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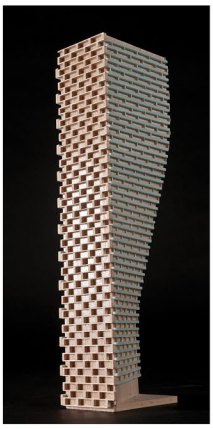
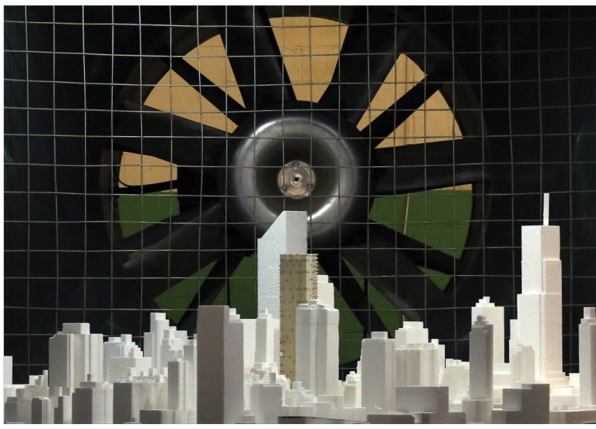
ROADWAY TRAFFIC NOISE ASSESSMENT

Wateridge Block
Ottawa, Ontario

Report: 22-113 – Roadway Traffic Noise





August 8, 2022

PREPARED FOR

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PREPARED BY

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EXECUTIVE SUMMARY

This report describes a roadway traffic noise assessment undertaken in support of a Site Plan Control (SPC) application for a proposed mixed-use development, known as Wateridge Block, located in Ottawa, Ontario. The proposed development comprises three 9-storey buildings, with Building 1 and 2 being separated by Bareille-Snow Street. The major sources of roadway traffic noise impacting the development include Hemlock Road and Codd's Road. Figure 1 illustrates the site location with the surrounding context.

The assessment is based on (i) theoretical noise prediction methods that conform to the Ministry of the Environment, Conservation and Parks (MECP), Ministry of Transportation of Ontario (MTO), 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) site plan drawings provided by Mataj Architects Inc. in May 2022.

The results of the current analysis indicated that noise levels will range between 44 and 64 dBA during the daytime period (07:00-23:00) and between 46 and 56 dBA during the nighttime period (23:00-07:00). The highest noise level (64 dBA) occurs at the south façade of Building 2, which is nearest and most exposed to Hemlock Road and Codd's Road. Since noise levels are less than 65 dBA at all building façades, standard building components in compliance with Ontario Building Code standards will be sufficient to attenuate noise levels indoors when windows are closed for Buildings 1, 2, and 3.

Noise levels predicted due to roadway traffic are expected to fall between 55 dBA and 65 dBA for Building 1 and 2, and below 55 dBA at Building 3. As such, Building 1 and 2 will need forced air heating with provisions for central air conditioning as a minimum requirement which, if installed at the owner's discretion, will allow building occupants to keep windows closed and maintain a comfortable living environment. Ventilation requirements for Building 3 are not necessary for noise mitigation purposes. In addition to ventilation requirements, a Type C Warning Clause will also be required in all Lease, Purchase and Sale Agreements, as summarized in Section 6.

As for the Building 1 Level 7 amenity area, noise levels are expected to fall below the noise level criteria for OLAs. Therefore, no acoustic mitigation is required.

Moreover, the stationary noise impacts of the buildings on the surroundings would be considered at a future stage once the mechanical design has progressed and equipment has been selected. Stationary noise sources associated with the development could include rooftop air handling units, cooling towers or dry coolers, and emergency generators. Should noise levels from these units exceed the criteria established in NPC-300 and ENCG, noise from these sources can be controlled to acceptable limits by judicious selection of the equipment, locating the equipment on a high roof away from nearby residential receptors, and where necessary, installing silencers or noise screens.

TABLE OF CONTENTS

1. INTRODUCTION

Gradient Wind Engineering Inc. (Gradient Wind) was retained by Bayview Wateridge Inc. to undertake a roadway traffic noise assessment for a proposed mixed-use development, known as Wateridge Block, located in Ottawa, Ontario. This report summarizes the methodology, results, and recommendations related to the assessment of exterior and interior noise levels generated by local roadway traffic.

