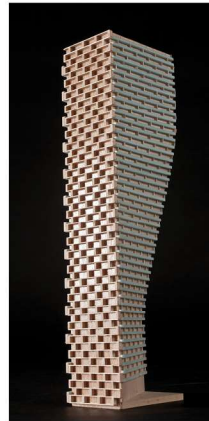


**TRANSPORTATION NOISE
ASSESSMENT**

Waterford Ottawa Senior Apartments
2425-2431 Bank Street
Ottawa, Ontario

REPORT: GW20-065 – Transportation Noise



April 29, 2020

PREPARED FOR
Zlepign Holdings Limited
2431 Bank Street
Ottawa, Ontario
K1V 8R9

PREPARED BY
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EXECUTIVE SUMMARY

This report describes a transportation noise assessment undertaken in support of Site Plan Application (SPA) submission for a proposed residential development located at 2425-2431 Bank Street in Ottawa, Ontario. The development is a 14-storey addition to the existing Waterford Retirement Community. The addition comprises indoor amenity spaces, including an indoor pool, and building support spaces at grade and residential units in the remaining floors above. Levels 2 through 7 rise with an L-shaped planform. At Level 8, the floorplate sets back at the southeast corner to create a rectangular planform and accommodate an outdoor amenity terrace. The major sources of transportation noise are Hunt Club Road to the southeast of the site, Bank Street extending from the west to the south of the site, as well as aircraft noise from the Ottawa International Airport. 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) future vehicular traffic volumes based on the City of Ottawa's Official Plan roadway classifications; and (iv) architectural drawings prepared by NEUF Architect(e)s provided in April 2020.

The results of the current analysis indicate that noise levels will range between 61 and 70 dBA during the daytime period (07:00-23:00) and between 53 and 62 dBA during the nighttime period (23:00-07:00). The highest noise level (70 dBA) occurs at the south façade, which is nearest and most exposed to Hunt Club Road and Bank Street. 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 the development will require central air conditioning, which will allow occupants to keep windows closed and maintain a comfortable living environment. A Warning Clause¹ will also be required in all Lease, Purchase and Sale Agreements.

Noise levels at the rooftop receptor (Receptor 11) are expected to approach 58 dBA during the daytime period. If this area is to be used as an OLA, noise control measures are required to reduce the L_{eq} to 55

¹ City of Ottawa Environmental Noise Control Guidelines, January 2016



dB(A). Further analysis investigated the noise mitigating impact of incorporating a noise attenuating guardrail with a height of 1.2 m surrounding the terrace. Results of the investigation proved that noise levels can be reduced to 55 dB(A), which meets the ENCG noise level criterion for an OLA. Table 4 summarizes the results of the barrier investigation. The guardrail must be constructed from materials having a minimum surface density of 20 kg/m² (STC rating of 30) and contain no gaps. Design of the guardrail will conform to the requirements outlined in Part 5 of the ENCG. The following information will be required by the City for review prior to installation of the barrier:

1. Shop drawings, signed and sealed by a qualified Professional Engineer licenced by the Professional Engineers of Ontario, showing the details of the acoustic barrier systems components, including material specifications.
2. Structural drawing(s), signed by a qualified Professional Engineer licenced by the Professional Engineers of Ontario, showing foundation details and specifying design criteria, climatic design loads, as well as applicable geotechnical data used in the design.
3. Layout plan, and wall elevations, showing proposed colours and patterns.



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1. INTRODUCTION

Gradient Wind Engineering Inc. (Gradient Wind) was retained by Zlepzig Holdings Limited to undertake a transportation noise assessment, in support of Site Plan Application (SPA) submission, for a proposed residential development at 2425-2431 Bank Street in Ottawa, Ontario. This report summarizes the methodology, results, and recommendations related to the assessment of exterior and interior noise levels generated by local transportation traffic.

Our work is based on 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 prepared by NEUF Architect(e)s provided in April 2020, with future traffic volumes corresponding to the City of Ottawa's Official Plan (OP) roadway classifications. Aircraft noise has been assessed based on its proximity to the airport and the nearest noise exposure contour line, as per Annex 10 in the City of Ottawa's Official Plan.

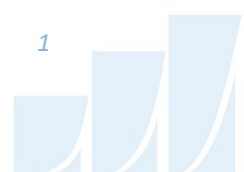
2. TERMS OF REFERENCE

The focus of this transportation noise assessment is a proposed senior's residence at 2425-2431 Bank Street in Ottawa, Ontario. The study site is located at the north side of the intersection of Bank Street and Hunt Club Road.

The proposed development is a 14-storey addition at the northeast corner of the existing Waterford Retirement Community. Indoor amenity spaces, including an indoor pool, and building support facilities occupy grade level while the floors above are reserved for residential occupancy. Levels 2 through 3 rise with a L-shaped planform. At Level 8, the floorplate sets back from the southeast corner to create a rectangular planform and accommodate a rooftop outdoor amenity terrace. Additionally, the floorplate sets back at the north and south sides of Level 8 to create private roof terraces. Balconies are provided at all elevations serving the residential units. As the private roof terraces and balconies extend less than 4 metres from the façade, they do not require consideration as outdoor living areas (OLA) in this study.

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



The study building is integrated with an existing 6-storey building at the west side. The site is surrounded by low-rise residential buildings from the northwest clockwise to the northeast and arterial roadways, Bank Street and Hunt Club Road, in the remaining compass directions. Beyond the arterial roadways, low-rise commercial buildings are situated from the east clockwise to the southwest.

The major sources of traffic noise are Hunt Club Road to the southeast of the site, Bank Street extending from the west to the south of the site. Although Albion Road South and Cahill Drive, located east and north of the site, respectively, are nearby collector roadways, they are located beyond 100 metres of the study site and therefore are not expected to have a significant impact considering the proximity of Hunt Club Road and Bank Street. Figure 1 illustrates a complete site plan with surrounding context.

With regard to aircraft noise, the proposed development lies outside the 25 NEF/NEP composite contour, but within the Airport Vicinity Development Zone. As a result, aircraft noise impacts are anticipated to be minimal and were considered qualitatively within this report.

3. OBJECTIVES

The principal objectives of this study are to (i) calculate the future noise levels on the study buildings produced by local transportation traffic, and (ii) ensure that interior and exterior noise levels do not exceed the allowable limits specified by the City of Ottawa's Environmental Noise Control Guidelines as outlined in Section 4.2 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 surface roadway traffic noise, 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 City of Ottawa’s Environmental Noise Control Guidelines (ENCG) specifies that the recommended indoor noise limit range (that is relevant to this study) is 45 dBA and 40 dBA for living rooms and sleeping quarters respectively for roadway as listed in Table 1. Based on Gradient Wind’s experience, more comfortable indoor noise levels should be targeted towards 42 dBA and 37 dBA, respectively, to control peak noise and deficiencies in building envelope construction.

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 centres, 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

⁴ Adapted from ENCG 2016 – Tables 2.2b and 2.2c

a standard closed window is capable of providing a minimum 20 dBA noise reduction⁵. A closed window due to a ventilation requirement will bring noise levels down to achieve an acceptable indoor environment⁶. 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 triggers the need for forced air heating with provision for central air conditioning. Where noise levels exceed 65 dBA daytime and 60 dBA nighttime, air conditioning will be required and building components will require higher levels of sound attenuation⁷.

The sound level criterion for outdoor living areas is 55 dBA, which applies during the daytime (07:00 to 23:00). When noise levels exceed 55 dBA, mitigation must be provided to reduce noise levels where technically and administratively feasible to acceptable levels at or below the criterion.

4.2.2 Theoretical Roadway 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 separate line sources of noise. In addition to the traffic volumes summarized in Table 2, theoretical noise predictions were based on the following parameters:

- Truck traffic on all roadways was taken to comprise 5% heavy trucks and 7% medium trucks, as per ENCG requirements for noise level predictions.
- The day/night split for all streets was taken to be 92%/8%, respectively.
- 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.
- Receptor height was taken to be 20.9 metres at Level 7 for the centre of the window (height to 7th floor slab + 1.5 metres) for Receptors 1-6, 39.6 metres at Level 13 for the centre of the window for Receptors 7-9, 1.5 metres at Level 1 for Receptor 10 and 24.4 metres for the Level 8 rooftop outdoor amenity area for Receptor 11 (height to 8th floor slab + 1.5 metres).

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

⁶ MECP, Environmental Noise Guidelines, NPC 300 – Part C, Section 7.8

⁷ MECP, Environmental Noise Guidelines, NPC 300 – Part C, Section 7.1.3



- The existing, adjacent mid-rise building to the west was considered as a noise barrier with a height of 18-metres.
- Noise receptors were strategically placed at eleven locations around the study area (see Figure 2).
- Receptor distances and exposure angles are illustrated in Figures 4-10 in Appendix A.

4.2.1 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 Plan⁸ 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 Traffic Data	Speed Limit (km/h)	Traffic Volumes
Hunt Club Road	4-Lane Urban Arterial – Divided (4-UAD)	60	35,000
Bank Street	4-Lane Urban Arterial – Divided (4-UAD)	60	35,000

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, brick veneer walls can achieve STC 50 or more. Standard commercially sided exterior metal stud walls have around STC 45. Standard good quality double-glazed non-operable windows can have STC ratings ranging from 25 to 40, depending on the window

⁸ City of Ottawa Transportation Master Plan, November 2013

manufacturer, pane thickness and inter-pane spacing. As previously mentioned, the windows are the known weak point in a partition.

As per Section 4.2, 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 procedure⁹ 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

Based on published research¹⁰, 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, detailed floor layouts and building elevations have not been finalized; 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 = outdoor noise level – targeted indoor noise levels).

5. RESULTS AND DISCUSSION

5.1 Roadway Traffic Noise Levels

The results of the roadway traffic noise calculations are summarized in Table 3 below. A complete set of input and output data from all STAMSON 5.04 calculations are available in Appendix A.

⁹ Building Practice Note: Controlling Sound Transmission into Buildings by J.D. Quirt, National Research Council of Canada, September 1985

¹⁰ CMHC, Road & Rail Noise: Effects on Housing

TABLE 3: EXTERIOR NOISE LEVELS DUE TO ROAD TRAFFIC

Receptor Number	Receptor Height Above Grade (m)	Receptor Location	STAMSON 5.04 Noise Level (dBA)	
			Day	Night
1	20.9	POW – Level 7, East Façade at Southeast Corner	67	59
2	20.9	POW – Level 7, South Façade	70	62
3	20.9	POW – Level 7, East Façade at Northeast Corner	61	53
4	20.9	POW – Level 7, North Façade at Northwest Corner	61	53
5	20.9	POW – Level 7, West Façade at Northwest Corner	63	56
6	20.9	POW – Level 7, West Façade at Southwest Corner	67	59
7	39.6	POW – Level 13, East Façade at Southeast Corner	66	58
8	39.6	POW – Level 13, South Façade	69	61
9	39.6	POW – Level 13, West Façade at Southwest Corner	67	59
10	1.5	POW – Level 1, South Façade	70	62
11	24.4	OLA – Level 8, Rooftop at Southeast Corner	58	-

The results of the current analysis indicate that noise levels will range between 61 and 70 dBA during the daytime period (07:00-23:00) and between 53 and 62 dBA during the nighttime period (23:00-07:00). The highest noise level (70 dBA) occurs at the south façade, which is nearest and most exposed to Hunt Club Road and Bank Street. The noise levels at the OLA at Level 8 are expected to approach 58 dBA during the daytime.

