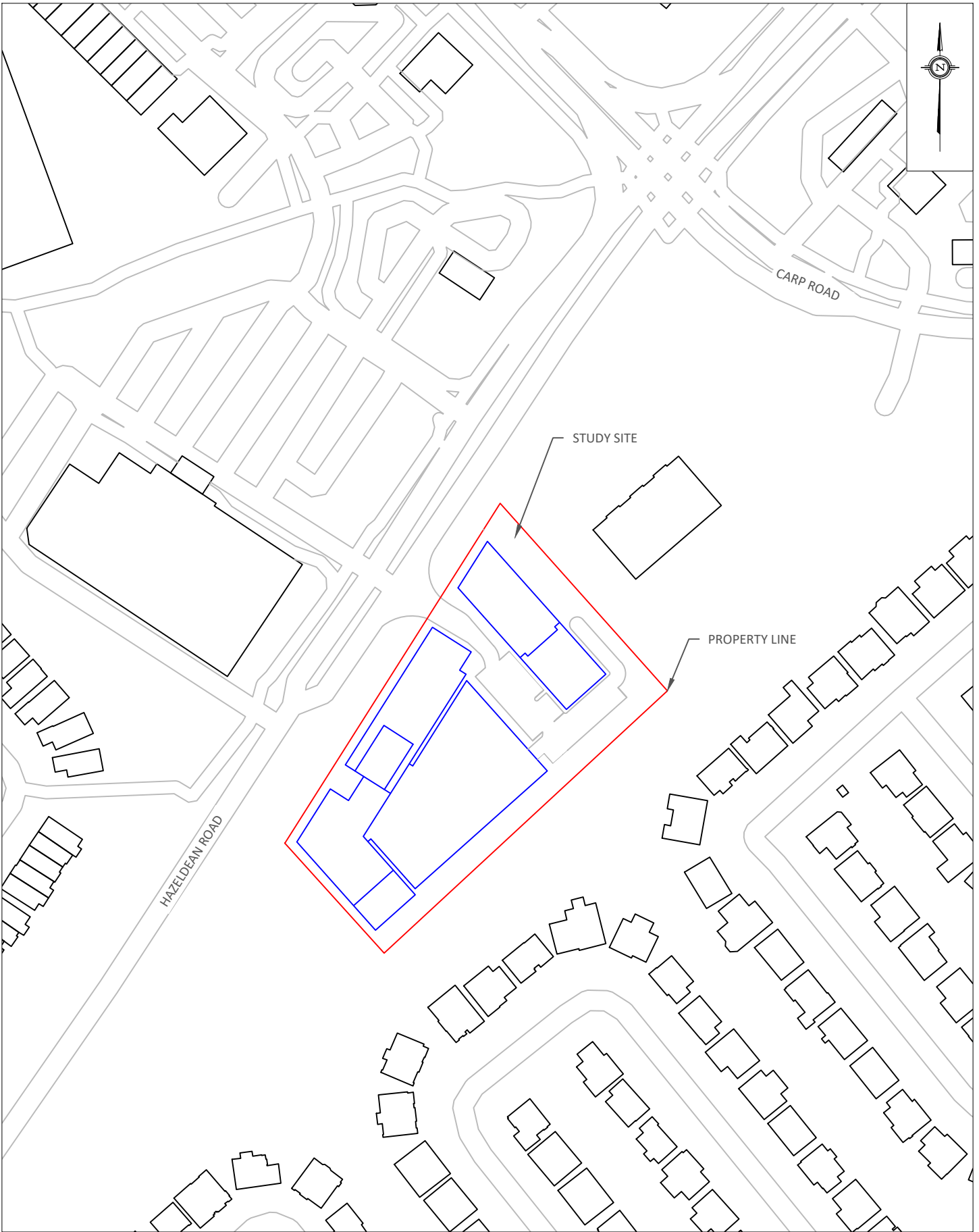
Adam Bonello, B.Eng.
Junior Environmental Scientist



