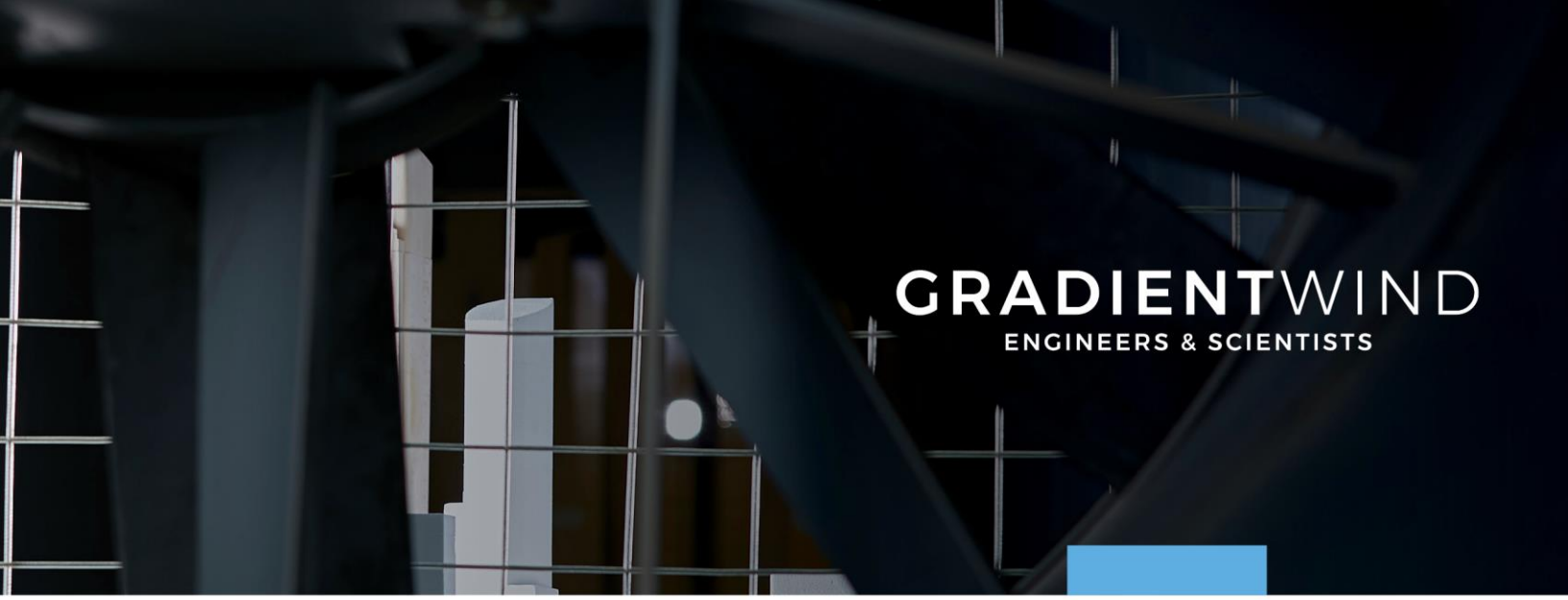

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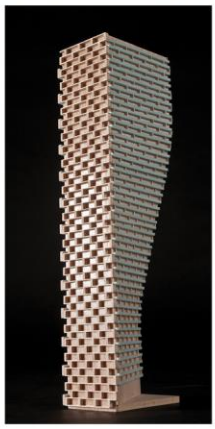
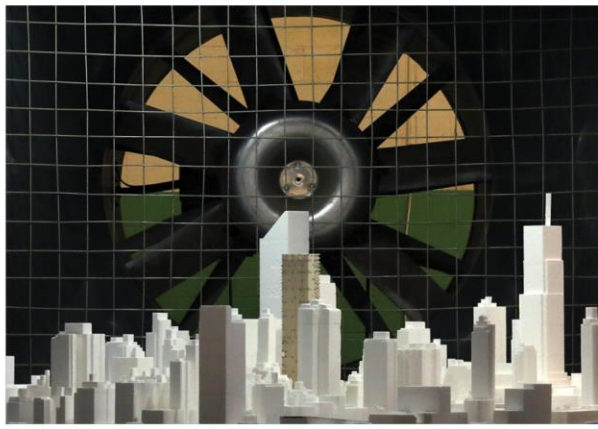
ENVIRONMENTAL NOISE ASSESSMENT

Zibi Block 206
Chaudière Island, Ottawa

Report: 16-100-Environmental Noise





July 15, 2020

DRAFT

PREPARED FOR
Windmill Dream Ontario 206 LP
c/o Zibi Project
6 Booth Street (Albert Island)
Ottawa, ON K1R 6K8

PREPARED BY
Michael Lafortune, C.E.T., Environmental Scientist
Joshua Foster, P.Eng., Principal

EXECUTIVE SUMMARY

This report describes an environmental noise assessment performed for Zibi Block 206, a proposed mixed-use residential and commercial development located at the intersection of Chaudière Private and Miwate Private on Chaudière Island in Ottawa, Ontario. Block 206 comprises a single 25-storey tower atop 8-storey and 2-storey podia. Common terraces are located atop the podia, as well as at Level 25, which the tower sets in at the west and east façades. The major source of roadway noise influencing the site is Booth Street to the east of the development. Other sources noise influencing the development are stationary sources located at the Chaudière Hydro Limited Partnership (CHLP) generating station. 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 progress drawings from Kohn Partnership Architects Inc., dated June 16, 2020.

The results of the current transportation noise analysis indicate that noise levels will range between 55 and 63 dBA during the daytime period (07:00-23:00) and between 52 and 56 dBA during the nighttime period (23:00-07:00). The highest noise level (i.e. 63 dBA) occurs along the north and east façades, which are nearest and most exposed to Booth Street.

Results of the calculations also indicate that the development will require forced air heating with provision for central air conditioning, which if installed would allow occupants to keep windows closed and maintain a comfortable living environment. A Warning Clause will be required in all Agreements of Lease, Purchase and Sale for these units, a summarized in Section 6 of this report.

Noise levels from roadway sources at the 3rd Floor Terrace (Receptor 4) are expected to approach 59 dBA during the daytime period. If this area is to be used as an outdoor living area, noise control measures are required to reduce the L_{eq} to 55 dBA, where technically and administratively feasible. Further analysis investigated the noise mitigating impact of including a 1.1 m noise mitigating guardrail along the east and south sides of the terrace (see Figure 5). Results of the investigation proved that noise levels can be

reduced to 52 dBA, which is below the acceptable limit. The guardrail 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.

Noise levels from stationary sources across the study site were found to be below 54 dBA. These levels fall below the background noise levels on site due to Chaudière Falls. As such, the proposed development is expected to be compatible with the existing land uses and will satisfy all site plan conditions, consistent with the findings of the previously completed environmental noise feasibility assessment and addendum.