5.2 Noise Control Measures

The noise levels predicted due to roadway traffic exceed the criteria listed in Section 4.2 for building components. As discussed in Section 4.3, 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). The STC requirements for the windows are summarized below for various units within the development (see Figure 3):

- **Bedroom Windows**
 - (i) Bedroom windows facing east and west will require a minimum STC of 30
 - (ii) Bedroom windows facing south will require a minimum STC of 33
 - (iii) All other bedroom windows are to satisfy Ontario Building Code (OBC 2012) requirements

- **Living Room Windows**
 - (i) Living room windows facing east and west will require a minimum STC of 25
 - (ii) Living room windows facing south will require a minimum STC of 28
 - (iii) All other living room windows are to satisfy Ontario Building Code (OBC 2012) requirements

- **Exterior Walls**
 - (i) Exterior wall components on the east, south and west façades will require a minimum STC of 45, which will be achieved with brick cladding or an acoustical equivalent according to NRC test data¹¹

The STC requirements apply to windows, doors, spandrel panels and curtainwall elements. Exterior wall components on these façades are recommended to have a minimum STC of 45, where a window/wall system is used. A review of window supplier literature indicates that the specified STC ratings can be achieved by a variety of window systems having a combination of glass thickness and inter-pane spacing. We have specified an example window configuration, however several manufacturers and various combinations of window components, such as those proposed, will offer the necessary sound attenuation rating. It is the responsibility of the manufacturer to ensure that the specified window achieves the required STC. This can only be assured by using window configurations that have been certified by laboratory testing. The requirements for STC ratings assume that the remaining components of the building are constructed and installed according to the minimum standards of the Ontario Building Code. The specified STC requirements also apply to swinging and/or sliding patio doors.

Results of the calculations also indicate that the development will require central air conditioning, which will allow occupants to keep windows closed and maintain a comfortable living environment. In addition to ventilation requirements, Warning Clauses will also be required in all Lease, Purchase and Sale Agreements, as summarized in Section 6.

¹¹ J.S. Bradley and J.A. Birta. Laboratory Measurements of the Sound Insulation of Building Façade Elements, National Research Council October 2000.



5.3 Noise Barrier Calculation

Noise levels at the rooftop receptor (Receptor 11) are expected to approach 58 dBA during the daytime period. If this area is to be used as an OLA, noise control measures are required to reduce the L_{eq} to 55 dBA. Further analysis investigated the noise mitigating impact of incorporating a noise attenuating guardrail with a height of 1.2 m surrounding the terrace. Results of the investigation proved that noise levels can be reduced to 55 dBA, which meets the ENCG noise level criterion for an OLA. Table 4 summarizes the results of the barrier investigation.

TABLE 4: RESULTS OF NOISE BARRIER INVESTIGATION

Location	Receptor Number	Barrier Height	Daytime L_{eq} Noise Levels (dBA)
OLA – Level 8, Rooftop at Southeast Corner	11	No Barrier	58
		1.2 m above floor slab	55

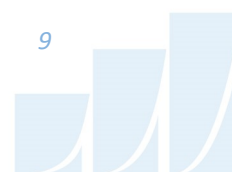
6. CONCLUSIONS AND RECOMMENDATIONS

The results of the current analysis indicate that noise levels will range between 61 and 70 dBA during the daytime period (07:00-23:00) and between 53 and 62 dBA during the nighttime period (23:00-07:00). The highest noise level (70 dBA) occurs at the south façade, which is nearest and most exposed to Hunt Club Road and Bank Street. 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 the development will require central air conditioning, which will allow occupants to keep windows closed and maintain a comfortable living environment. The following Warning Clause¹² will also be required be placed on all Lease, Purchase and Sale Agreements, as summarized below:

“Purchasers/tenants are advised that despite the inclusion of noise control features in the development and within the building units, sound levels due to increasing roadway traffic may, on occasion, interfere with some activities of the dwelling occupants, as the sound

¹² City of Ottawa Environmental Noise Control Guidelines, January 2016



levels exceed the sound level limits of the City and the Ministry of the Environment, Conservation and Parks. To help address the need for sound attenuation, this development includes:

- *STC rated multi-pane glazing elements and spandrel panels*
 - *East and West façade bedroom/living room: STC 30/25*
 - *South façade bedroom/living room: STC 33/28*
- *STC rated exterior walls*
 - *East, south and west façade: STC 45*

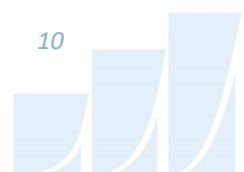
This dwelling unit has also been designed with air conditioning. Air conditioning will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the City and the Ministry of the Environment, Conservation and Parks.

To ensure that provincial sound level limits are not exceeded, it is important to maintain these sound attenuation features.”

With regard to aircraft noise, the proposed development lies outside the 25 NEP contour, but within the Airport Vicinity Development Zone. As a result, aircraft noise impacts are anticipated to be minimal and were considered qualitatively within the noise report. With this consideration, A Warning Clause will also be required to be placed on all Lease, Purchase and Sale Agreements, as summarized below:

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

Noise levels at the rooftop receptor (Receptor 11) are expected to approach 58 dBA during the daytime period. If this area is to be used as an OLA, noise control measures are required to reduce the L_{eq} to 55 dBA. Further analysis investigated the noise mitigating impact of incorporating a noise attenuating guardrail with a height of 1.2 m surrounding the terrace. Results of the investigation proved that noise levels can be reduced to 55 dBA, which meets the ENCG noise level criterion for an OLA. The guardrail



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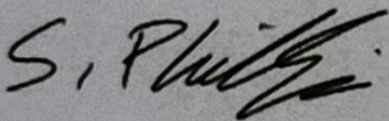
must be constructed from materials having a minimum surface density of 20 kg/m^2 (STC rating of 30) and contain no gaps. Design of the guardrail will conform to the requirements outlined in Part 5 of the ENCG. The following information will be required by the City for review prior to installation of the barrier:

1. Shop drawings, signed and sealed by a qualified Professional Engineer licenced by the Professional Engineers of Ontario, showing the details of the acoustic barrier systems components, including material specifications.
2. Structural drawing(s), signed by a qualified Professional Engineer licenced by the Professional Engineers of Ontario, showing foundation details and specifying design criteria, climatic design loads, as well as applicable geotechnical data used in the design.
3. Layout plan, and wall elevations, showing proposed colours and patterns.

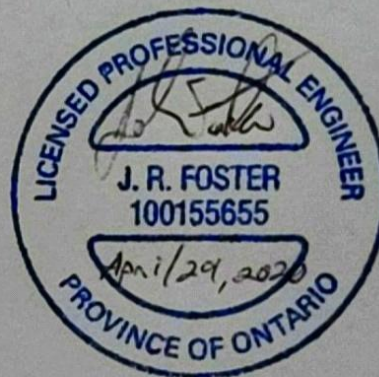
This concludes our traffic noise assessment and report. If you have any questions or wish to discuss our findings please advise us. In the interim, we thank you for the opportunity to be of service.

Sincerely,

Gradient Wind Engineering Inc.

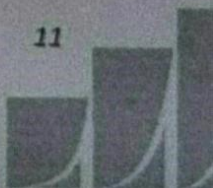


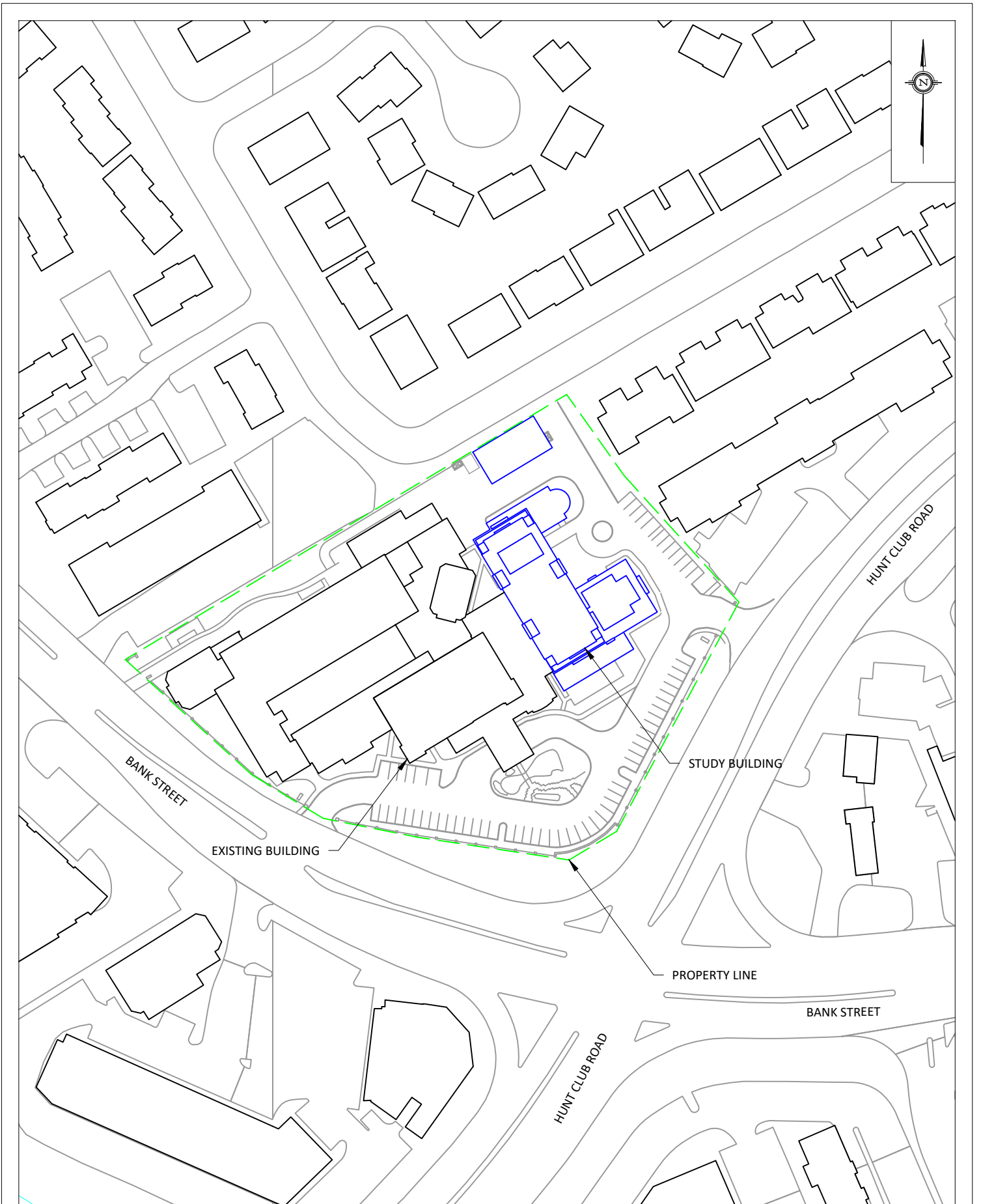
Samantha Phillips, B.Eng.
Environmental Scientist