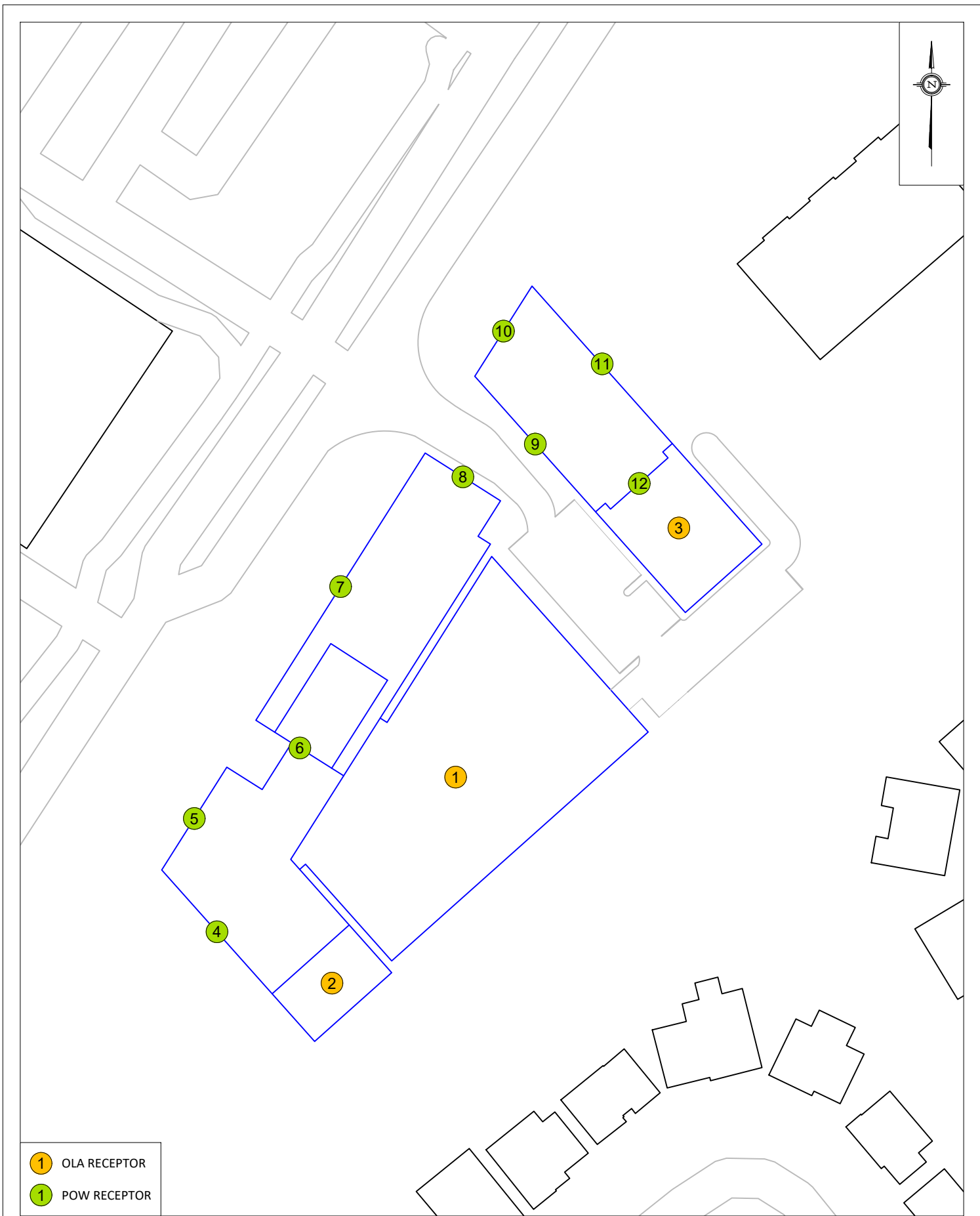
Joshua Foster, P.Eng.
Lead Engineer

Gradient Wind File #20-303-Environmental Noise

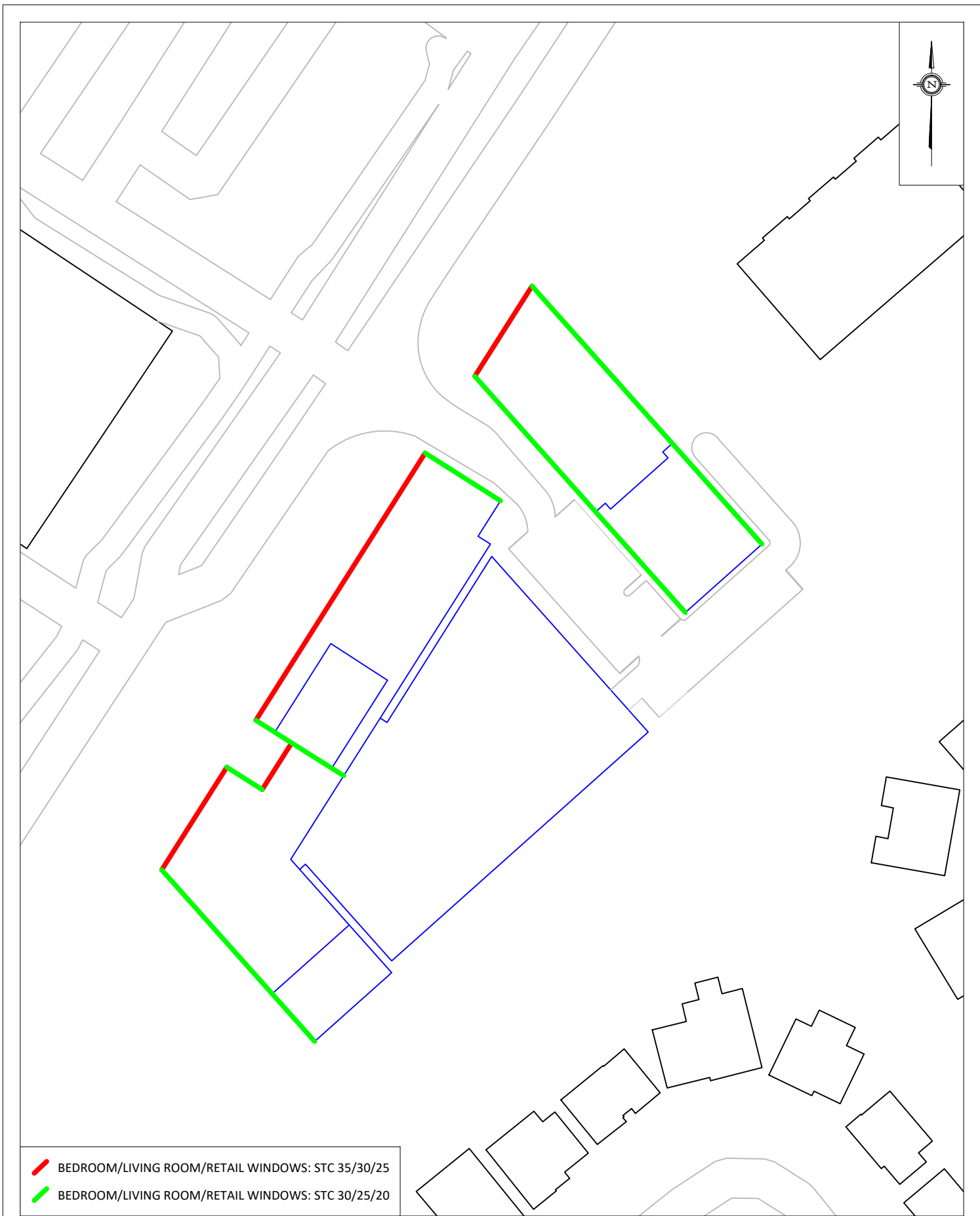




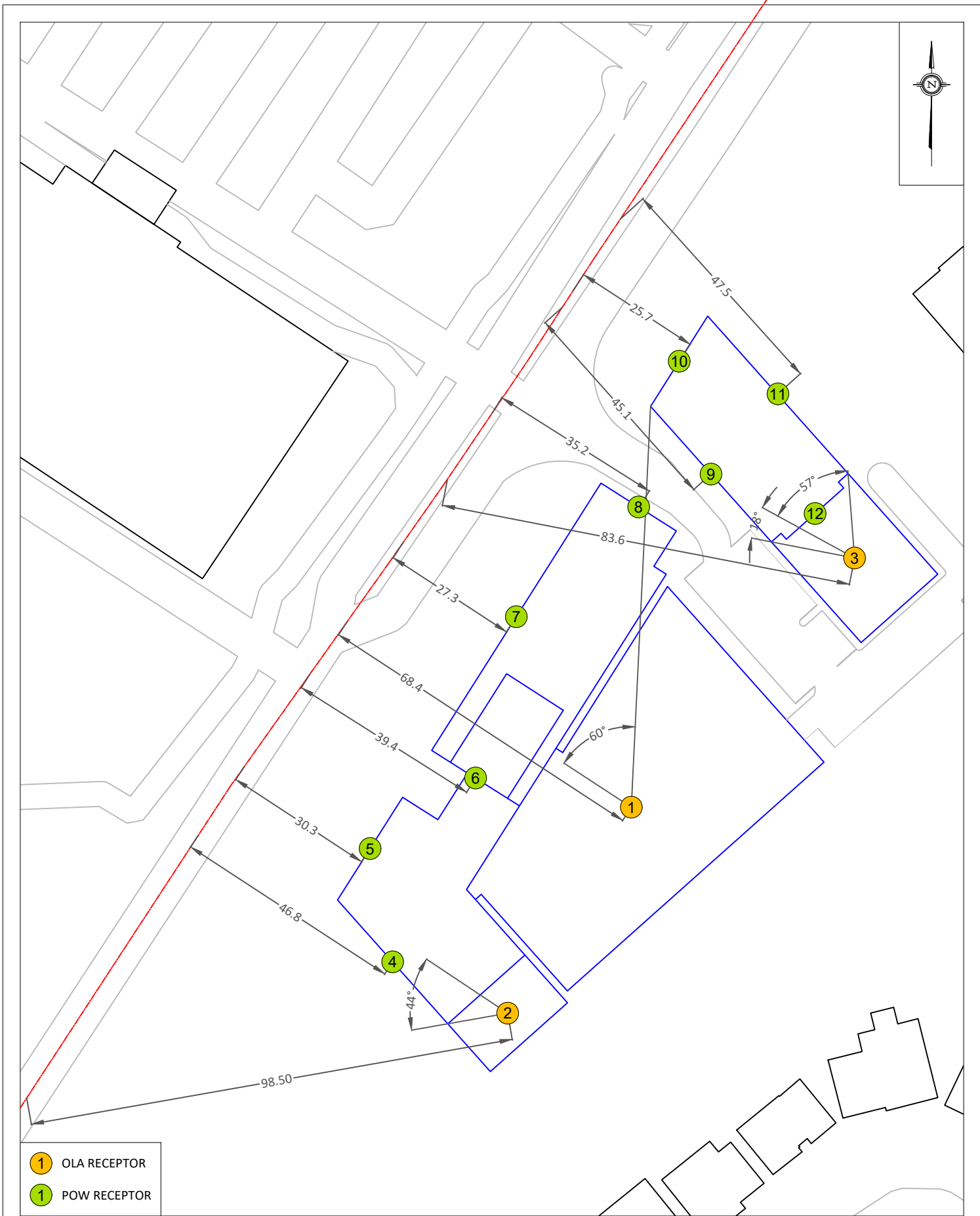
GRADIENTWIND ENGINEERS & SCIENTISTS 127 WALGREEN ROAD, OTTAWA, ON 613 836 0934 • GRADIENTWIND.COM	PROJECT	6310 HAZELDEAN ROAD, STITTSVILLE ROADWAY TRAFFIC/STATIONARY NOISE ASSESSMENT		DESCRIPTION
	SCALE	1:2000 (APPROX.)	DRAWING NO.	FIGURE 1: SITE PLAN AND SURROUNDING CONTEXT