TABLE OF CONTENTS

1. INTRODUCTION

Gradient Wind Engineering Inc. (Gradient Wind) was retained by Windmill Dream Ontario 206 LP to perform an updated environmental noise study for a site plan control application (SPA) submission for Zibi Block 206, a proposed mixed-use residential and commercial development located at the intersection of Chaudière Private and Miwate Private on Chaudière Island in Ottawa, Ontario. Gradient Wind has previously performed environmental noise feasibility assessment reports for the Zibi development (re. Gradient Wind report GWE14-017 – Noise Final, dated December 8, 2015) related to the master plan and rezoning and addendum (re. GWE14-017 – Noise Addendum R2, dated March 6, 2019) for Block 207.

Gradient Wind's scope of work involved assessing exterior noise levels generated by local roadway traffic and stationary noise sources surrounding the site. The assessment was performed on the basis of both theoretical noise calculations and on previous site measurements conforming to the City of Ottawa[1] and Ministry of the Environment, Conservation and Parks (MECP)[2] guidelines. Noise calculations were based on architectural progress drawings from Kohn Partnership Architects Inc., dated June 16, 2020, with future traffic volumes corresponding to the City of Ottawa's Official Plan (OP) roadway classifications. Information regarding the new generating station on the Chaudière Hydro Limited Partnership (CHLP) lands were provided by their consultant HATCH, as per the previously completed environmental noise feasibility assessment and addendum noted above.

2. TERMS OF REFERENCE

Block 206 is located at the northwest corner of the Phase 1 property, immediately west of Booth Street on Chaudière Island. Block 206 comprises a single 25-storey tower atop 8-storey and 2-storey podia. Common terraces are located atop the podia, as well as at Level 25, which the tower sets in at the west and east façades. The ground floor contains commercial space, with residential suites and common areas on the remaining floors.

[1] City of Ottawa Environmental Noise Control Guidelines, January 2016
[2] Ontario Ministry of the Environment, Conservation and Parks – Environmental Noise Guidelines, Publication NPC-300, Queens Printer for Ontario, Toronto, 2013

The major source of roadway noise influencing the site is Booth Street to the east of the development. The Prince of Wales rail bridge, which is currently out of commission, is more than 700 metres (m) to the west of the site and would not impact the site, even if rail operations on the bridge were to resume. Therefore, the railway has not been considered in this assessment. Other sources noise influencing the development are stationary sources located at the CHLP generating station, as per the previously completed environmental noise feasibility assessment and addendum. Figure 1 illustrates a complete site plan with surrounding context. From Gradient Wind's previous assessments, noise from the Chaudière Falls would not have a significant impact on Block 206.

3. OBJECTIVES

The main goals of this work are to (i) calculate the future noise levels on the study building produced by local transportation and stationary sources, (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 Transportation Noise

4.2.1 Criteria for Transportation 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 that 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 50, 45 and 40 dBA for retail, living rooms and sleeping quarters, respectively, as listed in Table 1. However, to account for deficiencies in building construction and control peak noise, these levels should be targeted toward 47, 42 and 37 dBA.

TABLE 1: INDOOR SOUND LEVEL CRITERIA (ROAD)[3]

Type of Space	Time Period	L_{eq} (dBA)
		Road
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 a standard closed window is capable of providing a minimum 20 dBA noise reduction[4]. Therefore, where noise levels exceed 55 dBA daytime and 50 dBA nighttime, the ventilation for the building should consider

[3] Adapted from ENCG 2016 – Tables 2.2b and 2.2c
[4] Burberry, P.B. (2014). Mitchell's Environment and Services. Routledge, Page 125

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 attenuation[5].

Noise levels at outdoor living areas should be limited to 55 dBA where technically and administratively feasible. The City of Ottawa preferences for noise control prescribe the following hierarchy:

(i) Increased distance setback with absorptive ground cover (vegetation)
(ii) Relocation of noise sensitive areas away from roadways
(iii) Earth berms
(iv) Acoustic barriers

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 Plan[6] 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
Booth Street	4-UAU	60	**30,000**

4.2.3 Theoretical Transportation Noise Predictions

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

[5] MECP, Environmental Noise Guidelines, NPC 300 – Part C, Section 7.1.3
[6] City of Ottawa Transportation Master Plan, November 2013

Roadway noise calculations were performed by treating the road segment as a line source of noise, and by using 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:

- 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 was taken to be 92%/8% respectively.
- Ground surfaces were taken to be reflective based on specific source-receiver path ground characteristics.
- The site is considered as having flat topography relative to surrounding roadways.
- Noise receptors were strategically placed at five (5) locations around the study area (see Figure 2).

4.3 Stationary Noise

4.3.1 Criteria for Stationary Noise

For stationary sources, the L_{eq} is commonly calculated on an hourly interval, while for roadways, the L_{eq} is calculated on the basis of a 16-hour daytime/8-hour nighttime split as previously mentioned in Section 4.2.1. Stationary sources are defined in the ENCG as "all sources of sound and vibration, whether fixed or mobile, that exist or operate on a premises, property or facility, the combined sound and vibration levels of which are emitted beyond the property boundary of the premises, property or facility, unless the source(s) is (are) due to construction" [7]. This applies to the plane of window and outdoor amenity spaces serving the development. The surrounding area of the development would be defined as a Class 1 (Urban) environment, as background noise levels are dominated by human activities such as roadway and transit sources. The exclusionary sound level limits for Class 1 areas are summarized in Table 3 below. The applicable sound level limit is the higher of either the values in Table 3 or background noise levels due to sources such as Chaudière Falls.

Background noise levels at Block 206 are dominated by the sound of falling water over the Chaudière Falls as documented in the noise report prepared by Gradient Wind for the Master Plan (re. Gradient Wind

[7] City of Ottawa Environmental Noise Control Guidelines, page 10

report GME14-017 MP FINAL REV1, dated July 22, 2014). Information regarding the new generating station on the Chaudière Hydro Limited Partnership (CHLP) lands were provided by their consultant HATCH, as per the previously completed environmental noise feasibility assessment and addendum noted above. This equipment consists of transformers and exhaust fans. For maintenance purposes a trash rake is infrequently used and was considered to be an insignificant source of noise.

TABLE 3: EXCLUSIONARY LIMITS FOR CLASS 1 AREA

Time of Day	Class 1	
	Outdoor Points of Reception	Plane of Window
07:00 – 19:00	50	50
19:00 – 23:00	50	50
23:00 – 07:00	N/A	45

4.3.2 Determination of Noise Source Power Levels

For the new powerhouse, the sound data and operating frequency for each unit are based on information provided by HATCH and summarized in Table 4 below and includes equipment such as transformers and ventilation fans. All transformers and ventilation fans were assumed to operate continuously and concurrently during the daytime/evening and nighttime periods. Figure 3 illustrates the location of the mechanical equipment located at the proposed powerhouse.