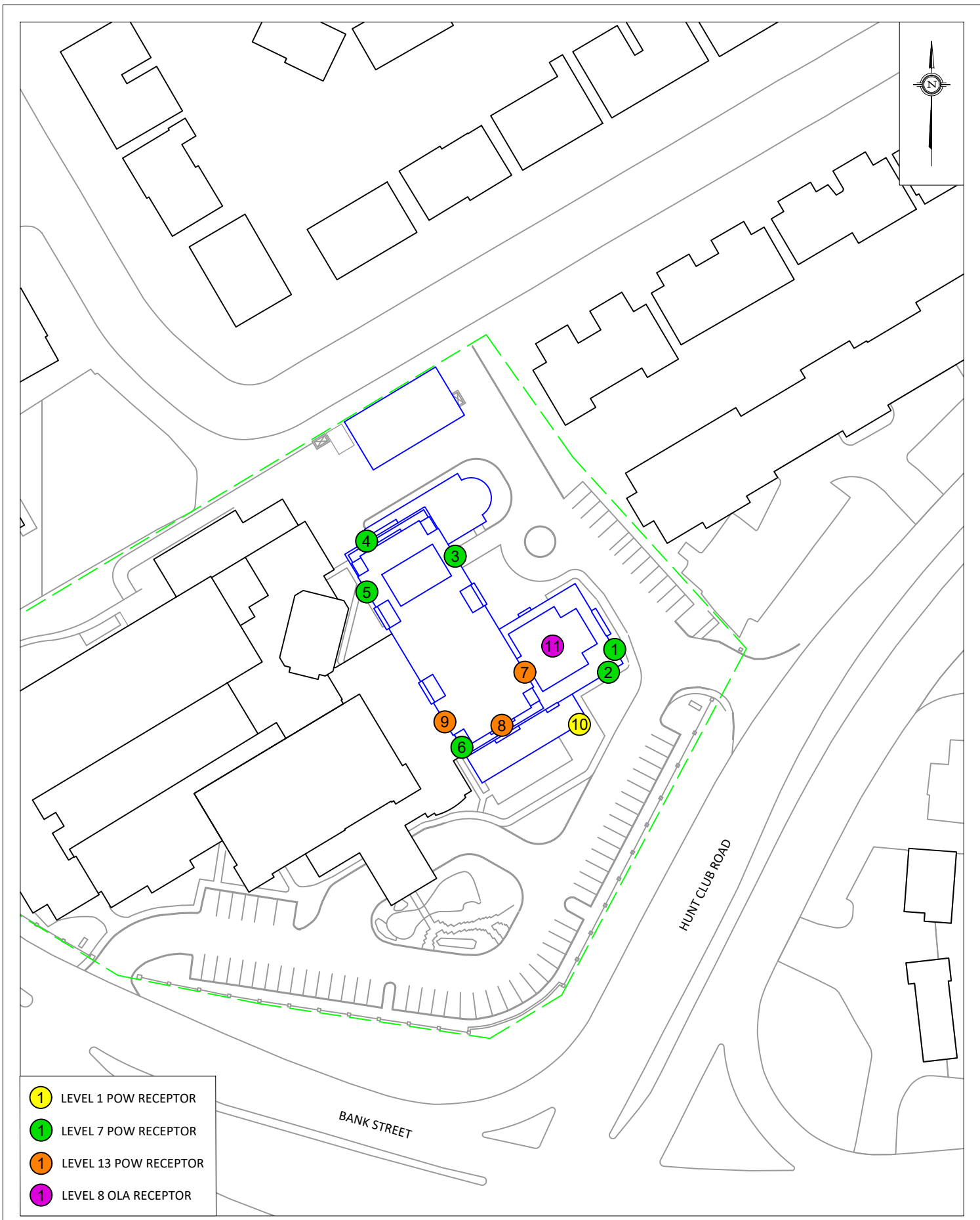
Joshua Foster, P.Eng.
Principal

Gradient Wind File #20-065-Transportation Noise



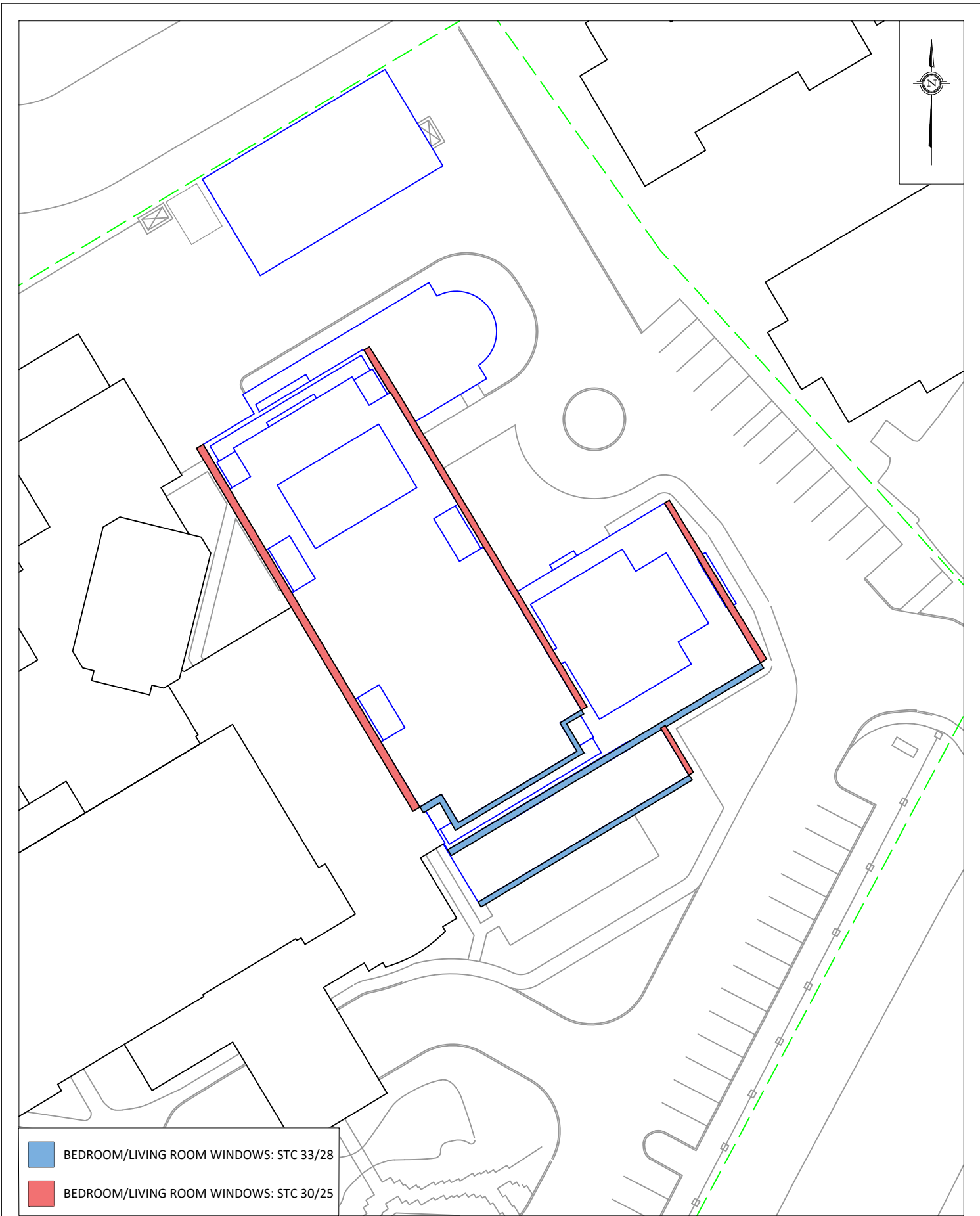


GRADIENTWIND ENGINEERS & SCIENTISTS 127 WALGREEN ROAD, OTTAWA, ON 613 836 0934 • GRADIENTWIND.COM	PROJECT 2425-2431 BANK STREET, OTTAWA TRANSPORTATION NOISE ASSESSMENT		DESCRIPTION FIGURE 1: SITE PLAN AND SURROUNDING CONTEXT
	SCALE 1:1500 (APPROX.)	DRAWING NO. GW20-065-1	
	DATE APRIL 24, 2020	DRAWN BY S.P.	



- 1 LEVEL 1 POW RECEPTOR
- 1 LEVEL 7 POW RECEPTOR
- 1 LEVEL 13 POW RECEPTOR
- 1 LEVEL 8 OLA RECEPTOR

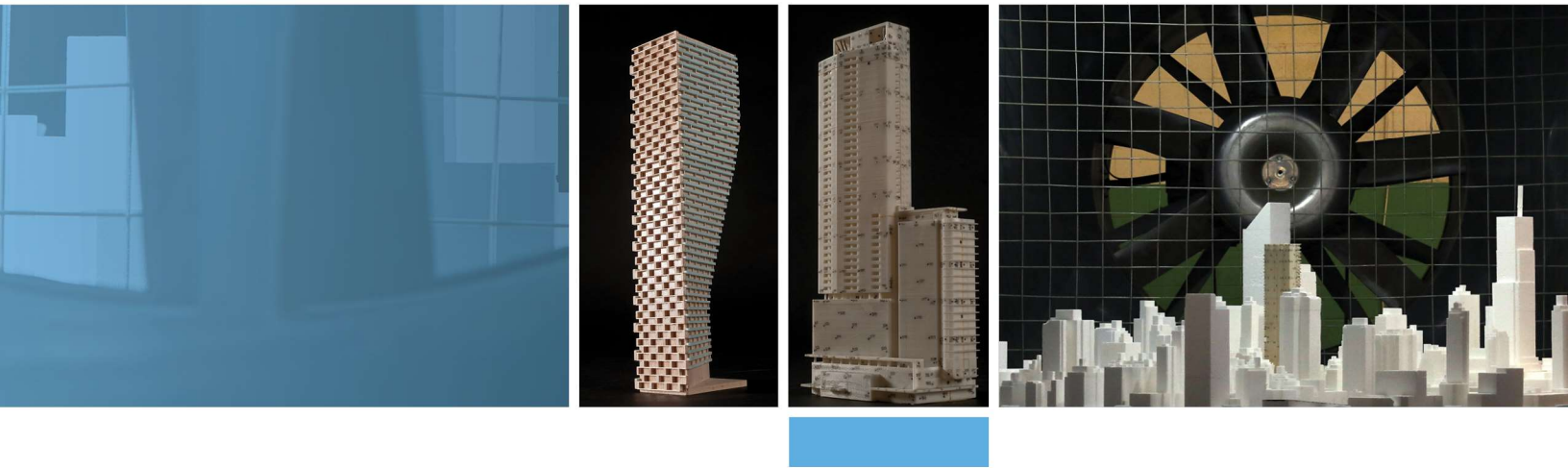
GRADIENTWIND ENGINEERS & SCIENTISTS 127 WALGREEN ROAD, OTTAWA, ON 613 836 0934 • GRADIENTWIND.COM	PROJECT	2425-2431 BANK STREET, OTTAWA TRANSPORTATION NOISE ASSESSMENT		DESCRIPTION	FIGURE 2: RECEPTOR LOCATIONS
	SCALE	1:1000 (APPROX.)	DRAWING NO.	GW20-065-2	
	DATE	APRIL 24, 2020	DRAWN BY	S.P.	