	DATE	OCTOBER 11, 2023	DRAWN BY	
			A.B.	

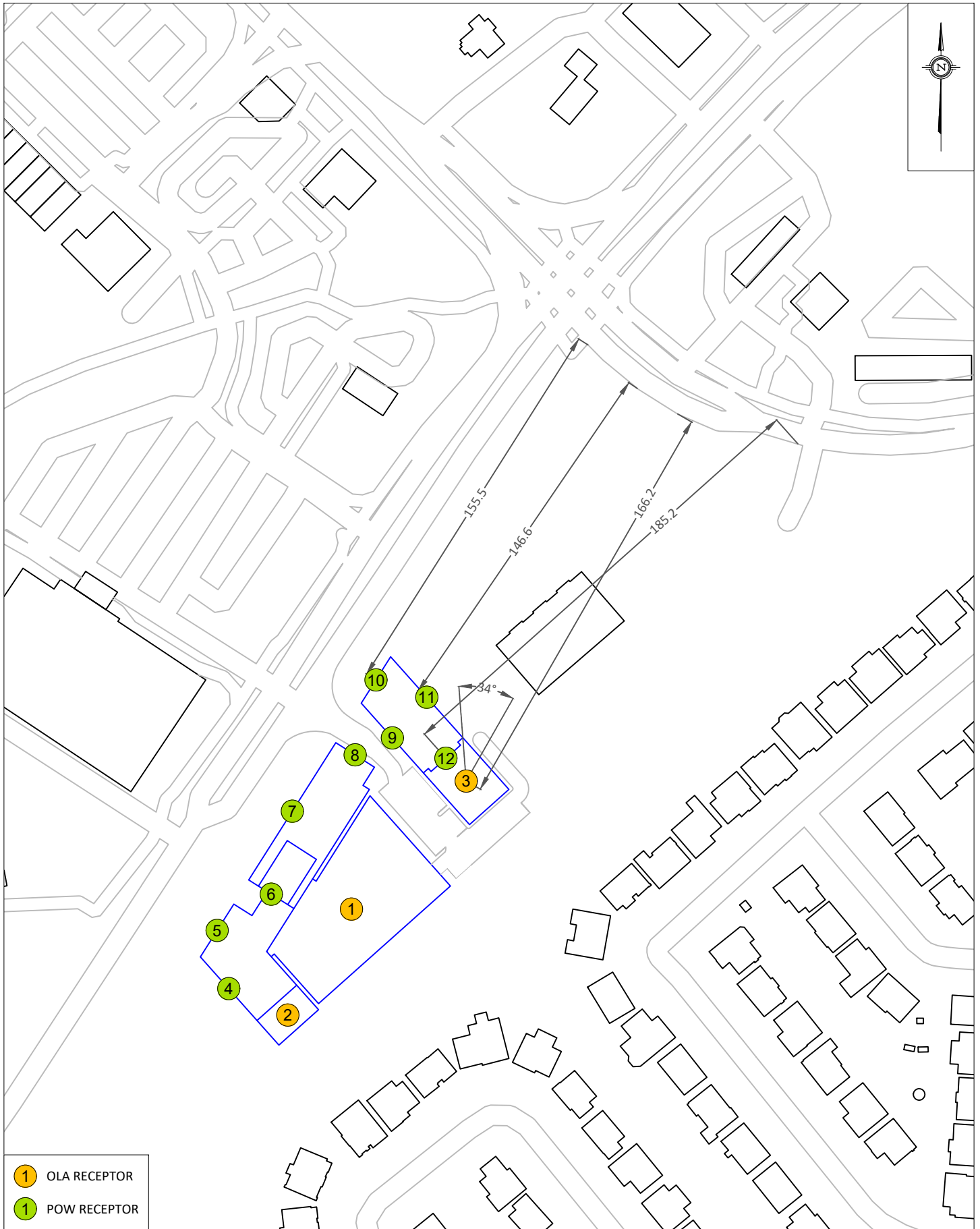


GRADIENTWIND ENGINEERS & SCIENTISTS 127 WALGREEN ROAD, OTTAWA, ON 613 836 0934 • GRADIENTWIND.COM	PROJECT		6310 HAZELDEAN ROAD, STITTSVILLE ROADWAY TRAFFIC/STATIONARY NOISE ASSESSMENT		DESCRIPTION FIGURE 2: TRAFFIC NOISE RECEPTOR LOCATIONS
	SCALE	1:1000 (APPROX.)	DRAWING NO.	GW20-303-2	
	DATE	OCTOBER 11, 2023	DRAWN BY	A.B.	