TABLE 4: EQUIPMENT SOUND POWER LEVELS (dBA)

Source ID	Description	Frequency (Hz)								
		63	125	250	500	1000	2000	4000	8000	Total
S1	T1	92	95	93	93	87	82	77	69	93.2
S2	T2									
S3	T3									
S4	T4									
S5	FAN SF-A1	76	74	76	77	71	66	63	58	77.1
S6	FAN EF-A	83	83	77	71	68	65	61	55	74.9
S7	FAN SF-G1	81	81	78	70	70	70	68	66	77.1
S8	FAN SF-01	79	81	81	76	68	68	63	58	77.6
S9	FAN EF-01									
S10	Outfall	52	54	52	54	55	52	47	40	59

4.3.3 Stationary Source Noise Predictions

The impact of the surrounding stationary noise sources on development was determined by computer modelling. Stationary noise source modelling is based on the software program *Predictor-Lima* developed from the International Standards Organization (ISO) standard 9613 Parts 1 and 2. This computer program is capable of representing three-dimensional surfaces and first reflections of sound waves over a suitable spectrum for human hearing. The methodology has been used on numerous assignments and has been accepted by the MECP as part of Environmental Compliance Approvals applications.

Five (5) individual noise sensor locations were selected in the *Predictor-Lima* model to measure the noise impact at points of reception (POR) during the daytime (07:00 – 19:00) and nighttime (19:00 – 07:00) periods (see Figure 3). The mechanical equipment at the proposed powerhouse was represented as point sources in the *Predictor* model, while the outfall to the north of the site was represented as an area source. Air temperature, pressure and humidity were set to 10°C, 101.3 kPA and 70%, respectively. Ground absorption over the study area was determined based on topographical features (such as water, concrete, grassland, etc.). A coefficient of 0 was used for hard surfaces, such as concrete and paved areas, and 1 for soft surfaces, such as grass and vegetative areas. Existing and proposed buildings were added to the model

to account for screening and reflection effects from building façades. Modelling files and outputs are available upon request.

5. RESULTS AND DISCUSSION

5.1 Transportation Noise Levels

The results of the roadway noise calculations are summarized in Table 5 below. A complete set of input and output data from all STAMSON 5.04 calculations are available in Appendix A. Figure 4-6 illustrate STAMSON input parameters.

TABLE 5: EXTERIOR NOISE LEVELS DUE TO TRANSPORTATION SOURCES

Receptor Number	Receptor Location	STAMSON 5.04 Noise Level (dBA)	
		Day	Night
1	24th Floor – North Façade – POW	63	56
2	24th Floor – East Façade – POW	63	56
3	24th Floor – South Façade – POW	60	52
4	3rd Floor Terrace – OLA	59	N/A
5	25th Floor Terrace – OLA	55	N/A

The results of the current analysis indicate that noise levels will range between 55 and 63 dBA during the daytime period (07:00-23:00) and between 52 and 56 dBA during the nighttime period (23:00-07:00). The highest noise level (i.e. 63 dBA) occurs along the north and east façades, which are nearest and most exposed to Booth Street.

Results of the calculations also indicate that the development will require forced air heating with provision for central air conditioning, if installed air conditioning 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.

5.1.1 Noise Barrier Calculation

Noise levels at the 3rd Floor Terrace (Receptor 4) are expected to approach 59 dBA during the daytime period. If this area is to be used as an outdoor living area, noise control measures are required to reduce the L_{eq} to 55 dBA, were technically and administratively feasible. Further analysis investigated the noise mitigating impact of including a 1.1 m noise mitigating guardrail along the east and south sides of the terrace (see Figure 5). Results of the investigation proved that noise levels can be reduced to 52 dBA, which is below the acceptable limit. Table 6 summarizes the results of the barrier investigation.

TABLE 6: RESULTS OF NOISE BARRIER INVESTIGATION

Location	Reference Receptor	Barrier Height (m)	Daytime L_{eq} Noise Levels (dBA)	
			With Barrier	Without Barrier
3rd Floor Terrace	4	1.1	52	59

5.2 Stationary Noise Levels

Noise levels from stationary sources across the study site were found to be below 54 dBA. These levels fall below the background noise levels on site due to Chaudière Falls. As such, the proposed development is expected to be compatible with the existing land uses and will satisfy all site plan conditions. Noise contours throughout the site can be seen in Figure 7. The anticipated sound levels across the development are summarized in Table 7 and are based on the assumptions outlined in Section 4.3.

TABLE 7: NOISE LEVELS FROM STATIONARY SOURCES

Receptor Number	Plane of Window Receptor Location	Noise Level (dBA)		Exclusionary Limits		Meets ENCG Class 1 Criteria	
		Day	Night	Day	Night	Day	Night
1	8th Floor – North Façade	54	54	58*	58*	YES	YES
2	8th Floor – West Façade	54	54	58*	58*	YES	YES
3	25th Floor – North Façade	52	52	58*	58*	YES	YES
4	25th Floor – West Façade	50	50	58*	58*	YES	YES
5	9th Floor Terrace	41	41	58*	58*	YES	YES

* - Background noise due to Chaudière Falls

6. CONCLUSIONS AND RECOMMENDATIONS

The results of the current transportation noise analysis indicate that noise levels will range between 55 and 63 dBA during the daytime period (07:00-23:00) and between 52 and 56 dBA during the nighttime period (23:00-07:00). The highest noise level (i.e. 63 dBA) occurs along the north and east façades, which are nearest and most exposed to Booth Street.

Results of the calculations also indicate that the development will require forced air heating with provision for central air conditioning, which if installed would allow occupants to keep windows closed and maintain a comfortable living environment. The following Warning Clause[8] will be required in all Agreements of Lease, Purchase and Sale for these units:

> *"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 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 dwelling unit has also been designed with forced air heating with provision for air conditioning (or similar mechanical system). Air conditioning will allow windows and exterior doors to*

[8] City of Ottawa Environmental Noise Control Guidelines, January 2016

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."

Noise levels from roadway sources at the 3rd Floor Terrace (Receptor 4) are expected to approach 59 dBA during the daytime period. If this area is to be used as an outdoor living area, noise control measures are required to reduce the L_{eq} to 55 dBA, where technically and administratively feasible. Further analysis investigated the noise mitigating impact of including a 1.1 m noise mitigating guardrail along the east and south sides of the terrace (see Figure 5). Results of the investigation proved that noise levels can be reduced to 52 dBA, which is below the acceptable limit.

Noise levels from stationary sources across the study site were found to be below 54 dBA. These levels fall below the background noise levels on site due to Chaudière Falls. As such, the proposed development is expected to be compatible with the existing land uses and will satisfy all site plan conditions, consistent with the findings of the previously completed environmental noise feasibility assessment and addendum.

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.