GRADIENTWIND ENGINEERS & SCIENTISTS 127 WALGREEN ROAD, OTTAWA, ON 613 836 0934 • GRADIENTWIND.COM	PROJECT	2425-2431 BANK STREET, OTTAWA TRANSPORTATION NOISE ASSESSMENT		DESCRIPTION	FIGURE 3: WINDOW STC REQUIREMENTS
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	DATE	APRIL 24, 2020	DRAWN BY	S.P.	

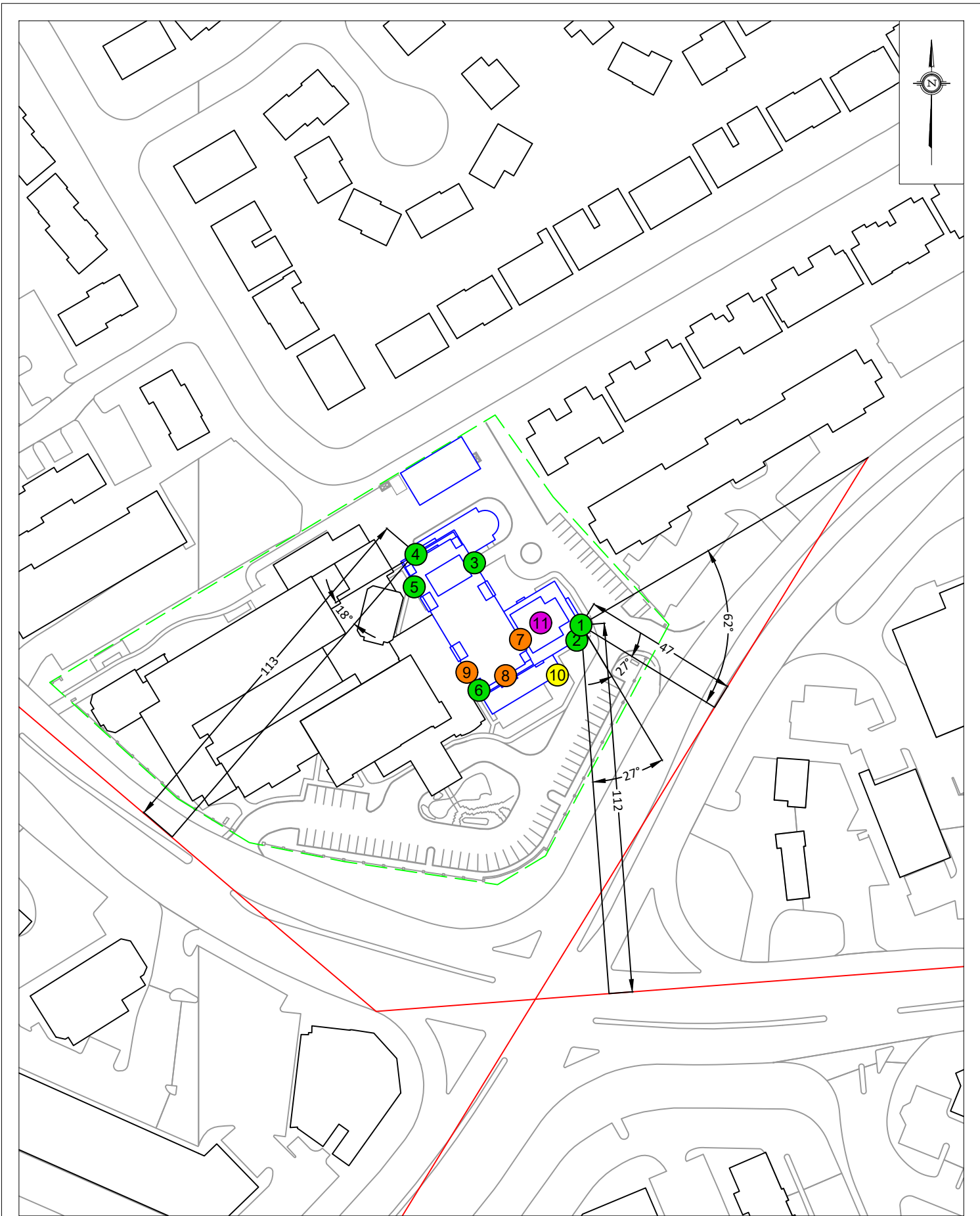
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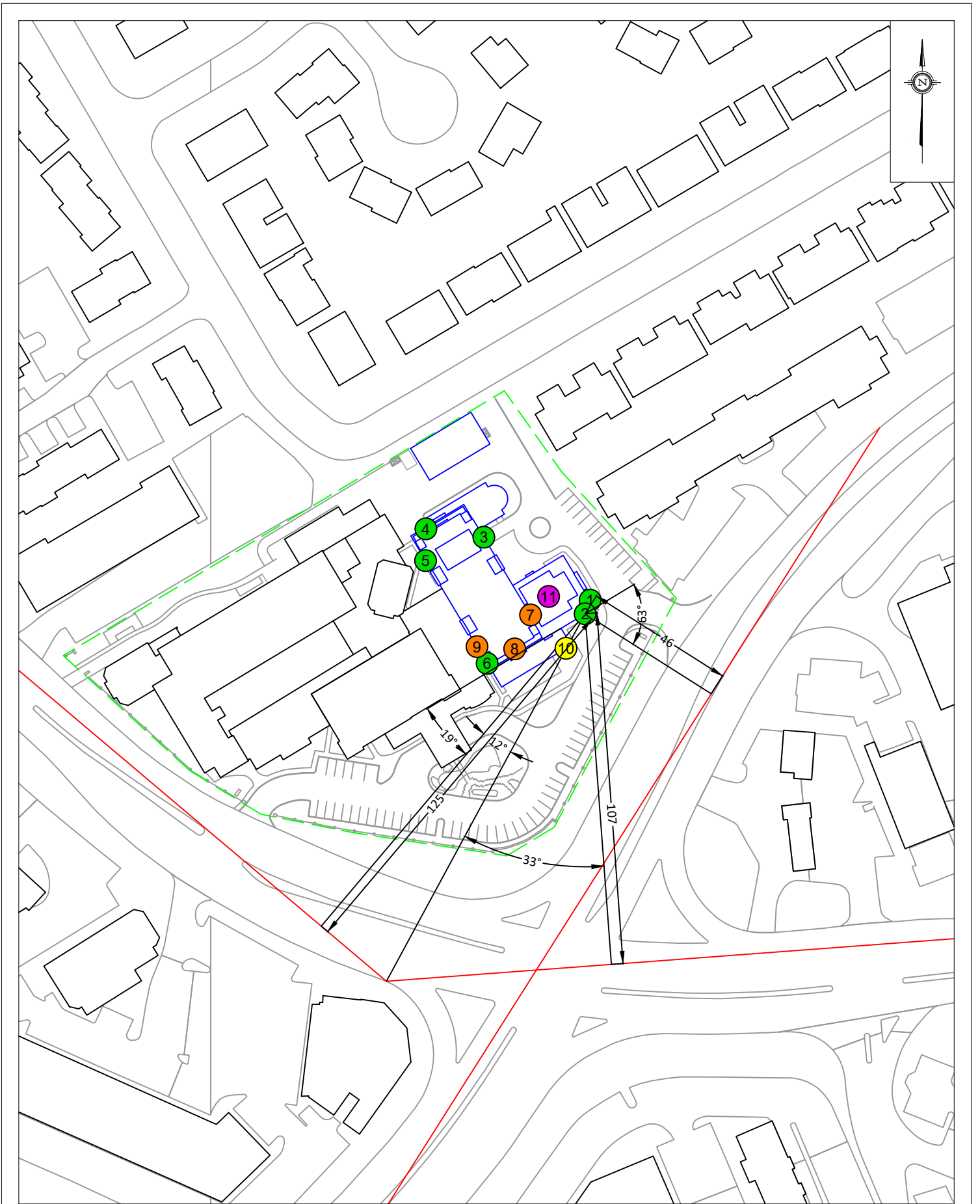