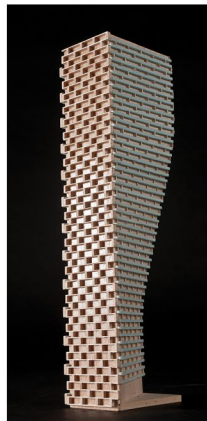
GRADIENTWIND ENGINEERS & SCIENTISTS 127 WALGREEN ROAD , OTTAWA, ON 613 836 0934 • GRADIENTWIND.COM	PROJECT	6310 HAZELDEAN ROAD, STITTSVILLE ROADWAY TRAFFIC/STATIONARY NOISE ASSESSMENT		DESCRIPTION
	SCALE	1:1000 (APPROX.)	DRAWING NO.	FIGURE 3: WINDOW STC REQUIREMENTS
	DATE	OCTOBER 11, 2023	DRAWN BY	
			A.B.	





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APPENDIX A

STAMSON 5.04 – INPUT AND OUTPUT DATA

STAMSON 5.0 **NORMAL REPORT** **Date: 13-10-2023 10:42:06**
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r1.te **Time Period: Day/Night 16/8 hours**
Description:

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

Car traffic volume : 28336/2464 veh/TimePeriod *
Medium truck volume : 2254/196 veh/TimePeriod *
Heavy truck volume : 1610/140 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 35000
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: Hazeldean (day/night)

Angle1 Angle2 : -90.00 deg 60.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 68.40 / 68.40 m
Receiver height : 15.50 / 15.50 m
Topography : 2 (Flat/gentle slope; with
barrier)
Barrier angle1 : -90.00 deg Angle2 : 60.00 deg
Barrier height : 23.00 m
Barrier receiver distance : 19.10 / 19.10 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

Results segment # 1: Hazeldean (day)

Source height = 1.50 m

Barrier height for grazing incidence

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Source	!	Receiver	!	Barrier	!	Elevation of
Height (m)	!	Height (m)	!	Height (m)	!	Barrier Top (m)
1.50	!	15.50	!	11.59	!	11.59

ROAD (0.00 + 47.83 + 0.00) = 47.83 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	60	0.00	73.68	0.00	-6.59	-0.79	0.00	0.00	-18.47	47.83

Segment Leq : 47.83 dBA

Total Leq All Segments: 47.83 dBA

Results segment # 1: Hazeldean (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source	!	Receiver	!	Barrier	!	Elevation of
Height (m)	!	Height (m)	!	Height (m)	!	Barrier Top (m)
1.50	!	15.50	!	11.59	!	11.59

ROAD (0.00 + 40.23 + 0.00) = 40.23 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	60	0.00	66.08	0.00	-6.59	-0.79	0.00	0.00	-18.47	40.23

Segment Leq : 40.23 dBA

Total Leq All Segments: 40.23 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 47.83
(NIGHT): 40.23



STAMSON 5.0 **NORMAL REPORT** **Date: 13-10-2023 10:42:49**
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r2.te **Time Period: Day/Night 16/8 hours**
Description:

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

Car traffic volume : 28336/2464 veh/TimePeriod *
Medium truck volume : 2254/196 veh/TimePeriod *
Heavy truck volume : 1610/140 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 35000
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: Hazeldean (day/night)

Angle1 Angle2 : -90.00 deg -44.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 98.50 / 98.50 m
Receiver height : 15.50 / 15.50 m
Topography : 2 (Flat/gentle slope; with
barrier)
Barrier angle1 : -90.00 deg Angle2 : -44.00 deg
Barrier height : 14.00 m
Barrier receiver distance : 12.00 / 12.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

Results segment # 1: Hazeldean (day)

Source height = 1.50 m

Barrier height for grazing incidence



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Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	15.50	13.79	13.79

ROAD (0.00 + 54.54 + 0.00) = 54.54 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-44	0.00	73.68	0.00	-8.17	-5.93	0.00	0.00	-5.04	54.54

Segment Leq : 54.54 dBA

Total Leq All Segments: 54.54 dBA

Results segment # 1: Hazeldean (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	15.50	13.79	13.79

ROAD (0.00 + 46.94 + 0.00) = 46.94 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-44	0.00	66.08	0.00	-8.17	-5.93	0.00	0.00	-5.04	46.94

Segment Leq : 46.94 dBA

Total Leq All Segments: 46.94 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 54.54
(NIGHT): 46.94



STAMSON 5.0 **NORMAL REPORT** **Date: 13-10-2023 11:34:06**
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r2 (1.1m barrier).te **Time Period:** Day/Night 16/8 hours
Description:

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

Car traffic volume : 28336/2464 veh/TimePeriod *
Medium truck volume : 2254/196 veh/TimePeriod *
Heavy truck volume : 1610/140 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 35000
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: Hazeldean (day/night)

Angle1 Angle2 : -90.00 deg -44.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 98.50 / 98.50 m
Receiver height : 15.50 / 15.50 m
Topography : 2 (Flat/gentle slope; with
barrier)
Barrier angle1 : -90.00 deg Angle2 : -44.00 deg
Barrier height : 15.10 m
Barrier receiver distance : 12.00 / 12.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

Results segment # 1: Hazeldean (day)

Source height = 1.50 m

Barrier height for grazing incidence



Source	!	Receiver	!	Barrier	!	Elevation of
Height (m)	!	Height (m)	!	Height (m)	!	Barrier Top (m)
1.50	!	15.50	!	13.79	!	13.79

ROAD (0.00 + 53.26 + 0.00) = 53.26 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-44	0.00	73.68	0.00	-8.17	-5.93	0.00	0.00	-6.32	53.26

Segment Leq : 53.26 dBA

Total Leq All Segments: 53.26 dBA

Results segment # 1: Hazeldean (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source	!	Receiver	!	Barrier	!	Elevation of
Height (m)	!	Height (m)	!	Height (m)	!	Barrier Top (m)
1.50	!	15.50	!	13.79	!	13.79

ROAD (0.00 + 45.66 + 0.00) = 45.66 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-44	0.00	66.08	0.00	-8.17	-5.93	0.00	0.00	-6.32	45.66

Segment Leq : 45.66 dBA

Total Leq All Segments: 45.66 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 53.26
(NIGHT): 45.66