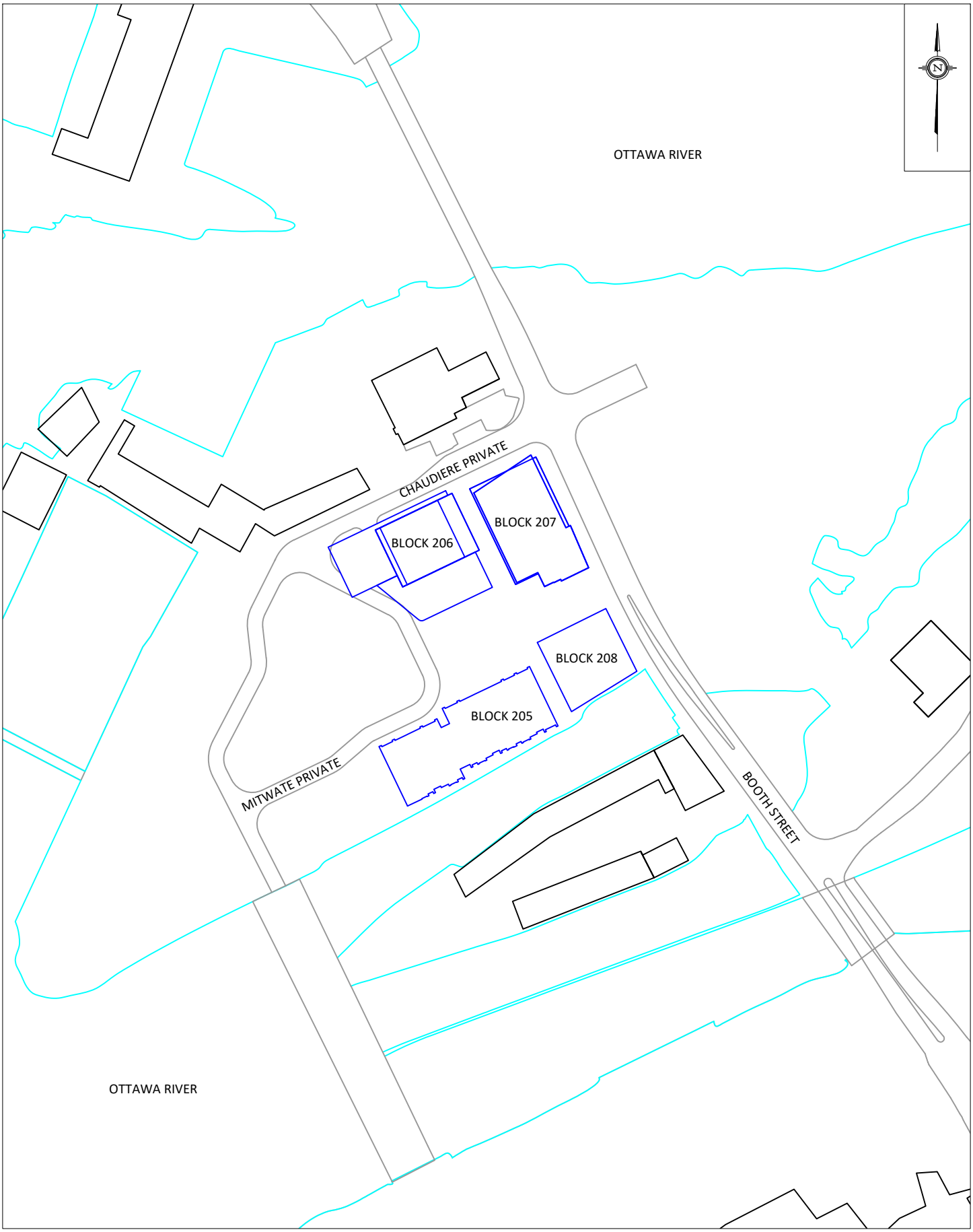
Sincerely,

Gradient Wind Engineering Inc.

Michael Lafortune, C.E.T.
Environmental Scientist

Joshua Foster, P.Eng.
Principal

Gradient Wind File #16-100-Environmental Noise



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PROJECT	ZIBI BLOCK 206, OTTAWA ENVIRONMENTAL NOISE ASSESSMENT		DESCRIPTION
SCALE	1:2000 (APPROX.)	DRAWING NO.	GW16-100-1
DATE	JUNE 30, 2020	DRAWN BY	M.L.

FIGURE 1:
SITE PLAN AND SURROUNDING CONTEXT

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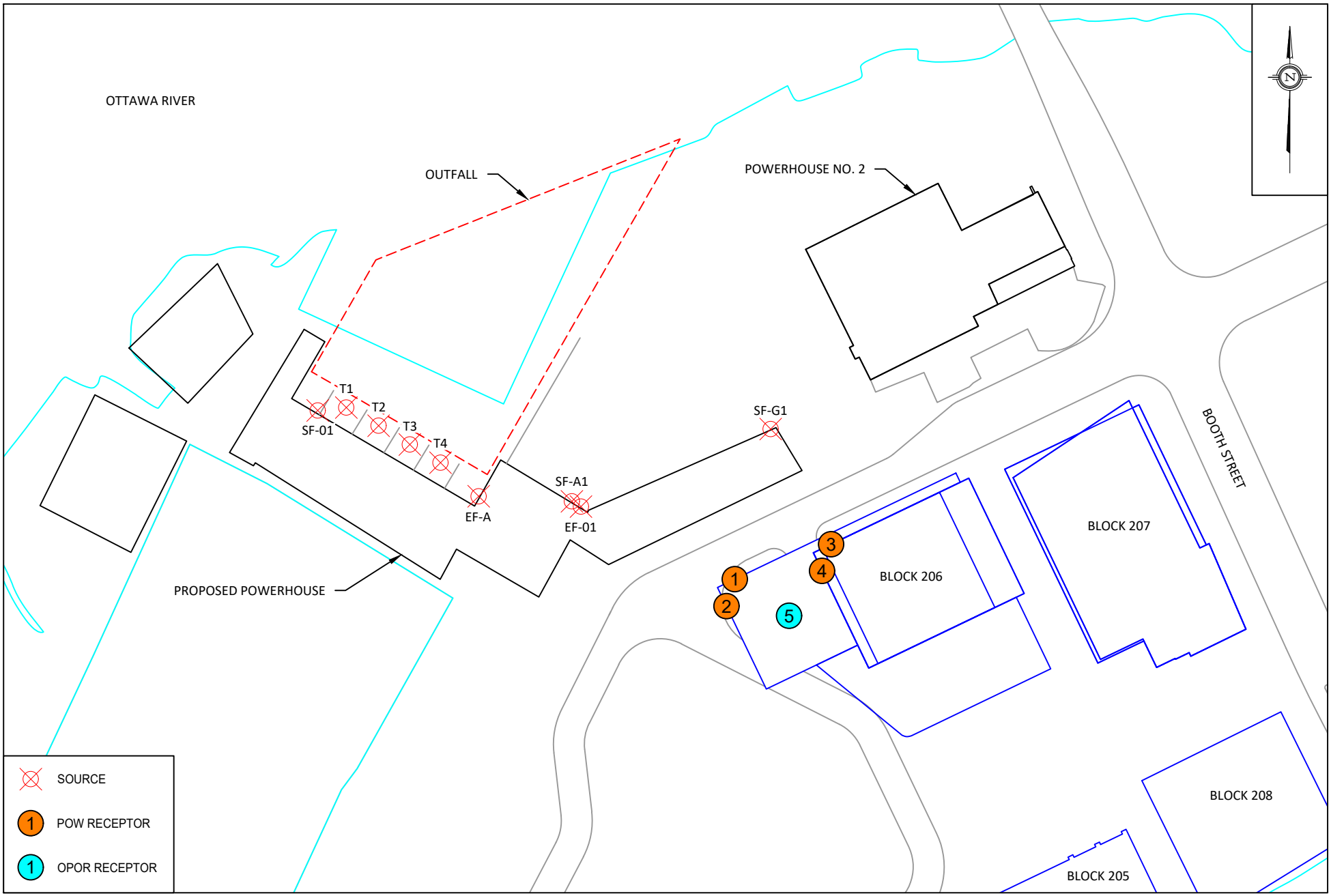
SCALE	1:500 (APPROX.)	DRAWING NO.	GW16-100-2
DATE	JUNE 30, 2020	DRAWN BY	M.L.