APPENDIX A

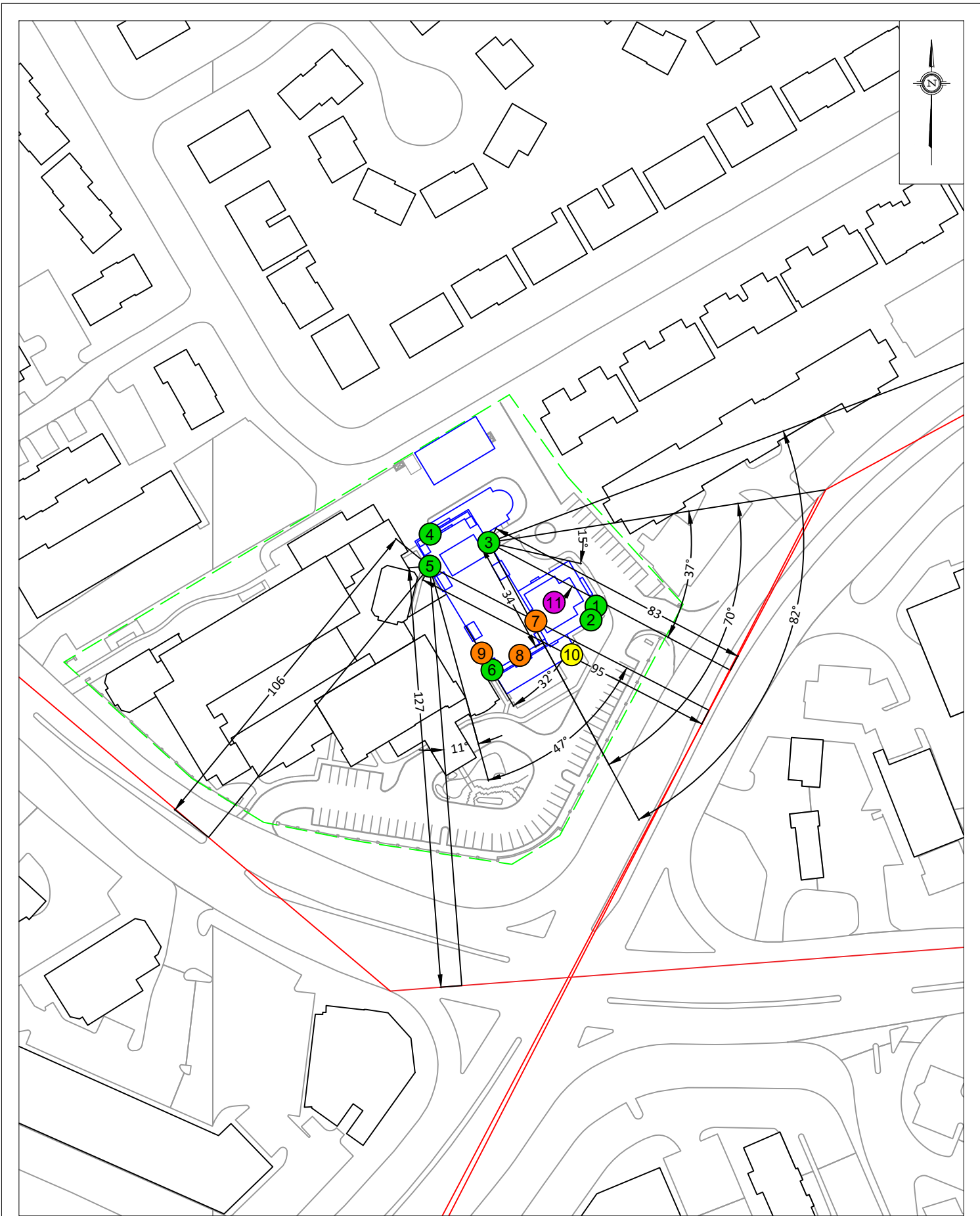
STAMSON 5.04 – INPUT AND OUTPUT DATA AND SUPPORTING INFORMATION



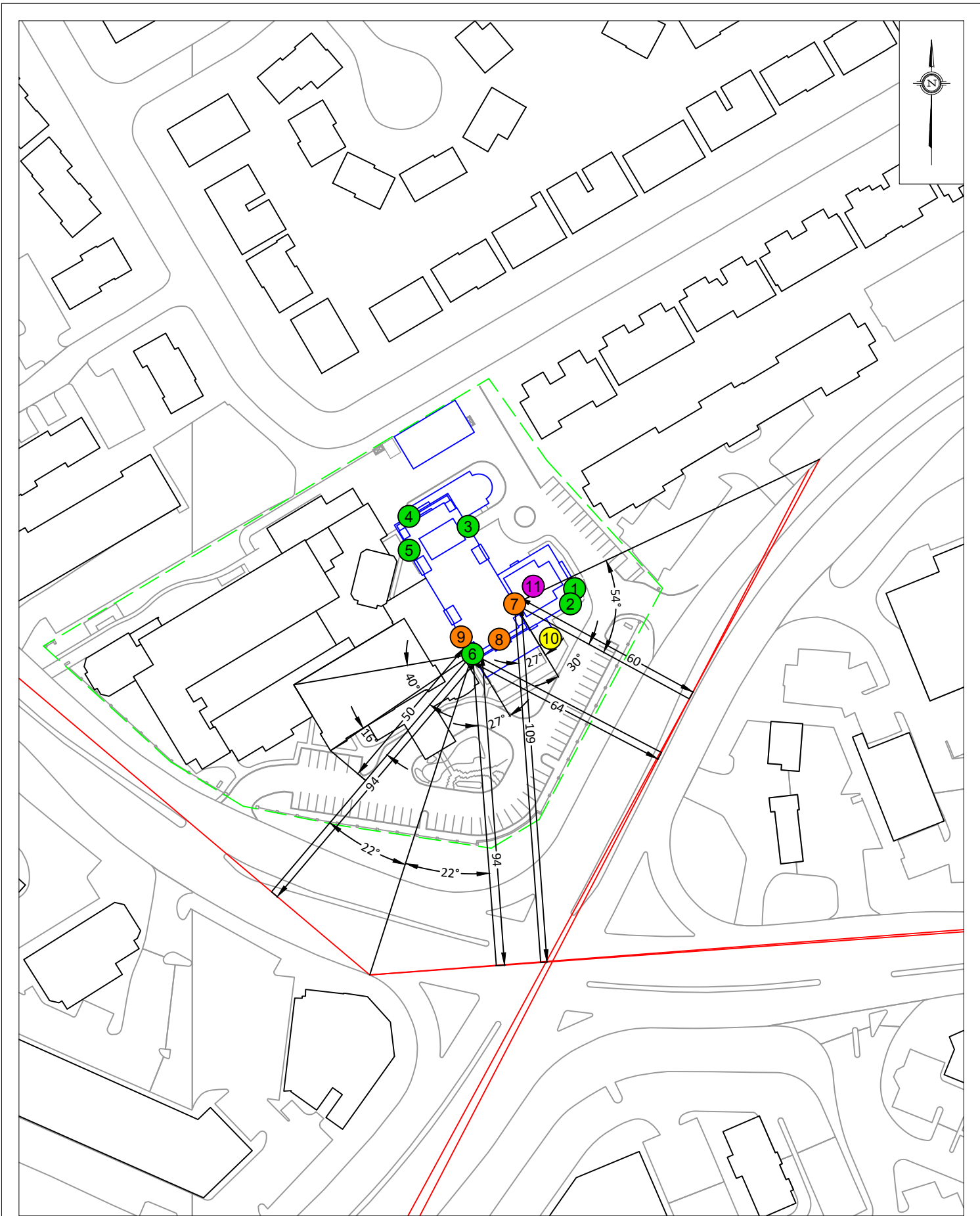
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DATE	APRIL 24, 2020	DRAWN BY S.P.

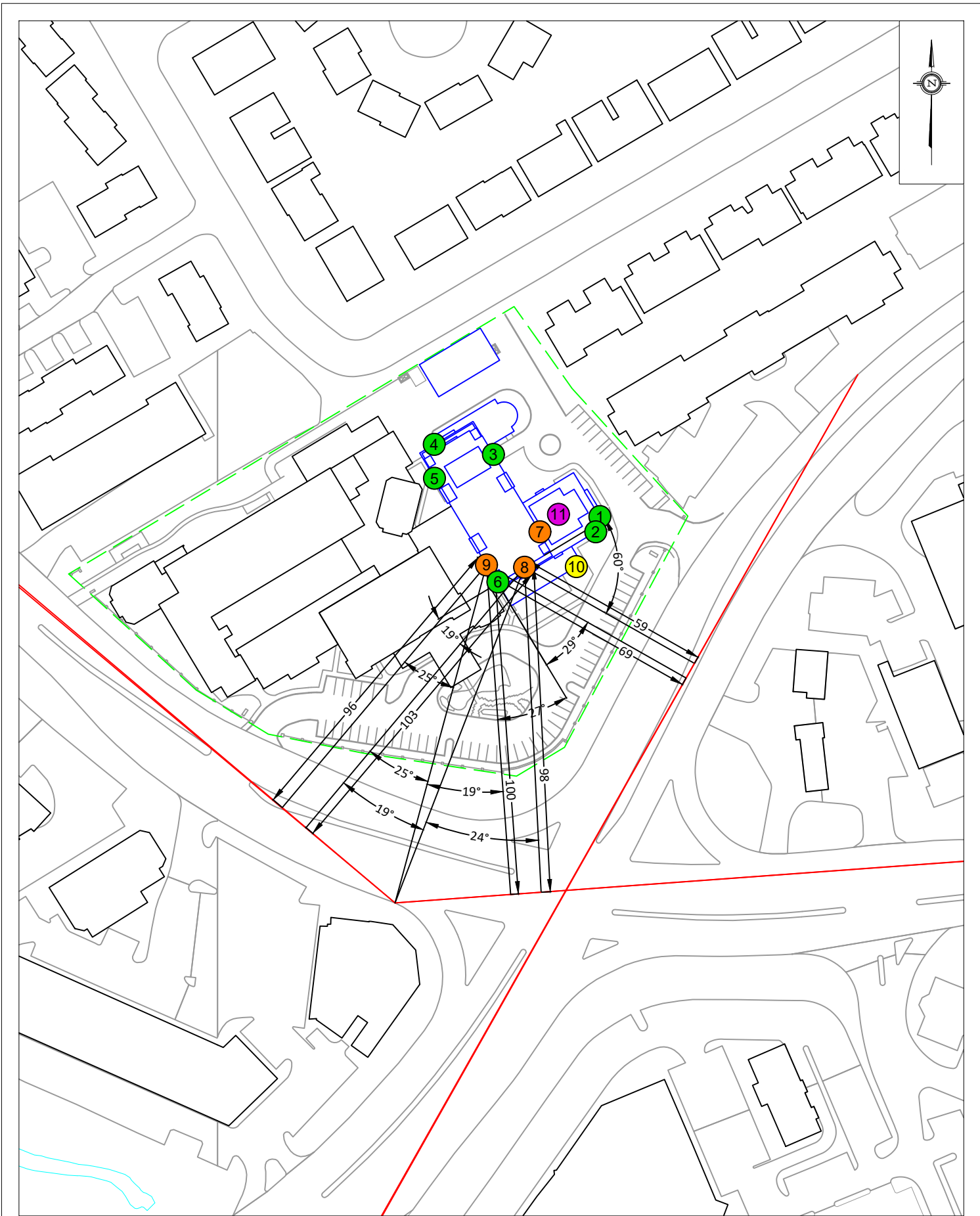


GRADIENTWIND ENGINEERS & SCIENTISTS 127 WALGREEN ROAD, OTTAWA, ON 613 836 0934 • GRADIENTWIND.COM	PROJECT	2425-2431 BANK STREET, OTTAWA TRANSPORTATION NOISE ASSESSMENT		DESCRIPTION
	SCALE	1:1500 (APPROX.)	DRAWING NO.	FIGURE 5: STAMSON INPUT PARAMETERS - RECEPTOR 2
	DATE	APRIL 24, 2020	DRAWN BY	