STAMSON 5.0 **NORMAL REPORT** **Date: 13-10-2023 10:44:07**
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r3.te **Time Period: Day/Night 16/8 hours**
Description:

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

Car traffic volume : 28336/2464 veh/TimePeriod *
Medium truck volume : 2254/196 veh/TimePeriod *
Heavy truck volume : 1610/140 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 35000
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: Hazeldean L (day/night)

Angle1 Angle2 : -90.00 deg -18.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 83.60 / 83.60 m
Receiver height : 33.50 / 33.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : -18.00 deg
Barrier height : 32.00 m
Barrier receiver distance : 17.00 / 17.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

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

Car traffic volume : 28336/2464 veh/TimePeriod *
Medium truck volume : 2254/196 veh/TimePeriod *
Heavy truck volume : 1610/140 veh/TimePeriod *
Posted speed limit : 60 km/h



Road gradient : 0 %
 Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 35000
 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: Hazeldean R (day/night)

 Angle1 Angle2 : 57.00 deg 90.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 2 (Reflective ground surface)
 Receiver source distance : 125.00 / 125.00 m
 Receiver height : 33.50 / 33.50 m
 Topography : 2 (Flat/gentle slope; with barrier)
 Barrier angle1 : 57.00 deg Angle2 : 90.00 deg
 Barrier height : 32.00 m
 Barrier receiver distance : 17.00 / 17.00 m
 Source elevation : 0.00 m
 Receiver elevation : 0.00 m
 Barrier elevation : 0.00 m
 Reference angle : 0.00

Road data, segment # 3: Carp (day/night)

 Car traffic volume : 28336/2464 veh/TimePeriod *
 Medium truck volume : 2254/196 veh/TimePeriod *
 Heavy truck volume : 1610/140 veh/TimePeriod *
 Posted speed limit : 60 km/h
 Road gradient : 0 %
 Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 35000
 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: Carp (day/night)

```

-----
Angle1   Angle2           : -34.00 deg   31.00 deg
Wood depth           :           0       (No woods.)
No of house rows     :           0 / 0
Surface              :           2       (Reflective ground surface)
Receiver source distance : 166.20 / 166.20 m
Receiver height       :   33.50 / 33.50 m
Topography           :           2       (Flat/gentle slope; with
barrier)
Barrier angle1       : -34.00 deg   Angle2 : 31.00 deg
Barrier height        :   32.00 m
Barrier receiver distance :    8.00 / 8.00 m
Source elevation      :    0.00 m
Receiver elevation    :    0.00 m
Barrier elevation     :    0.00 m
Reference angle       :    0.00
  
```

Results segment # 1: Hazeldean L (day)

Source height = 1.50 m

Barrier height for grazing incidence

```

-----
Source      ! Receiver    ! Barrier      ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
-----+-----+-----+-----
          1.50 !       33.50 !       26.99 !       26.99
  
```

ROAD (0.00 + 49.98 + 0.00) = 49.98 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-18	0.00	73.68	0.00	-7.46	-3.98	0.00	0.00	-12.26	49.98

Segment Leq : 49.98 dBA

Results segment # 2: Hazeldean R (day)

Source height = 1.50 m

Barrier height for grazing incidence

```

-----
Source      ! Receiver    ! Barrier      ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
-----+-----+-----+-----
  
```



1.50 ! 33.50 ! 29.15 ! 29.15

ROAD (0.00 + 49.51 + 0.00) = 49.51 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
57	90	0.00	73.68	0.00	-9.21	-7.37	0.00	0.00	-7.59	49.51

Segment Leq : 49.51 dBA

Results segment # 3: Carp (day)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50 !	33.50 !	31.96 !	31.96

ROAD (0.00 + 53.80 + 0.00) = 53.80 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-34	31	0.00	73.68	0.00	-10.45	-4.42	0.00	0.00	-5.01	53.80

Segment Leq : 53.80 dBA

Total Leq All Segments: 56.32 dBA

Results segment # 1: Hazeldean L (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50 !	33.50 !	26.99 !	26.99

ROAD (0.00 + 42.38 + 0.00) = 42.38 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-18	0.00	66.08	0.00	-7.46	-3.98	0.00	0.00	-12.26	42.38



Segment Leq : 42.38 dBA

Results segment # 2: Hazeldean R (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	33.50	29.15	29.15

ROAD (0.00 + 41.91 + 0.00) = 41.91 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
57	90	0.00	66.08	0.00	-9.21	-7.37	0.00	0.00	-7.59	41.91

Segment Leq : 41.91 dBA

Results segment # 3: Carp (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	33.50	31.96	31.96

ROAD (0.00 + 46.20 + 0.00) = 46.20 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-34	31	0.00	66.08	0.00	-10.45	-4.42	0.00	0.00	-5.01	46.20

Segment Leq : 46.20 dBA

Total Leq All Segments: 48.72 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 56.32
(NIGHT): 48.72



STAMSON 5.0 **NORMAL REPORT** **Date: 13-10-2023 11:22:57**
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r3 (1.1m barrier).te **Time Period:** Day/Night 16/8 hours
Description:

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

Car traffic volume : 28336/2464 veh/TimePeriod *
Medium truck volume : 2254/196 veh/TimePeriod *
Heavy truck volume : 1610/140 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 35000
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: Hazeldean L (day/night)

Angle1 Angle2 : -90.00 deg -18.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 83.60 / 83.60 m
Receiver height : 33.50 / 33.50 m
Topography : 2 (Flat/gentle slope; with
barrier)
Barrier angle1 : -90.00 deg Angle2 : -18.00 deg
Barrier height : 33.10 m
Barrier receiver distance : 17.00 / 17.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

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

Car traffic volume : 28336/2464 veh/TimePeriod *
Medium truck volume : 2254/196 veh/TimePeriod *
Heavy truck volume : 1610/140 veh/TimePeriod *
Posted speed limit : 60 km/h



Road gradient : 0 %
 Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 35000
 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: Hazeldean R (day/night)

 Angle1 Angle2 : 57.00 deg 90.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 2 (Reflective ground surface)
 Receiver source distance : 125.00 / 125.00 m
 Receiver height : 33.50 / 33.50 m
 Topography : 2 (Flat/gentle slope; with barrier)
 Barrier angle1 : 57.00 deg Angle2 : 90.00 deg
 Barrier height : 33.10 m
 Barrier receiver distance : 17.00 / 17.00 m
 Source elevation : 0.00 m
 Receiver elevation : 0.00 m
 Barrier elevation : 0.00 m
 Reference angle : 0.00

Road data, segment # 3: Carp (day/night)