FIGURE 2:
TRAFFIC NOISE RECEPTOR LOCATIONS



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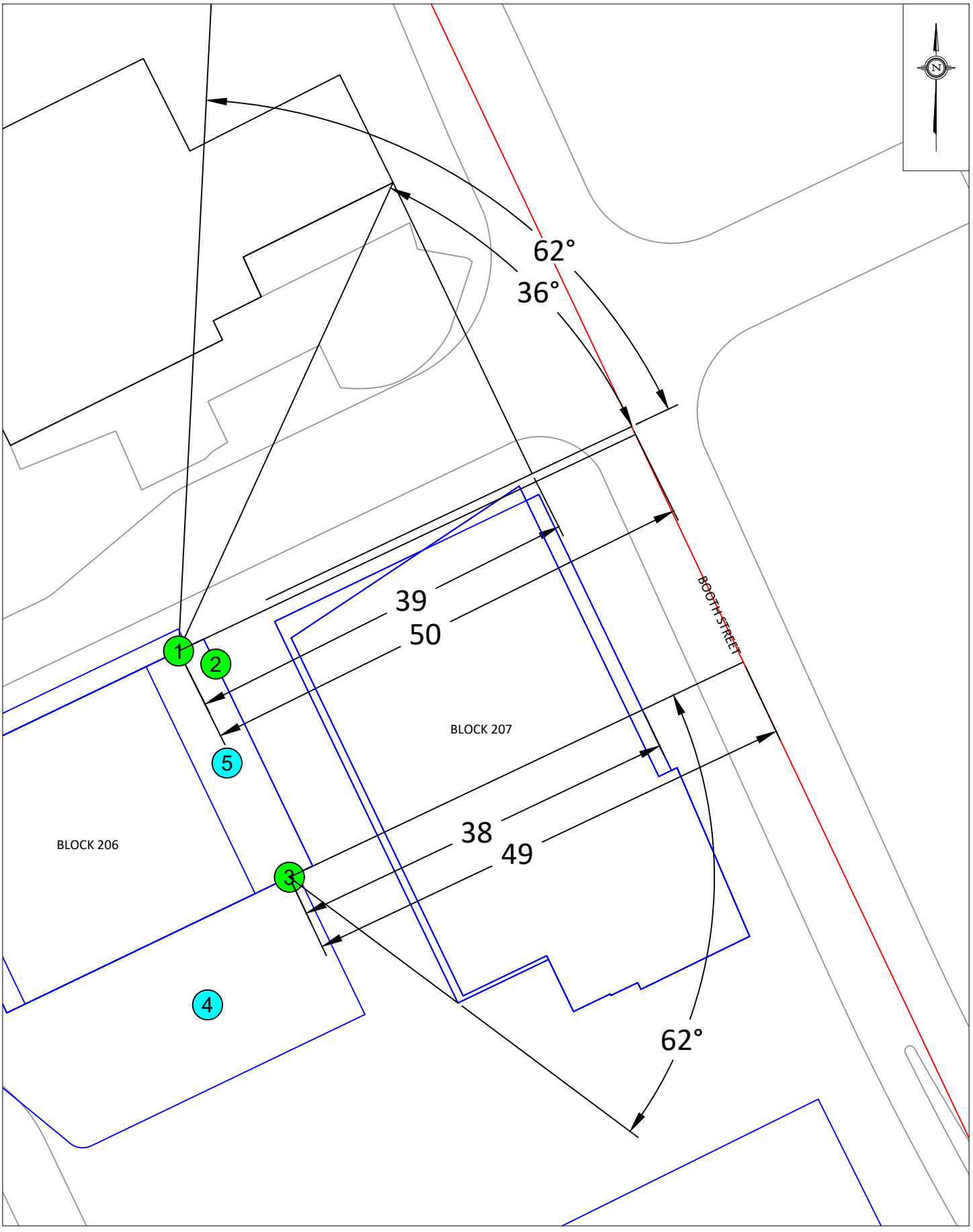
PROJECT	ZIBI BLOCK 206, OTTAWA ENVIRONMENTAL NOISE ASSESSMENT
SCALE	1:1000 (APPROX.)
DRAWING NO.	GW16-100-3
DATE	JUNE 30, 2020
DRAWN BY	M.L

DESCRIPTION

FIGURE 3:
STATIONARY RECEPTOR AND SOURCE LOCATIONS



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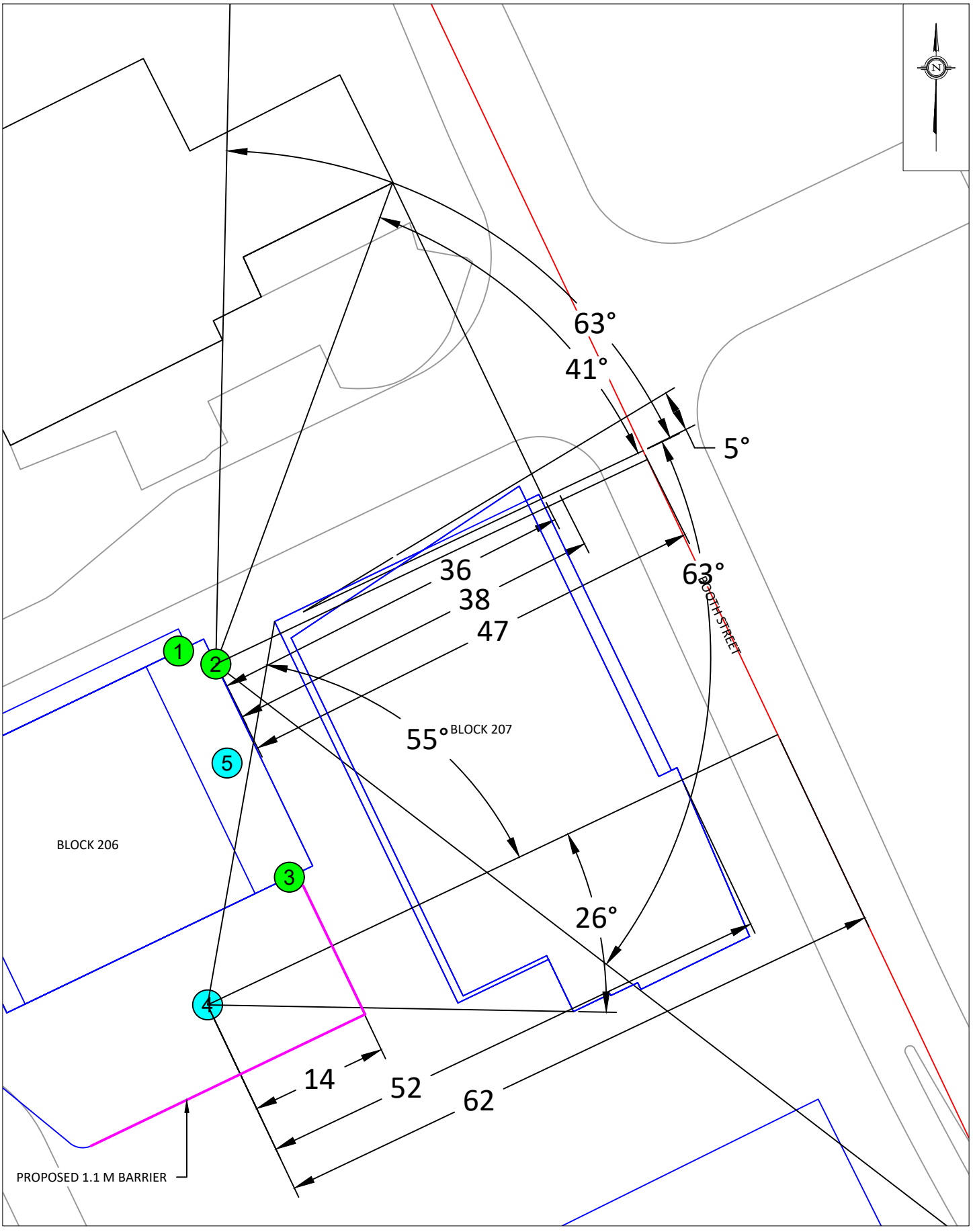
PROJECT	ZIBI BLOCK 206, OTTAWA ENVIRONMENTAL NOISE ASSESSMENT		DESCRIPTION
SCALE	1:500 (APPROX.)	DRAWING NO.	GW16-100-4
DATE	JUNE 30, 2020	DRAWN BY	M.L.