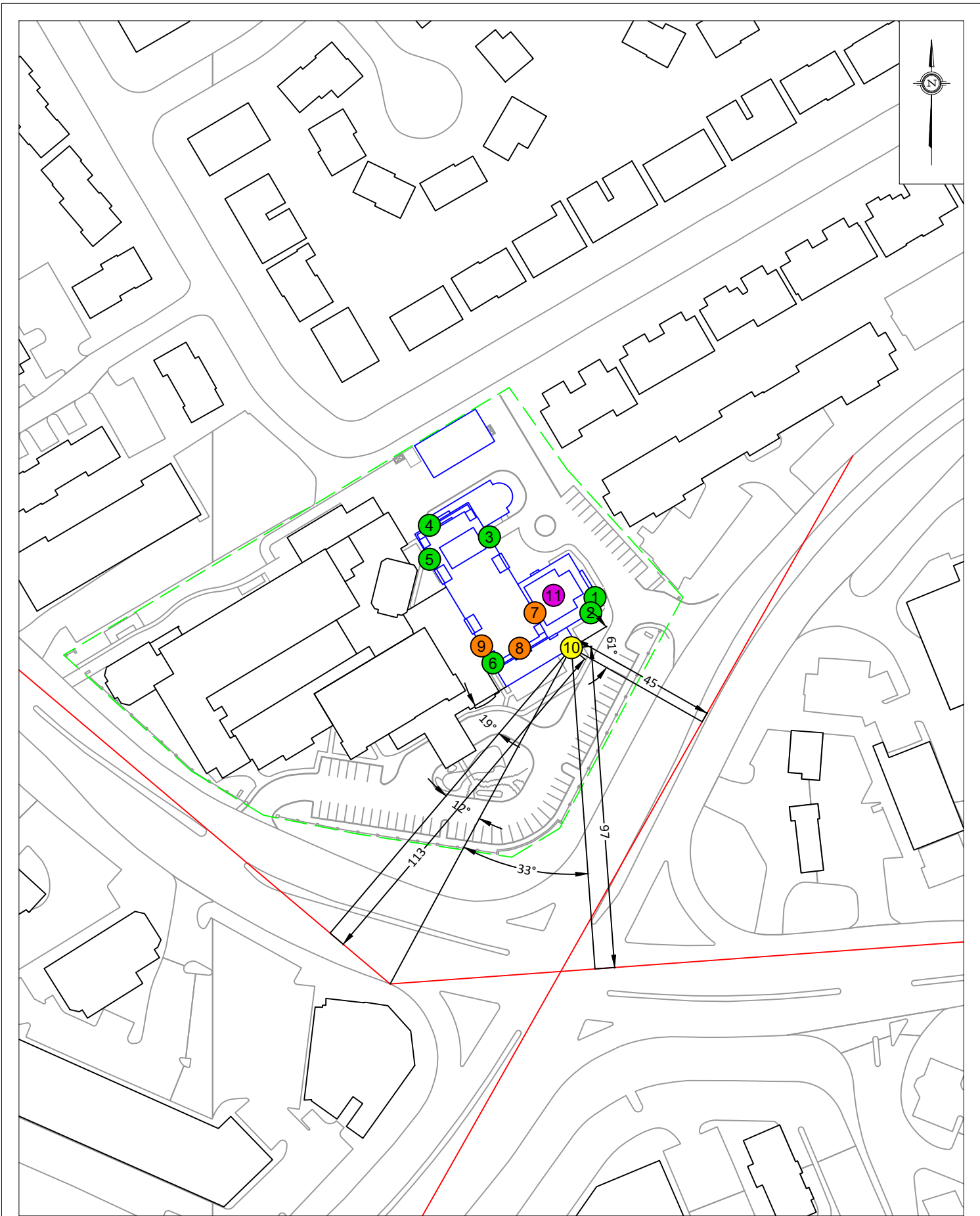


PROJECT	2425-2431 BANK STREET, OTTAWA TRANSPORTATION NOISE ASSESSMENT	
SCALE	1:1500 (APPROX.)	DRAWING NO. GW20-065-6
DATE	APRIL 24, 2020	DRAWN BY S.P.

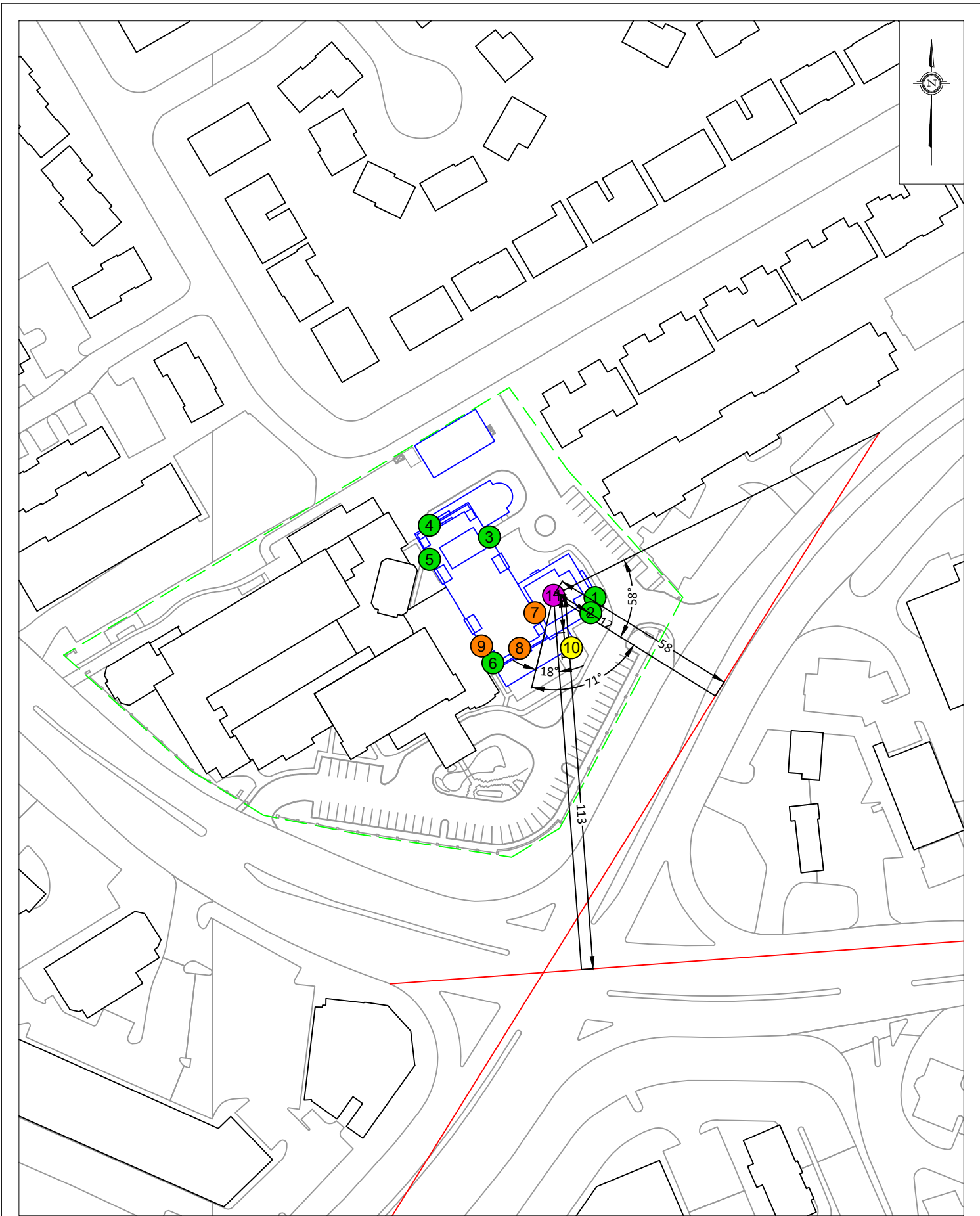




PROJECT	2425-2431 BANK STREET, OTTAWA TRANSPORTATION NOISE ASSESSMENT	
SCALE	1:1500 (APPROX.)	DRAWING NO. GW20-065-8
DATE	APRIL 24, 2020	DRAWN BY S.P.



PROJECT	2425-2431 BANK STREET, OTTAWA TRANSPORTATION NOISE ASSESSMENT	
SCALE	1:1500 (APPROX.)	DRAWING NO. GW20-065-9
DATE	APRIL 24, 2020	DRAWN BY S.P.



PROJECT	2425-2431 BANK STREET, OTTAWA TRANSPORTATION NOISE ASSESSMENT	
SCALE	1:1500 (APPROX.)	DRAWING NO. GW20-065-10
DATE	APRIL 24, 2020	DRAWN BY S.P.

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STAMSON 5.0 NORMAL REPORT Date: 20-04-2020 15:05:52
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

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

Angle1 Angle2 : -62.00 deg 27.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 47.00 / 47.00 m
Receiver height : 20.90 / 20.90 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

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ENGINEERS & SCIENTISTS

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

```
-----
Angle1 Angle2 : -90.00 deg -27.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 112.00 / 112.00 m
Receiver height : 20.90 / 20.90 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00
```

Results segment # 1: Hunt Club (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
-62	27	0.00	73.68	0.00	-4.96	-3.06	0.00	0.00	0.00

```
-----
SubLeq
--
65.66
-----
```

Segment Leq : 65.66 dBA



Results segment # 2: Bank (day)

Source height = 1.50 m

ROAD (0.00 + 60.39 + 0.00) = 60.39 dBA

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

-90	-27	0.00	73.68	0.00	-8.73	-4.56	0.00	0.00	0.00
60.39									

Segment Leq : 60.39 dBA

Total Leq All Segments: 66.79 dBA

Results segment # 1: Hunt Club (night)

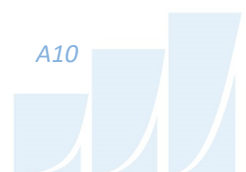
Source height = 1.50 m

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									

-62	27	0.00	66.08	0.00	-4.96	-3.06	0.00	0.00	0.00
58.06									

Segment Leq : 58.06 dBA



Results segment # 2: Bank (night)

Source height = 1.50 m

ROAD (0.00 + 52.79 + 0.00) = 52.79 dBA

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

--
-90 -27 0.00 66.08 0.00 -8.73 -4.56 0.00 0.00 0.00
52.79

--

Segment Leq : 52.79 dBA

Total Leq All Segments: 59.19 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 66.79
(NIGHT): 59.19

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STAMSON 5.0 NORMAL REPORT Date: 22-04-2020 14:50:41
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

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

Angle1 Angle2 : -63.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 46.00 / 46.00 m
Receiver height : 20.90 / 20.90 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: Bank1 (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: Bank1 (day/night)

Angle1 Angle2 : -90.00 deg 33.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 107.00 / 107.00 m
Receiver height : 20.90 / 20.90 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

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Road data, segment # 3: Bank2 (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: Bank2 (day/night)

Angle1 Angle2 : -12.00 deg 19.00 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 : 20.90 / 20.90 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Hunt Club (day)

Source height = 1.50 m

ROAD (0.00 + 68.10 + 0.00) = 68.10 dBA

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

--									
-63	90	0.00	73.68	0.00	-4.87	-0.71	0.00	0.00	0.00
68.10									

Segment Leq : 68.10 dBA

Results segment # 2: Bank1 (day)

Source height = 1.50 m

ROAD (0.00 + 63.49 + 0.00) = 63.49 dBA

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

--									
-90	33	0.00	73.68	0.00	-8.53	-1.65	0.00	0.00	0.00
63.49									

Segment Leq : 63.49 dBA



Results segment # 3: Bank2 (day)

Source height = 1.50 m

ROAD (0.00 + 56.83 + 0.00) = 56.83 dBA

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

--									
-12	19	0.00	73.68	0.00	-9.21	-7.64	0.00	0.00	0.00
56.83									

Segment Leq : 56.83 dBA

Total Leq All Segments: 69.62 dBA

Results segment # 1: Hunt Club (night)

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									

--									
-63	90	0.00	66.08	0.00	-4.87	-0.71	0.00	0.00	0.00
60.51									

Segment Leq : 60.51 dBA



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Results segment # 2: Bank1 (night)

Source height = 1.50 m

ROAD (0.00 + 55.89 + 0.00) = 55.89 dBA

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

SubLeq

--									
-90	33	0.00	66.08	0.00	-8.53	-1.65	0.00	0.00	0.00
55.89									

Segment Leq : 55.89 dBA

Results segment # 3: Bank2 (night)

Source height = 1.50 m

ROAD (0.00 + 49.23 + 0.00) = 49.23 dBA

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

SubLeq

--									
-12	19	0.00	66.08	0.00	-9.21	-7.64	0.00	0.00	0.00
49.23									

Segment Leq : 49.23 dBA

Total Leq All Segments: 62.03 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 69.62
(NIGHT): 62.03

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STAMSON 5.0 NORMAL REPORT Date: 17-04-2020 17:03:51
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: R3.te Time Period: Day/Night 16/8 hours
Description:

Road data, segment # 1: Hunt Club1 (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: Hunt Club1 (day/night)

Angle1 Angle2 : -37.00 deg -15.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 83.00 / 83.00 m
Receiver height : 20.90 / 20.90 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

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Road data, segment # 2: Hunt Club2 (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: Hunt Club2 (day/night)

Angle1 Angle2 : -82.00 deg -70.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 34.00 / 34.00 m
Receiver height : 20.90 / 20.90 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Hunt Club1 (day)

Source height = 1.50 m

ROAD (0.00 + 57.12 + 0.00) = 57.12 dBA

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

--									
-37	-15	0.00	73.68	0.00	-7.43	-9.13	0.00	0.00	0.00
57.12									

Segment Leq : 57.12 dBA

Results segment # 2: Hunt Club2 (day)

Source height = 1.50 m

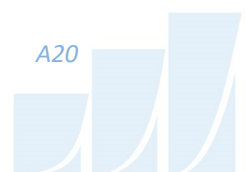
ROAD (0.00 + 58.36 + 0.00) = 58.36 dBA

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

--									
-82	-70	0.00	73.68	0.00	-3.55	-11.76	0.00	0.00	0.00
58.36									

Segment Leq : 58.36 dBA

Total Leq All Segments: 60.79 dBA



Results segment # 1: Hunt Club1 (night)

Source height = 1.50 m

ROAD (0.00 + 49.52 + 0.00) = 49.52 dBA

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

--									
-37	-15	0.00	66.08	0.00	-7.43	-9.13	0.00	0.00	0.00
49.52									

Segment Leq : 49.52 dBA

Results segment # 2: Hunt Club2 (night)

Source height = 1.50 m

ROAD (0.00 + 50.76 + 0.00) = 50.76 dBA

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

--									
-82	-70	0.00	66.08	0.00	-3.55	-11.76	0.00	0.00	0.00
50.76									

Segment Leq : 50.76 dBA

Total Leq All Segments: 53.19 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 60.79
(NIGHT): 53.19

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STAMSON 5.0 NORMAL REPORT Date: 20-04-2020 15:10:57
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

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

Angle1 Angle2 : 18.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 113.00 / 113.00 m
Receiver height : 20.90 / 20.90 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Bank (day)

Source height = 1.50 m

ROAD (0.00 + 60.93 + 0.00) = 60.93 dBA

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

--									
18	90	0.00	73.68	0.00	-8.77	-3.98	0.00	0.00	0.00
60.93									

Segment Leq : 60.93 dBA

Total Leq All Segments: 60.93 dBA

Results segment # 1: Bank (night)

Source height = 1.50 m

ROAD (0.00 + 53.33 + 0.00) = 53.33 dBA

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

--									
18	90	0.00	66.08	0.00	-8.77	-3.98	0.00	0.00	0.00
53.33									

Segment Leq : 53.33 dBA

Total Leq All Segments: 53.33 dBA

TOTAL Leq FROM ALL SOURCES (DAY) : 60.93
(NIGHT) : 53.33

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STAMSON 5.0 NORMAL REPORT Date: 20-04-2020 15:20:46
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

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

Angle1 Angle2 : 32.00 deg 47.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 95.00 / 95.00 m
Receiver height : 20.90 / 20.90 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00



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Road data, segment # 2: Bank1 (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: Bank1 (day/night)

Angle1 Angle2 : 1.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 106.00 / 106.00 m
Receiver height : 20.90 / 20.90 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 3: Bank2 (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: Bank2 (day/night)

Angle1 Angle2 : -27.00 deg -11.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 127.00 / 127.00 m
Receiver height : 20.90 / 20.90 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

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Results segment # 1: Hunt Club (day)

Source height = 1.50 m

ROAD (0.00 + 54.87 + 0.00) = 54.87 dBA

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

SubLeq

32	47	0.00	73.68	0.00	-8.02	-10.79	0.00	0.00	0.00
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Segment Leq : 54.87 dBA

Results segment # 2: Bank1 (day)

Source height = 1.50 m

ROAD (0.00 + 62.13 + 0.00) = 62.13 dBA

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

SubLeq

1	90	0.00	73.68	0.00	-8.49	-3.06	0.00	0.00	0.00
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Segment Leq : 62.13 dBA

Results segment # 3: Bank2 (day)

Source height = 1.50 m

ROAD (0.00 + 53.89 + 0.00) = 53.89 dBA

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

--									
	-27	-11	0.00	73.68	0.00	-9.28	-10.51	0.00	0.00
	53.89								

Segment Leq : 53.89 dBA

Total Leq All Segments: 63.39 dBA

Results segment # 1: Hunt Club (night)

Source height = 1.50 m

ROAD (0.00 + 47.27 + 0.00) = 47.27 dBA

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

--									
	32	47	0.00	66.08	0.00	-8.02	-10.79	0.00	0.00
	47.27								

Segment Leq : 47.27 dBA

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Results segment # 2: Bank1 (night)

Source height = 1.50 m

ROAD (0.00 + 54.53 + 0.00) = 54.53 dBA

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

1	90	0.00	66.08	0.00	-8.49	-3.06	0.00	0.00	0.00
---	----	------	-------	------	-------	-------	------	------	------

Segment Leq : 54.53 dBA

Results segment # 3: Bank2 (night)

Source height = 1.50 m

ROAD (0.00 + 46.29 + 0.00) = 46.29 dBA

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

SubLeq

-27	-11	0.00	66.08	0.00	-9.28	-10.51	0.00	0.00	0.00
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Segment Leq : 46.29 dBA

Total Leq All Segments: 55.79 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 63.39
(NIGHT): 55.79



GRADIENTWIND

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STAMSON 5.0 NORMAL REPORT Date: 21-04-2020 16:47:18
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

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

Angle1 Angle2 : 31.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 64.00 / 64.00 m
Receiver height : 20.90 / 20.90 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00



Road data, segment # 2: Bank1 (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: Bank1 (day/night)

Angle1 Angle2 : -27.00 deg 22.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 94.00 / 94.00 m
Receiver height : 20.90 / 20.90 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

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Road data, segment # 3: Bank2 (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: Bank2 (day/night)

Angle1 Angle2 : -22.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 94.00 / 94.00 m
Receiver height : 20.90 / 20.90 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 16.00 deg Angle2 : 40.00 deg
Barrier height : 18.00 m
Barrier receiver distance : 50.00 / 50.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

Results segment # 1: Hunt Club (day)

Source height = 1.50 m

ROAD (0.00 + 62.53 + 0.00) = 62.53 dBA

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

31	90	0.00	73.68	0.00	-6.30	-4.84	0.00	0.00	0.00
62.53									

Segment Leq : 62.53 dBA

Results segment # 2: Bank1 (day)

Source height = 1.50 m

ROAD (0.00 + 60.05 + 0.00) = 60.05 dBA

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

-27	22	0.00	73.68	0.00	-7.97	-5.65	0.00	0.00	0.00
60.05									

Segment Leq : 60.05 dBA



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Results segment # 3: Bank2 (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	20.90	10.58	10.58

ROAD (58.95 + 39.52 + 60.14) = 62.62 dBA

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

--	-22	16	0.00	73.68	0.00	-7.97	-6.75	0.00	0.00	0.00
58.95										

--	16	40	0.00	73.68	0.00	-7.97	-8.75	0.00	0.00	-17.44
39.52										

--	40	90	0.00	73.68	0.00	-7.97	-5.56	0.00	0.00	0.00
60.14										

Segment Leq : 62.62 dBA

Total Leq All Segments: 66.66 dBA



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Results segment # 1: Hunt Club (night)

Source height = 1.50 m

ROAD (0.00 + 54.93 + 0.00) = 54.93 dBA

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

SubLeq

31	90	0.00	66.08	0.00	-6.30	-4.84	0.00	0.00	0.00
----	----	------	-------	------	-------	-------	------	------	------

54.93

Segment Leq : 54.93 dBA

Results segment # 2: Bank1 (night)

Source height = 1.50 m

ROAD (0.00 + 52.46 + 0.00) = 52.46 dBA

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

SubLeq

-27	22	0.00	66.08	0.00	-7.97	-5.65	0.00	0.00	0.00
-----	----	------	-------	------	-------	-------	------	------	------

52.46

Segment Leq : 52.46 dBA

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Results segment # 3: Bank2 (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	20.90	10.58	10.58

ROAD (51.35 + 31.92 + 52.55) = 55.02 dBA

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

-22	16	0.00	66.08	0.00	-7.97	-6.75	0.00	0.00	0.00
51.35									

16	40	0.00	66.08	0.00	-7.97	-8.75	0.00	0.00	-17.44
31.92									

40	90	0.00	66.08	0.00	-7.97	-5.56	0.00	0.00	0.00
52.55									

Segment Leq : 55.02 dBA

Total Leq All Segments: 59.06 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 66.66
(NIGHT): 59.06



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STAMSON 5.0 NORMAL REPORT Date: 20-04-2020 15:39:29
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

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

Angle1 Angle2 : -54.00 deg 30.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 60.00 / 60.00 m
Receiver height : 39.60 / 39.60 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00



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

Angle1 Angle2 : -90.00 deg -27.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 109.00 / 109.00 m
Receiver height : 39.60 / 39.60 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Hunt Club (day)

Source height = 1.50 m

ROAD (0.00 + 64.35 + 0.00) = 64.35 dBA

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

--									
-54	30	0.00	73.68	0.00	-6.02	-3.31	0.00	0.00	0.00
64.35									

Segment Leq : 64.35 dBA

Results segment # 2: Bank (day)

Source height = 1.50 m

ROAD (0.00 + 60.50 + 0.00) = 60.50 dBA

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

--									
-90	-27	0.00	73.68	0.00	-8.61	-4.56	0.00	0.00	0.00
60.50									

Segment Leq : 60.50 dBA

Total Leq All Segments: 65.85 dBA

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Results segment # 1: Hunt Club (night)

Source height = 1.50 m

ROAD (0.00 + 56.75 + 0.00) = 56.75 dBA

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

SubLeq

--	--	--	--	--	--	--	--	--	--
-54	30	0.00	66.08	0.00	-6.02	-3.31	0.00	0.00	0.00
56.75									

Segment Leq : 56.75 dBA

Results segment # 2: Bank (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	-27	0.00	66.08	0.00	-8.61	-4.56	0.00	0.00	0.00
52.91									

Segment Leq : 52.91 dBA

Total Leq All Segments: 58.25 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 65.85
(NIGHT): 58.25

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STAMSON 5.0 NORMAL REPORT Date: 21-04-2020 16:56:40
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

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

Angle1 Angle2 : -60.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 59.00 / 59.00 m
Receiver height : 39.60 / 39.60 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00



Road data, segment # 2: Bank1 (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: Bank1 (day/night)

Angle1 Angle2 : -90.00 deg 24.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 98.00 / 98.00 m
Receiver height : 39.60 / 39.60 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 3: Bank2 (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: Bank2 (day/night)

Angle1 Angle2 : -19.00 deg 19.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 103.00 / 103.00 m
Receiver height : 39.60 / 39.60 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Hunt Club (day)