 Car traffic volume : 28336/2464 veh/TimePeriod *
 Medium truck volume : 2254/196 veh/TimePeriod *
 Heavy truck volume : 1610/140 veh/TimePeriod *
 Posted speed limit : 60 km/h
 Road gradient : 0 %
 Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 35000
 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: Carp (day/night)

```

-----
Angle1   Angle2           : -34.00 deg   31.00 deg
Wood depth           :           0       (No woods.)
No of house rows     :           0 / 0
Surface              :           2       (Reflective ground surface)
Receiver source distance : 166.20 / 166.20 m
Receiver height       :   33.50 / 33.50 m
Topography           :           2       (Flat/gentle slope; with
barrier)
Barrier angle1       : -34.00 deg   Angle2 : 31.00 deg
Barrier height        :   33.10 m
Barrier receiver distance :    8.00 / 8.00 m
Source elevation      :    0.00 m
Receiver elevation    :    0.00 m
Barrier elevation     :    0.00 m
Reference angle       :    0.00
  
```

Results segment # 1: Hazeldean L (day)

Source height = 1.50 m

Barrier height for grazing incidence

```

-----
Source      ! Receiver    ! Barrier      ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
-----+-----+-----+-----
          1.50 !       33.50 !       26.99 !       26.99
  
```

ROAD (0.00 + 48.69 + 0.00) = 48.69 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-18	0.00	73.68	0.00	-7.46	-3.98	0.00	0.00	-13.54	48.69

Segment Leq : 48.69 dBA

Results segment # 2: Hazeldean R (day)

Source height = 1.50 m

Barrier height for grazing incidence

```

-----
Source      ! Receiver    ! Barrier      ! Elevation of
Height (m) ! Height (m) ! Height (m) ! Barrier Top (m)
-----+-----+-----+-----
  
```



1.50 ! 33.50 ! 29.15 ! 29.15

ROAD (0.00 + 48.13 + 0.00) = 48.13 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
57	90	0.00	73.68	0.00	-9.21	-7.37	0.00	0.00	-8.97	48.13

Segment Leq : 48.13 dBA

Results segment # 3: Carp (day)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50 !	33.50 !	31.96 !	31.96

ROAD (0.00 + 50.66 + 0.00) = 50.66 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-34	31	0.00	73.68	0.00	-10.45	-4.42	0.00	0.00	-8.15	50.66

Segment Leq : 50.66 dBA

Total Leq All Segments: 54.07 dBA

Results segment # 1: Hazeldean L (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50 !	33.50 !	26.99 !	26.99

ROAD (0.00 + 41.10 + 0.00) = 41.10 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	-18	0.00	66.08	0.00	-7.46	-3.98	0.00	0.00	-13.54	41.10



Segment Leq : 41.10 dBA

Results segment # 2: Hazeldean R (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source	!	Receiver	!	Barrier	!	Elevation of
Height (m)	!	Height (m)	!	Height (m)	!	Barrier Top (m)
1.50	!	33.50	!	29.15	!	29.15

ROAD (0.00 + 40.53 + 0.00) = 40.53 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
57	90	0.00	66.08	0.00	-9.21	-7.37	0.00	0.00	-8.97	40.53

Segment Leq : 40.53 dBA

Results segment # 3: Carp (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source	!	Receiver	!	Barrier	!	Elevation of
Height (m)	!	Height (m)	!	Height (m)	!	Barrier Top (m)
1.50	!	33.50	!	31.96	!	31.96

ROAD (0.00 + 43.06 + 0.00) = 43.06 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-34	31	0.00	66.08	0.00	-10.45	-4.42	0.00	0.00	-8.15	43.06

Segment Leq : 43.06 dBA

Total Leq All Segments: 46.47 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 54.07
(NIGHT): 46.47



STAMSON 5.0 **NORMAL REPORT** **Date: 13-10-2023 10:44:38**
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r4.te **Time Period: Day/Night 16/8 hours**
Description:

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

```
-----
Car traffic volume   : 28336/2464   veh/TimePeriod  *
Medium truck volume : 2254/196    veh/TimePeriod  *
Heavy truck volume  : 1610/140    veh/TimePeriod  *
Posted speed limit  : 60 km/h
Road gradient       : 0 %
Road pavement      : 1 (Typical asphalt or concrete)
```

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

```
24 hr Traffic Volume (AADT or SADT): 35000
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: Hazeldean (day/night)

```
-----
Angle1  Angle2      : 0.00 deg  90.00 deg
Wood depth          : 0          (No woods.)
No of house rows    : 0 / 0
Surface             : 2          (Reflective ground surface)
Receiver source distance : 46.80 / 46.80 m
Receiver height     : 21.50 / 21.50 m
Topography          : 1          (Flat/gentle slope; no
barrier)
Reference angle     : 0.00
```

Results segment # 1: Hazeldean (day)

Source height = 1.50 m

ROAD (0.00 + 65.72 + 0.00) = 65.72 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.00	73.68	0.00	-4.94	-3.01	0.00	0.00	0.00	65.72

Segment Leq : 65.72 dBA



Total Leq All Segments: 65.72 dBA

Results segment # 1: Hazeldean (night)

Source height = 1.50 m

ROAD (0.00 + 58.13 + 0.00) = 58.13 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.00	66.08	0.00	-4.94	-3.01	0.00	0.00	0.00	58.13

Segment Leq : 58.13 dBA

Total Leq All Segments: 58.13 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 65.72
(NIGHT): 58.13



STAMSON 5.0 **NORMAL REPORT** **Date: 13-10-2023 10:52:44**
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r5.te **Time Period: Day/Night 16/8 hours**
Description:

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

```
-----
Car traffic volume   : 28336/2464   veh/TimePeriod  *
Medium truck volume : 2254/196    veh/TimePeriod  *
Heavy truck volume  : 1610/140    veh/TimePeriod  *
Posted speed limit   : 60 km/h
Road gradient        : 0 %
Road pavement       : 1 (Typical asphalt or concrete)
```

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

```
24 hr Traffic Volume (AADT or SADT): 35000
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: Hazeldean (day/night)

```
-----
Angle1  Angle2      : -90.00 deg   90.00 deg
Wood depth          : 0           (No woods.)
No of house rows    : 0 / 0
Surface            : 2           (Reflective ground surface)
Receiver source distance : 30.30 / 30.30 m
Receiver height     : 21.50 / 21.50 m
Topography          : 1           (Flat/gentle slope; no
barrier)
Reference angle     : 0.00
```

Results segment # 1: Hazeldean (day)

Source height = 1.50 m

ROAD (0.00 + 70.62 + 0.00) = 70.62 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	73.68	0.00	-3.05	0.00	0.00	0.00	0.00	70.62

Segment Leq : 70.62 dBA



Total Leq All Segments: 70.62 dBA

Results segment # 1: Hazeldean (night)