FIGURE 4:
STAMSON INPUT PARAMETERS - R1,3



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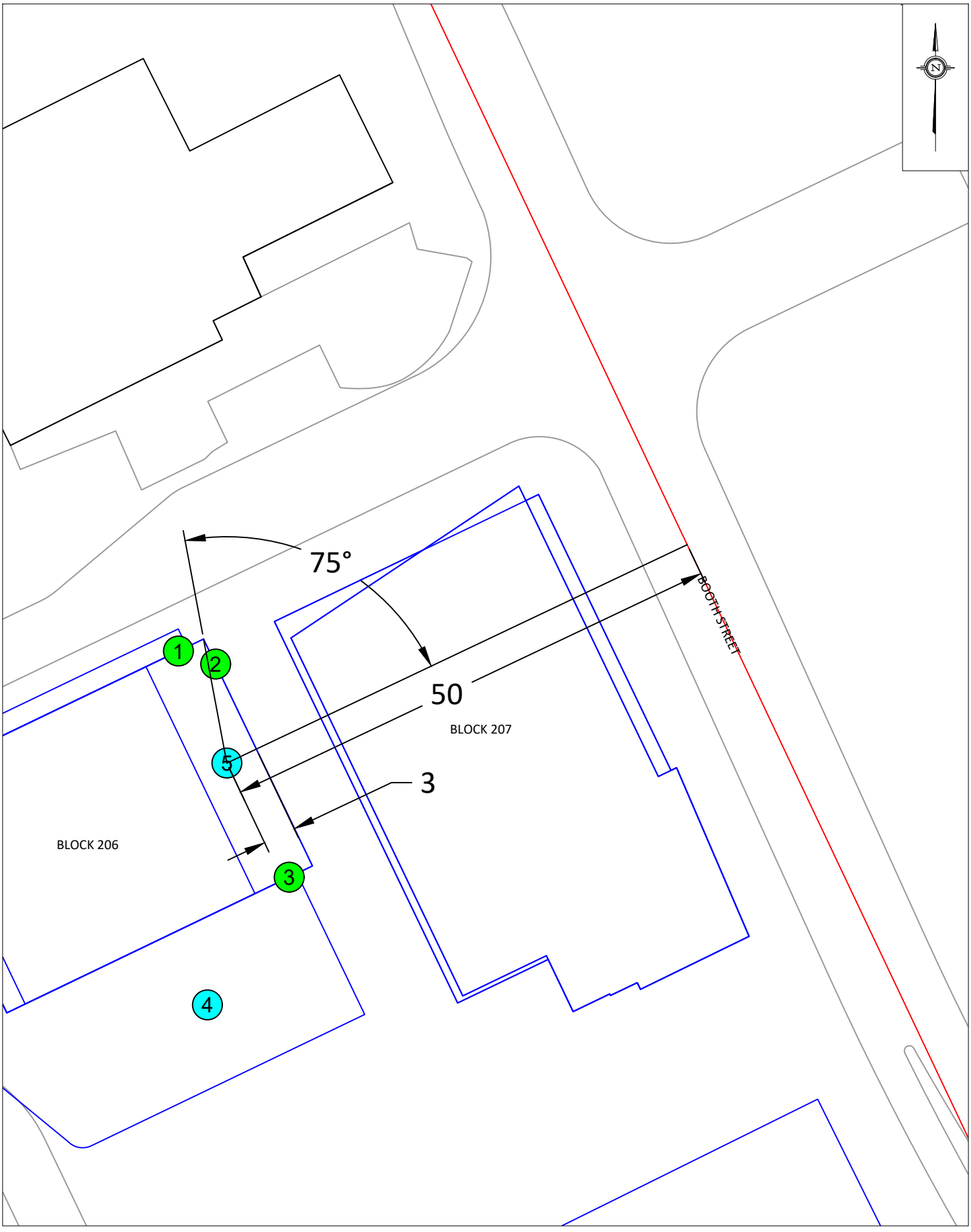
PROJECT	ZIBI BLOCK 206, OTTAWA ENVIRONMENTAL NOISE ASSESSMENT
SCALE	1:500 (APPROX.)
DRAWING NO.	GW16-100-5
DATE	JUNE 30, 2020
DRAWN BY	M.L.

DESCRIPTION

FIGURE 5:
STAMSON INPUT PARAMETERS - R2,4



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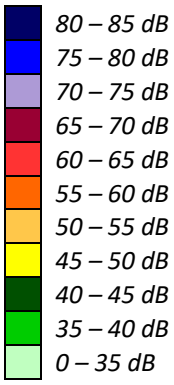
PROJECT	ZIBI BLOCK 206, OTTAWA ENVIRONMENTAL NOISE ASSESSMENT		DESCRIPTION
SCALE	1:500 (APPROX.)	DRAWING NO.	GW16-100-6
DATE	JUNE 30, 2020	DRAWN BY	M.L.