Source height = 1.50 m

ROAD (0.00 + 66.94 + 0.00) = 66.94 dBA

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

--									
-60	90	0.00	73.68	0.00	-5.95	-0.79	0.00	0.00	0.00
66.94									

Segment Leq : 66.94 dBA

Results segment # 2: Bank1 (day)

Source height = 1.50 m

ROAD (0.00 + 63.54 + 0.00) = 63.54 dBA

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

--									
-90	24	0.00	73.68	0.00	-8.15	-1.98	0.00	0.00	0.00
63.54									

Segment Leq : 63.54 dBA



Results segment # 3: Bank2 (day)

Source height = 1.50 m

ROAD (0.00 + 58.55 + 0.00) = 58.55 dBA

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

--									
-19	19	0.00	73.68	0.00	-8.37	-6.75	0.00	0.00	0.00
58.55									

Segment Leq : 58.55 dBA

Total Leq All Segments: 68.99 dBA

Results segment # 1: Hunt Club (night)

Source height = 1.50 m

ROAD (0.00 + 59.34 + 0.00) = 59.34 dBA

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

--									
-60	90	0.00	66.08	0.00	-5.95	-0.79	0.00	0.00	0.00
59.34									

Segment Leq : 59.34 dBA



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Results segment # 2: Bank1 (night)

Source height = 1.50 m

ROAD (0.00 + 55.94 + 0.00) = 55.94 dBA

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

SubLeq

--									
-90	24	0.00	66.08	0.00	-8.15	-1.98	0.00	0.00	0.00
55.94									

Segment Leq : 55.94 dBA

Results segment # 3: Bank2 (night)

Source height = 1.50 m

ROAD (0.00 + 50.96 + 0.00) = 50.96 dBA

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

SubLeq

--									
-19	19	0.00	66.08	0.00	-8.37	-6.75	0.00	0.00	0.00
50.96									

Segment Leq : 50.96 dBA

Total Leq All Segments: 61.39 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 68.99

(NIGHT): 61.39

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STAMSON 5.0 NORMAL REPORT Date: 20-04-2020 15:50:52
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

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

Angle1 Angle2 : 29.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 69.00 / 69.00 m
Receiver height : 39.60 / 39.60 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00



Road data, segment # 2: Bank1 (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: Bank1 (day/night)

Angle1 Angle2 : -26.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 96.00 / 96.00 m
Receiver height : 39.60 / 39.60 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 3: Bank2 (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: Bank2 (day/night)

Angle1 Angle2 : -27.00 deg 19.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 100.00 / 100.00 m
Receiver height : 39.60 / 39.60 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Hunt Club (day)

Source height = 1.50 m

ROAD (0.00 + 62.35 + 0.00) = 62.35 dBA

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

29	90	0.00	73.68	0.00	-6.63	-4.70	0.00	0.00	0.00
62.35									

Segment Leq : 62.35 dBA

Results segment # 2: Bank1 (day)

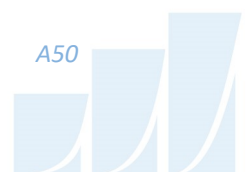
Source height = 1.50 m

ROAD (0.00 + 63.71 + 0.00) = 63.71 dBA

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

-26	90	0.00	73.68	0.00	-8.06	-1.91	0.00	0.00	0.00
63.71									

Segment Leq : 63.71 dBA



Results segment # 3: Bank2 (day)

Source height = 1.50 m

ROAD (0.00 + 59.51 + 0.00) = 59.51 dBA

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

--									
-27	19	0.00	73.68	0.00	-8.24	-5.93	0.00	0.00	0.00
59.51									

Segment Leq : 59.51 dBA

Total Leq All Segments: 66.96 dBA

Results segment # 1: Hunt Club (night)

Source height = 1.50 m

ROAD (0.00 + 54.75 + 0.00) = 54.75 dBA

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

--									
29	90	0.00	66.08	0.00	-6.63	-4.70	0.00	0.00	0.00
54.75									

Segment Leq : 54.75 dBA



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Results segment # 2: Bank1 (night)

Source height = 1.50 m

ROAD (0.00 + 56.11 + 0.00) = 56.11 dBA

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

-26	90	0.00	66.08	0.00	-8.06	-1.91	0.00	0.00	0.00
-----	----	------	-------	------	-------	-------	------	------	------

56.11

Segment Leq : 56.11 dBA

Results segment # 3: Bank2 (night)

Source height = 1.50 m

ROAD (0.00 + 51.92 + 0.00) = 51.92 dBA

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

SubLeq

-27	19	0.00	66.08	0.00	-8.24	-5.93	0.00	0.00	0.00
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51.92

Segment Leq : 51.92 dBA

Total Leq All Segments: 59.36 dBA

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

GRADIENTWIND

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STAMSON 5.0 NORMAL REPORT Date: 22-04-2020 14:41:41
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: R10.te Time Period: Day/Night 16/8 hours
Description:

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

Angle1 Angle2 : -61.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 45.00 / 45.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00



Road data, segment # 2: Bank 1 (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: Bank 1 (day/night)

Angle1 Angle2 : -90.00 deg 33.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 97.00 / 97.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

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Road data, segment # 3: Bank 2 (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: Bank 2 (day/night)

Angle1 Angle2 : -12.00 deg 19.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 113.00 / 113.00 m
Receiver height : 1.50 / 1.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Hunt Club (day)

Source height = 1.50 m

ROAD (0.00 + 68.14 + 0.00) = 68.14 dBA

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

--									
-61	90	0.00	73.68	0.00	-4.77	-0.76	0.00	0.00	0.00
68.14									

Segment Leq : 68.14 dBA

Results segment # 2: Bank 1 (day)

Source height = 1.50 m

ROAD (0.00 + 63.92 + 0.00) = 63.92 dBA

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

--									
-90	33	0.00	73.68	0.00	-8.11	-1.65	0.00	0.00	0.00
63.92									

Segment Leq : 63.92 dBA



Results segment # 3: Bank 2 (day)

Source height = 1.50 m

ROAD (0.00 + 57.27 + 0.00) = 57.27 dBA

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

--									
-12	19	0.00	73.68	0.00	-8.77	-7.64	0.00	0.00	0.00
57.27									

Segment Leq : 57.27 dBA

Total Leq All Segments: 69.78 dBA

Results segment # 1: Hunt Club (night)

Source height = 1.50 m

ROAD (0.00 + 60.55 + 0.00) = 60.55 dBA

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

--									
-61	90	0.00	66.08	0.00	-4.77	-0.76	0.00	0.00	0.00
60.55									

Segment Leq : 60.55 dBA

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Results segment # 2: Bank 1 (night)

Source height = 1.50 m

ROAD (0.00 + 56.32 + 0.00) = 56.32 dBA

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

SubLeq

--									
-90	33	0.00	66.08	0.00	-8.11	-1.65	0.00	0.00	0.00
56.32									

Segment Leq : 56.32 dBA

Results segment # 3: Bank 2 (night)

Source height = 1.50 m

ROAD (0.00 + 49.67 + 0.00) = 49.67 dBA

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

SubLeq

--									
-12	19	0.00	66.08	0.00	-8.77	-7.64	0.00	0.00	0.00
49.67									

Segment Leq : 49.67 dBA

Total Leq All Segments: 62.19 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 69.78

(NIGHT): 62.19

GRADIENTWIND

ENGINEERS & SCIENTISTS

STAMSON 5.0 NORMAL REPORT Date: 22-04-2020 15:38:24
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

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

Angle1 Angle2 : -58.00 deg 71.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 58.00 / 58.00 m
Receiver height : 24.40 / 24.40 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -58.00 deg Angle2 : 71.00 deg
Barrier height : 22.90 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



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Road data, segment # 2: Bank (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: Bank (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 : 113.00 / 113.00 m
Receiver height : 24.40 / 24.40 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : 18.00 deg
Barrier height : 22.90 m
Barrier receiver distance : 11.00 / 11.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

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Results segment # 1: Hunt Club (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	24.40	19.66	19.66

ROAD (0.00 + 53.15 + 0.00) = 53.15 dBA

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

-58	71	0.00	73.68	0.00	-5.87	-1.45	0.00	0.00	-13.21
53.15									

Segment Leq : 53.15 dBA

Results segment # 2: Bank (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	24.40	22.17	22.17

ROAD (0.00 + 56.84 + 0.00) = 56.84 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	-8.77	-2.22	0.00	0.00	-5.85
56.84									

Segment Leq : 56.84 dBA

Total Leq All Segments: 58.39 dBA

Results segment # 1: Hunt Club (night)



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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	24.40	19.66	19.66

ROAD (0.00 + 45.55 + 0.00) = 45.55 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
-58	71	0.00	66.08	0.00	-5.87	-1.45	0.00	0.00	-13.21

SubLeq

--
45.55

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Segment Leq : 45.55 dBA

Results segment # 2: Bank (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	24.40	22.17	22.17

ROAD (0.00 + 49.24 + 0.00) = 49.24 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
-90	18	0.00	66.08	0.00	-8.77	-2.22	0.00	0.00	-5.85

SubLeq

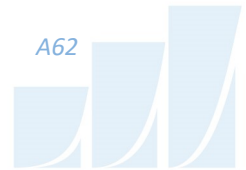
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49.24

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Segment Leq : 49.24 dBA

Total Leq All Segments: 50.79 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 58.39
(NIGHT): 50.79



GRADIENTWIND

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STAMSON 5.0 NORMAL REPORT Date: 22-04-2020 15:39:46
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r11b1.te Time Period: Day/Night 16/8 hours
Description:

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

Angle1 Angle2 : -58.00 deg 71.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 58.00 / 58.00 m
Receiver height : 24.40 / 24.40 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -58.00 deg Angle2 : 71.00 deg
Barrier height : 24.40 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



Road data, segment # 2: Bank (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: Bank (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 : 113.00 / 113.00 m
Receiver height : 24.40 / 24.40 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : 18.00 deg
Barrier height : 24.00 m
Barrier receiver distance : 11.00 / 11.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

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Results segment # 1: Hunt Club (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	24.40	19.66	19.66

ROAD (0.00 + 49.89 + 0.00) = 49.89 dBA

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

-58	71	0.00	73.68	0.00	-5.87	-1.45	0.00	0.00	-16.47
49.89									

Segment Leq : 49.89 dBA

Results segment # 2: Bank (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	24.40	22.17	22.17

ROAD (0.00 + 54.03 + 0.00) = 54.03 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	-8.77	-2.22	0.00	0.00	-8.66
54.03									

Segment Leq : 54.03 dBA

Total Leq All Segments: 55.45 dBA



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Results segment # 1: Hunt Club (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	24.40	19.66	19.66

ROAD (0.00 + 42.29 + 0.00) = 42.29 dBA

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

-58	71	0.00	66.08	0.00	-5.87	-1.45	0.00	0.00	-16.47
42.29									

Segment Leq : 42.29 dBA

Results segment # 2: Bank (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	24.40	22.17	22.17

ROAD (0.00 + 46.43 + 0.00) = 46.43 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	-8.77	-2.22	0.00	0.00	-8.66
46.43									

Segment Leq : 46.43 dBA

Total Leq All Segments: 47.85 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 55.45
(NIGHT): 47.85