Source height = 1.50 m

ROAD (0.00 + 63.03 + 0.00) = 63.03 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	66.08	0.00	-3.05	0.00	0.00	0.00	0.00	63.03

Segment Leq : 63.03 dBA

Total Leq All Segments: 63.03 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 70.62
(NIGHT): 63.03



STAMSON 5.0 **NORMAL REPORT** **Date: 13-10-2023 10:54:34**
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r6.te **Time Period: Day/Night 16/8 hours**
Description:

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

```
-----
Car traffic volume   : 28336/2464   veh/TimePeriod  *
Medium truck volume : 2254/196    veh/TimePeriod  *
Heavy truck volume  : 1610/140    veh/TimePeriod  *
Posted speed limit  : 60 km/h
Road gradient       : 0 %
Road pavement      : 1 (Typical asphalt or concrete)
```

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

```
24 hr Traffic Volume (AADT or SADT): 35000
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: Hazeldean (day/night)

```
-----
Angle1  Angle2      : 0.00 deg  90.00 deg
Wood depth          : 0          (No woods.)
No of house rows    : 0 / 0
Surface            : 2          (Reflective ground surface)
Receiver source distance : 39.40 / 39.40 m
Receiver height     : 30.50 / 30.50 m
Topography          : 1          (Flat/gentle slope; no
barrier)
Reference angle     : 0.00
```

Results segment # 1: Hazeldean (day)

Source height = 1.50 m

ROAD (0.00 + 66.47 + 0.00) = 66.47 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.00	73.68	0.00	-4.19	-3.01	0.00	0.00	0.00	66.47

Segment Leq : 66.47 dBA



Total Leq All Segments: 66.47 dBA

Results segment # 1: Hazeldean (night)

Source height = 1.50 m

ROAD (0.00 + 58.87 + 0.00) = 58.87 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.00	66.08	0.00	-4.19	-3.01	0.00	0.00	0.00	58.87

Segment Leq : 58.87 dBA

Total Leq All Segments: 58.87 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 66.47
(NIGHT): 58.87



STAMSON 5.0 **NORMAL REPORT** **Date: 13-10-2023 10:55:57**
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r7.te **Time Period: Day/Night 16/8 hours**
Description:

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

```
-----
Car traffic volume   : 28336/2464   veh/TimePeriod  *
Medium truck volume : 2254/196    veh/TimePeriod  *
Heavy truck volume  : 1610/140    veh/TimePeriod  *
Posted speed limit   : 60 km/h
Road gradient        : 0 %
Road pavement       : 1 (Typical asphalt or concrete)
```

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

```
24 hr Traffic Volume (AADT or SADT): 35000
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: Hazeldean (day/night)

```
-----
Angle1  Angle2      : -90.00 deg   90.00 deg
Wood depth          : 0           (No woods.)
No of house rows    : 0 / 0
Surface             : 2           (Reflective ground surface)
Receiver source distance : 27.30 / 27.30 m
Receiver height     : 30.50 / 30.50 m
Topography          : 1           (Flat/gentle slope; no
barrier)
Reference angle     : 0.00
```

Results segment # 1: Hazeldean (day)

Source height = 1.50 m

ROAD (0.00 + 71.08 + 0.00) = 71.08 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	73.68	0.00	-2.60	0.00	0.00	0.00	0.00	71.08

Segment Leq : 71.08 dBA



Total Leq All Segments: 71.08 dBA

Results segment # 1: Hazeldean (night)

Source height = 1.50 m

ROAD (0.00 + 63.48 + 0.00) = 63.48 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	66.08	0.00	-2.60	0.00	0.00	0.00	0.00	63.48

Segment Leq : 63.48 dBA

Total Leq All Segments: 63.48 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 71.08
(NIGHT): 63.48



STAMSON 5.0 **NORMAL REPORT** **Date: 13-10-2023 10:56:19**
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r8.te **Time Period: Day/Night 16/8 hours**
Description:

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

```
-----
Car traffic volume   : 28336/2464   veh/TimePeriod  *
Medium truck volume : 2254/196    veh/TimePeriod  *
Heavy truck volume  : 1610/140    veh/TimePeriod  *
Posted speed limit  :      60 km/h
Road gradient       :      0 %
Road pavement      :      1 (Typical asphalt or concrete)
```

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

```
24 hr Traffic Volume (AADT or SADT): 35000
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: Hazeldean (day/night)

```
-----
Angle1  Angle2      : -90.00 deg   0.00 deg
Wood depth          :      0      (No woods.)
No of house rows    :      0 / 0
Surface             :      2      (Reflective ground surface)
Receiver source distance : 35.20 / 35.20 m
Receiver height     : 30.50 / 30.50 m
Topography          :      1      (Flat/gentle slope; no
barrier)
Reference angle     :      0.00
```

Results segment # 1: Hazeldean (day)

Source height = 1.50 m

ROAD (0.00 + 66.96 + 0.00) = 66.96 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.00	73.68	0.00	-3.70	-3.01	0.00	0.00	0.00	66.96

Segment Leq : 66.96 dBA



Total Leq All Segments: 66.96 dBA

Results segment # 1: Hazeldean (night)

Source height = 1.50 m

ROAD (0.00 + 59.36 + 0.00) = 59.36 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.00	66.08	0.00	-3.70	-3.01	0.00	0.00	0.00	59.36

Segment Leq : 59.36 dBA

Total Leq All Segments: 59.36 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 66.96
(NIGHT): 59.36



STAMSON 5.0 **NORMAL REPORT** **Date: 13-10-2023 10:57:35**
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r9.te **Time Period: Day/Night 16/8 hours**
Description:

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

```
-----
Car traffic volume   : 28336/2464   veh/TimePeriod  *
Medium truck volume : 2254/196    veh/TimePeriod  *
Heavy truck volume  : 1610/140    veh/TimePeriod  *
Posted speed limit  :      60 km/h
Road gradient       :      0 %
Road pavement      :      1 (Typical asphalt or concrete)
```

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

```
24 hr Traffic Volume (AADT or SADT): 35000
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: Hazeldean (day/night)

```
-----
Angle1  Angle2      : 0.00 deg  90.00 deg
Wood depth          :      0      (No woods.)
No of house rows    :      0 / 0
Surface             :      2      (Reflective ground surface)
Receiver source distance : 45.10 / 45.10 m
Receiver height     : 78.50 / 78.50 m
Topography          :      1      (Flat/gentle slope; no
barrier)
Reference angle     :      0.00
```

Results segment # 1: Hazeldean (day)

Source height = 1.50 m

ROAD (0.00 + 65.88 + 0.00) = 65.88 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.00	73.68	0.00	-4.78	-3.01	0.00	0.00	0.00	65.88

Segment Leq : 65.88 dBA



Total Leq All Segments: 65.88 dBA

Results segment # 1: Hazeldean (night)