FIGURE 6:
STAMSON INPUT PARAMETERS - R5

FIGURE 7: DAYTIME/NIGHTTIME STATIONARY NOISE CONTOURS (33 METERS ABOVE GRADE)



APPENDIX A

STAMSON 5.04 INPUT AND OUTPUT DATA AND SUPPORTING INFORMATION

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```
STAMSON 5.0        NORMAL REPORT        Date: 07-07-2020 11:35:29
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Booth (day/night)
-----------------------------------------
Car traffic volume  : 24288/2112  veh/TimePeriod  *
Medium truck volume :  1932/168   veh/TimePeriod  *
Heavy truck volume  :  1380/120   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):  30000
    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: Booth (day/night)
---------------------------------------
Angle1   Angle2           : -62.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  50.00 / 50.00  m
Receiver height           :  70.00 / 70.00  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -62.00 deg   Angle2 : -36.00 deg
Barrier height            :   7.00 m
Barrier receiver distance :  39.00 / 39.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Results segment # 1: Booth (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 !       70.00 !       16.57 !        16.57

ROAD (0.00 + 59.37 + 60.79) = 63.15 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -62    -36   0.00  73.01   0.00  -5.23  -8.40   0.00   0.00   0.00  59.37*
   -62    -36   0.00  73.01   0.00  -5.23  -8.40   0.00   0.00   0.00  59.37
-------------------------------------------------------------------------------
   -36      0   0.00  73.01   0.00  -5.23  -6.99   0.00   0.00   0.00  60.79
-------------------------------------------------------------------------------

 * Bright Zone !

Segment Leq : 63.15 dBA

Total Leq All Segments: 63.15 dBA


Results segment # 1: Booth (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 !       70.00 !       16.57 !        16.57

ROAD (0.00 + 51.78 + 53.19) = 55.55 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -62    -36   0.00  65.41   0.00  -5.23  -8.40   0.00   0.00   0.00  51.78*
   -62    -36   0.00  65.41   0.00  -5.23  -8.40   0.00   0.00   0.00  51.78
-------------------------------------------------------------------------------
   -36      0   0.00  65.41   0.00  -5.23  -6.99   0.00   0.00   0.00  53.19
-------------------------------------------------------------------------------

 * Bright Zone !

Segment Leq : 55.55 dBA

Total Leq All Segments: 55.55 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 63.15
                           (NIGHT): 55.55
```

```
STAMSON 5.0         NORMAL REPORT         Date: 07-07-2020 11:33:50
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: BoothL (day/night)
-----------------------------------------
Car traffic volume  : 24288/2112  veh/TimePeriod  *
Medium truck volume :  1932/168   veh/TimePeriod  *
Heavy truck volume  :  1380/120   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):  30000
    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: BoothL (day/night)
----------------------------------------
Angle1   Angle2           : -63.00 deg   -5.00 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           :  70.00 / 70.00  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -63.00 deg   Angle2 : -5.00 deg
Barrier height            :   7.00 m
Barrier receiver distance :  36.00 / 36.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Road data, segment # 2: BoothR (day/night)
------------------------------------------
Car traffic volume  : 24288/2112  veh/TimePeriod  *
Medium truck volume :  1932/168   veh/TimePeriod  *
Heavy truck volume  :  1380/120   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):  30000
    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: BoothR (day/night)
----------------------------------------
Angle1   Angle2           :  -5.00 deg   63.00 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           :  70.00 / 70.00  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  -5.00 deg   Angle2 : 63.00 deg
Barrier height            :  25.00 m
Barrier receiver distance :  38.00 / 38.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Results segment # 1: BoothL (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 !       70.00 !       17.53 !        17.53

ROAD (0.00 + 63.13 + 0.00) = 63.13 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -63     -5   0.00  73.01   0.00  -4.96  -4.92   0.00   0.00   0.00  63.13*
   -63     -5   0.00  73.01   0.00  -4.96  -4.92   0.00   0.00   0.00  63.13
-------------------------------------------------------------------------------

 * Bright Zone !

Segment Leq : 63.13 dBA


Results segment # 2: BoothR (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 !       70.00 !       14.61 !        14.61

ROAD (0.00 + 47.28 + 0.00) = 47.28 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
    -5     63   0.00  73.01   0.00  -4.96  -4.23   0.00   0.00 -16.54  47.28
-------------------------------------------------------------------------------

Segment Leq : 47.28 dBA

Total Leq All Segments: 63.24 dBA
```

```
Results segment # 1: BoothL (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 !       70.00 !       17.53 !        17.53

ROAD (0.00 + 55.53 + 0.00) = 55.53 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -63     -5   0.00  65.41   0.00  -4.96  -4.92   0.00   0.00   0.00  55.53*
   -63     -5   0.00  65.41   0.00  -4.96  -4.92   0.00   0.00   0.00  55.53
-------------------------------------------------------------------------------

 * Bright Zone !

Segment Leq : 55.53 dBA


Results segment # 2: BoothR (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 !       70.00 !       14.61 !        14.61

ROAD (0.00 + 39.68 + 0.00) = 39.68 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
    -5     63   0.00  65.41   0.00  -4.96  -4.23   0.00   0.00 -16.54  39.68
-------------------------------------------------------------------------------

Segment Leq : 39.68 dBA

Total Leq All Segments: 55.64 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 63.24
                           (NIGHT): 55.64
```

```
STAMSON 5.0         NORMAL REPORT         Date: 07-07-2020 11:34:09
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Booth (day/night)
----------------------------------------
Car traffic volume  : 24288/2112  veh/TimePeriod  *
Medium truck volume :  1932/168   veh/TimePeriod  *
Heavy truck volume  :  1380/120   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):  30000
    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: Booth (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  :  49.00 / 49.00  m
Receiver height           :  70.00 / 70.00  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :   0.00 deg   Angle2 : 62.00 deg
Barrier height            :  25.00 m
Barrier receiver distance :  38.00 / 38.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Results segment # 1: Booth (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 !       70.00 !       16.87 !        16.87

ROAD (0.00 + 48.68 + 59.78) = 60.11 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
     0     62   0.00  73.01   0.00  -5.14  -4.63   0.00   0.00 -14.56  48.68
-------------------------------------------------------------------------------
    62     90   0.00  73.01   0.00  -5.14  -8.08   0.00   0.00   0.00  59.78
-------------------------------------------------------------------------------

Segment Leq : 60.11 dBA

Total Leq All Segments: 60.11 dBA


Results segment # 1: Booth (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 !       70.00 !       16.87 !        16.87

ROAD (0.00 + 41.08 + 52.19) = 52.51 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
     0     62   0.00  65.41   0.00  -5.14  -4.63   0.00   0.00 -14.56  41.08
-------------------------------------------------------------------------------
    62     90   0.00  65.41   0.00  -5.14  -8.08   0.00   0.00   0.00  52.19
-------------------------------------------------------------------------------

Segment Leq : 52.51 dBA

Total Leq All Segments: 52.51 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 60.11
                           (NIGHT): 52.51
```