Source height = 1.50 m

ROAD (0.00 + 58.29 + 0.00) = 58.29 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	90	0.00	66.08	0.00	-4.78	-3.01	0.00	0.00	0.00	58.29

Segment Leq : 58.29 dBA

Total Leq All Segments: 58.29 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 65.88
(NIGHT): 58.29



STAMSON 5.0 **NORMAL REPORT** **Date: 13-10-2023 10:58:14**
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r10.te **Time Period: Day/Night 16/8 hours**
Description:

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

Car traffic volume : 28336/2464 veh/TimePeriod *
Medium truck volume : 2254/196 veh/TimePeriod *
Heavy truck volume : 1610/140 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 35000
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: Hazeldean (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 25.70 / 25.70 m
Receiver height : 78.50 / 78.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

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

Car traffic volume : 28336/2464 veh/TimePeriod *
Medium truck volume : 2254/196 veh/TimePeriod *
Heavy truck volume : 1610/140 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 35000



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: Carp (day/night)

 Angle1 Angle2 : -90.00 deg 0.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 2 (Reflective ground surface)
 Receiver source distance : 155.50 / 155.50 m
 Receiver height : 78.50 / 78.50 m
 Topography : 1 (Flat/gentle slope; no
 barrier)
 Reference angle : 0.00

Results segment # 1: Hazeldean (day)

 Source height = 1.50 m

ROAD (0.00 + 71.34 + 0.00) = 71.34 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	73.68	0.00	-2.34	0.00	0.00	0.00	0.00	71.34

 Segment Leq : 71.34 dBA

Results segment # 2: Carp (day)

 Source height = 1.50 m

ROAD (0.00 + 60.51 + 0.00) = 60.51 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.00	73.68	0.00	-10.16	-3.01	0.00	0.00	0.00	60.51

 Segment Leq : 60.51 dBA

Total Leq All Segments: 71.68 dBA

Results segment # 1: Hazeldean (night)



Source height = 1.50 m

ROAD (0.00 + 63.74 + 0.00) = 63.74 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	66.08	0.00	-2.34	0.00	0.00	0.00	0.00	63.74

Segment Leq : 63.74 dBA

Results segment # 2: Carp (night)

Source height = 1.50 m

ROAD (0.00 + 52.91 + 0.00) = 52.91 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.00	66.08	0.00	-10.16	-3.01	0.00	0.00	0.00	52.91

Segment Leq : 52.91 dBA

Total Leq All Segments: 64.08 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 71.68
(NIGHT): 64.08



STAMSON 5.0 **NORMAL REPORT** **Date: 13-10-2023 10:58:59**
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r11.te **Time Period: Day/Night 16/8 hours**
Description:

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

Car traffic volume : 28336/2464 veh/TimePeriod *
Medium truck volume : 2254/196 veh/TimePeriod *
Heavy truck volume : 1610/140 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 35000
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: Hazeldean (day/night)

Angle1 Angle2 : -90.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 47.50 / 47.50 m
Receiver height : 78.50 / 78.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

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

Car traffic volume : 28336/2464 veh/TimePeriod *
Medium truck volume : 2254/196 veh/TimePeriod *
Heavy truck volume : 1610/140 veh/TimePeriod *
Posted speed limit : 60 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

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

24 hr Traffic Volume (AADT or SADT): 35000



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: Carp (day/night)

 Angle1 Angle2 : -90.00 deg 25.00 deg
 Wood depth : 0 (No woods.)
 No of house rows : 0 / 0
 Surface : 2 (Reflective ground surface)
 Receiver source distance : 146.60 / 146.60 m
 Receiver height : 78.50 / 78.50 m
 Topography : 1 (Flat/gentle slope; no
 barrier)
 Reference angle : 0.00

Results segment # 1: Hazeldean (day)

 Source height = 1.50 m

ROAD (0.00 + 65.66 + 0.00) = 65.66 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.00	73.68	0.00	-5.01	-3.01	0.00	0.00	0.00	65.66

Segment Leq : 65.66 dBA

Results segment # 2: Carp (day)

 Source height = 1.50 m

ROAD (0.00 + 61.83 + 0.00) = 61.83 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	25	0.00	73.68	0.00	-9.90	-1.95	0.00	0.00	0.00	61.83

Segment Leq : 61.83 dBA

Total Leq All Segments: 67.16 dBA

Results segment # 1: Hazeldean (night)



Source height = 1.50 m

ROAD (0.00 + 58.06 + 0.00) = 58.06 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.00	66.08	0.00	-5.01	-3.01	0.00	0.00	0.00	58.06

Segment Leq : 58.06 dBA

Results segment # 2: Carp (night)

Source height = 1.50 m

ROAD (0.00 + 54.23 + 0.00) = 54.23 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	25	0.00	66.08	0.00	-9.90	-1.95	0.00	0.00	0.00	54.23

Segment Leq : 54.23 dBA

Total Leq All Segments: 59.56 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 67.16
(NIGHT): 59.56



STAMSON 5.0 **NORMAL REPORT** **Date: 13-10-2023 10:59:21**
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r12.te **Time Period: Day/Night 16/8 hours**
Description:

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

```
-----
Car traffic volume   : 28336/2464   veh/TimePeriod  *
Medium truck volume : 2254/196    veh/TimePeriod  *
Heavy truck volume  : 1610/140    veh/TimePeriod  *
Posted speed limit  : 60 km/h
Road gradient       : 0 %
Road pavement      : 1 (Typical asphalt or concrete)
```

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

```
24 hr Traffic Volume (AADT or SADT): 35000
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: Carp (day/night)

```
-----
Angle1  Angle2      : 0.00 deg  15.00 deg
Wood depth           : 0        (No woods.)
No of house rows     : 0 / 0
Surface              : 2        (Reflective ground surface)
Receiver source distance : 185.20 / 185.20 m
Receiver height      : 78.50 / 78.50 m
Topography           : 1        (Flat/gentle slope; no
barrier)
Reference angle      : 0.00
```

Results segment # 1: Carp (day)

Source height = 1.50 m

ROAD (0.00 + 51.97 + 0.00) = 51.97 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	15	0.00	73.68	0.00	-10.92	-10.79	0.00	0.00	0.00	51.97

Segment Leq : 51.97 dBA



Total Leq All Segments: 51.97 dBA

Results segment # 1: Carp (night)

Source height = 1.50 m

ROAD (0.00 + 44.37 + 0.00) = 44.37 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
0	15	0.00	66.08	0.00	-10.92	-10.79	0.00	0.00	0.00	44.37

Segment Leq : 44.37 dBA

Total Leq All Segments: 44.37 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 51.97

(NIGHT): 44.37