```
STAMSON 5.0        COMPREHENSIVE REPORT        Date: 29-06-2020 11:37:15
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Booth1 (day/night)
-----------------------------------------
Car traffic volume  : 24288/2112  veh/TimePeriod  *
Medium truck volume :  1932/168   veh/TimePeriod  *
Heavy truck volume  :  1380/120   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):  30000
    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: Booth1 (day/night)
----------------------------------------
Angle1   Angle2           : -55.00 deg   26.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  62.00 / 62.00  m
Receiver height           :   7.90 / 7.90   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -55.00 deg   Angle2 : 26.00 deg
Barrier height            :  25.00 m
Barrier receiver distance :  52.00 / 52.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Road data, segment # 2: Booth2 (day/night)
------------------------------------------
Car traffic volume  : 24288/2112  veh/TimePeriod  *
Medium truck volume :  1932/168   veh/TimePeriod  *
Heavy truck volume  :  1380/120   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):  30000
    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: Booth2 (day/night)
----------------------------------------
Angle1   Angle2           :  26.00 deg   55.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  62.00 / 62.00  m
Receiver height           :   7.90 / 7.90   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  26.00 deg   Angle2 : 55.00 deg
Barrier height            :   6.40 m
Barrier receiver distance :  14.00 / 14.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Segment # 1: Booth1 (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 !        7.90 !        2.53 !         2.53

ROAD (0.00 + 43.38 + 0.00) = 43.38 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -55     26   0.00  73.01   0.00  -6.16  -3.47   0.00   0.00 -20.00  43.38
-------------------------------------------------------------------------------

Segment Leq : 43.38 dBA


Segment # 2: Booth2 (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 !        7.90 !        6.45 !         6.45

ROAD (0.00 + 58.91 + 0.00) = 58.91 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
    26     55   0.00  73.01   0.00  -6.16  -7.93   0.00   0.00  -4.99  53.92*
    26     55   0.00  73.01   0.00  -6.16  -7.93   0.00   0.00   0.00  58.91
-------------------------------------------------------------------------------

 * Bright Zone !

Segment Leq : 58.91 dBA

Total Leq All Segments: 59.03 dBA
```

```
Segment # 1: Booth1 (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 !        7.90 !        2.53 !         2.53

ROAD (0.00 + 35.78 + 0.00) = 35.78 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -55     26   0.00  65.41   0.00  -6.16  -3.47   0.00   0.00 -20.00  35.78
-------------------------------------------------------------------------------

Segment Leq : 35.78 dBA


Segment # 2: Booth2 (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 !        7.90 !        6.45 !         6.45

ROAD (0.00 + 51.32 + 0.00) = 51.32 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
    26     55   0.00  65.41   0.00  -6.16  -7.93   0.00   0.00  -4.99  46.32*
    26     55   0.00  65.41   0.00  -6.16  -7.93   0.00   0.00   0.00  51.32
-------------------------------------------------------------------------------

 * Bright Zone !

Segment Leq : 51.32 dBA

Total Leq All Segments: 51.44 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 59.03
                           (NIGHT): 51.44
```

```
STAMSON 5.0        COMPREHENSIVE REPORT        Date: 29-06-2020 11:37:21
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r4b.te              Time Period: Day/Night 16/8 hours
Description: 1.1 M BARRIER


Road data, segment # 1: Booth1 (day/night)
-----------------------------------------
Car traffic volume  : 24288/2112  veh/TimePeriod  *
Medium truck volume :  1932/168   veh/TimePeriod  *
Heavy truck volume  :  1380/120   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):  30000
    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: Booth1 (day/night)
----------------------------------------
Angle1   Angle2           : -55.00 deg   26.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  62.00 / 62.00  m
Receiver height           :   7.90 / 7.90   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -55.00 deg   Angle2 : 26.00 deg
Barrier height            :  25.00 m
Barrier receiver distance :  52.00 / 52.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Road data, segment # 2: Booth2 (day/night)
------------------------------------------
Car traffic volume  : 24288/2112  veh/TimePeriod  *
Medium truck volume :  1932/168   veh/TimePeriod  *
Heavy truck volume  :  1380/120   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):  30000
    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: Booth2 (day/night)
----------------------------------------
Angle1   Angle2           :  26.00 deg   55.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  62.00 / 62.00  m
Receiver height           :   7.90 / 7.90   m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            :  26.00 deg   Angle2 : 55.00 deg
Barrier height            :   7.50 m
Barrier receiver distance :  14.00 / 14.00  m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Segment # 1: Booth1 (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 !        7.90 !        2.53 !         2.53

ROAD (0.00 + 43.38 + 0.00) = 43.38 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -55     26   0.00  73.01   0.00  -6.16  -3.47   0.00   0.00 -20.00  43.38
-------------------------------------------------------------------------------

Segment Leq : 43.38 dBA


Segment # 2: Booth2 (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 !        7.90 !        6.45 !         6.45

ROAD (0.00 + 52.20 + 0.00) = 52.20 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
    26     55   0.00  73.01   0.00  -6.16  -7.93   0.00   0.00  -6.72  52.20
-------------------------------------------------------------------------------

Segment Leq : 52.20 dBA

Total Leq All Segments: 52.74 dBA
```

```
Segment # 1: Booth1 (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 !        7.90 !        2.53 !         2.53

ROAD (0.00 + 35.78 + 0.00) = 35.78 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -55     26   0.00  65.41   0.00  -6.16  -3.47   0.00   0.00 -20.00  35.78
-------------------------------------------------------------------------------

Segment Leq : 35.78 dBA


Segment # 2: Booth2 (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 !        7.90 !        6.45 !         6.45

ROAD (0.00 + 44.60 + 0.00) = 44.60 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
    26     55   0.00  65.41   0.00  -6.16  -7.93   0.00   0.00  -6.72  44.60
-------------------------------------------------------------------------------

Segment Leq : 44.60 dBA

Total Leq All Segments: 45.14 dBA




TOTAL Leq FROM ALL SOURCES (DAY): 52.74
                           (NIGHT): 45.14
```

```
STAMSON 5.0        COMPREHENSIVE REPORT        Date: 29-06-2020 11:37:27
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Booth (day/night)
----------------------------------------
Car traffic volume  : 24288/2112  veh/TimePeriod  *
Medium truck volume :  1932/168   veh/TimePeriod  *
Heavy truck volume  :  1380/120   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):  30000
    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: Booth (day/night)
---------------------------------------
Angle1   Angle2           : -75.00 deg   75.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  50.00 / 50.00  m
Receiver height           :  73.30 / 73.30  m
Topography                :      2       (Flat/gentle slope; with barrier)
Barrier angle1            : -75.00 deg   Angle2 : 75.00 deg
Barrier height            :  71.80 m
Barrier receiver distance :   3.00 / 3.00   m
Source elevation          :   0.00 m
Receiver elevation        :   0.00 m
Barrier elevation         :   0.00 m
Reference angle           :   0.00
```

```
Segment # 1: Booth (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 !       73.30 !       68.99 !        68.99

ROAD (0.00 + 54.68 + 0.00) = 54.68 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -75     75   0.00  73.01   0.00  -5.23  -0.79   0.00   0.00 -12.31  54.68
-------------------------------------------------------------------------------

Segment Leq : 54.68 dBA

Total Leq All Segments: 54.68 dBA


Segment # 1: Booth (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 !       73.30 !       68.99 !        68.99

ROAD (0.00 + 47.08 + 0.00) = 47.08 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -75     75   0.00  65.41   0.00  -5.23  -0.79   0.00   0.00 -12.31  47.08
-------------------------------------------------------------------------------

Segment Leq : 47.08 dBA

Total Leq All Segments: 47.08 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 54.68
                           (NIGHT): 47.08
```