This assessment is based on theoretical noise calculation methods conforming to the Ministry of the Environment, Conservation and Parks (MECP) NPC-300[1], Ministry of Transportation Ontario (MTO)[2], and City of Ottawa Environmental Noise Control Guidelines (ENCG)[3] guidelines. Noise calculations were based on site plan drawings provided by Mataj Architects Inc. in May 2022, with future traffic volumes corresponding to the City of Ottawa's Official Plan (OP) roadway classifications.

2. TERMS OF REFERENCE

The focus of this roadway traffic noise assessment is a proposed mixed-use development, known as Wateridge Block, located in Ottawa, Ontario. The proposed development comprises three 9-storey buildings, with Building 1 and 2 being separated by Bareille-Snow Street. All three buildings contain below-grade parking, amenities and commercial spaces at grade, and residential units from Levels 1 to 9.

Building 1 is located to the northeast of the Hemlock Road and Bareille-Snow Street intersection. It features two 9-storey building sections connected by a 6-storey podium section. The building steps back at Level 5 along the west, south, and east façade to accommodate semi-private balconies. A communal amenity area is located on the roof of the 6-storey podium.

Building 2 is located to the northwest of the Hemlock Road and Bareille-Snow Street intersection. It features a 9-storey building section to the west connected to a 6-storey podium section. The building steps back at Level 5 along the west, south, and east façade to accommodate semi-private balconies.

[1] Ontario Ministry of the Environment and Climate Change – Environmental Noise Guidelines, Publication NPC-300, Queens Printer for Ontario, Toronto, 2013
[2] Ministry of Transportation Ontario, "*Environmental Guide for Noise*", February 2022
[3] City of Ottawa, Environmental Noise Control Guidelines, January 2016

Building 3 is located to the southeast of the Codd's Road and Tawadina Road intersection. It features a 9-storey building section to the north connected to a 6-storey podium section. The building steps back at Level 5 along the north, west, and south façade to accommodate semi-private balconies.

The development is surrounded by mostly vacant land which is zoned as General Mixed-Use and Residential Use land as per Ottawa's Zoning By-Law[4]. A park is located to the southwest of the Codd's Road and Hemlock Road intersection. Low-rise residential buildings are located adjacent to Building 1 to the east and southeast. The major sources of traffic noise impacting the site include Hemlock Road and Codd's Road. It should be noted that Codd's Road is classified as a local road (i.e., not a noise source) north of Hemlock Road as per the City of Ottawa's Transportation Master Plan[5]. Figure 1 illustrates the site location with the surrounding context.

The study site is located approximately 530 m (property line to property line) southeast of Rockcliffe Airport. Rockcliffe Airport is classified as a small-scale airport primarily used by general aviation supporting a flight school, and private aviation activity and programs related to the Canada Aviation Museum. As this facility does not have a Noise Exposure Forecast (NEF) contour associated with Annex 10 of the City of Ottawa's Official Plan (OP) this facility is not classified as a noise source. As such, noise generated at the airport is not expected to be a concern.

3. OBJECTIVES

The principal objectives of this study are to (i) calculate the future noise levels on the study buildings produced by local roadway 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

[4] City of Ottawa, Zoning By-Law No. 2008-250
[5] City of Ottawa, Transportation Master Plan, November 2013

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

TABLE 1: INDOOR SOUND LEVEL CRITERIA (ROAD) [6]

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

[6] Adapted from ENCG 2016 – Tables 2.2b and 2.2c

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[7]. A closed window due to a ventilation requirement will bring noise levels down to achieve an acceptable indoor environment[8]. 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 attenuation[9].

The sound level criterion for outdoor living areas (OLA) is 55 dBA, which applies during the daytime (07:00 to 23:00). When noise levels exceed 55 dBA, mitigation should be provided to reduce noise levels where technically and administratively feasible to acceptable levels at or below the criterion. Furthermore, noise levels at the OLA must not exceed 60 dBA if mitigation can be technically and administratively achieved.

4.2.2 Theoretical Roadway Noise Predictions

The impact of transportation noise sources on the development was determined by two computer modelling programs. To provide a general sense of noise across the site, the employed software program was Predictor-Lima which utilizes the United States Federal Highway Administration's Traffic Noise Model (TNM) to represent the roadway line sources. The TNM model has been accepted as the preferred model as per the revised guideline titled "*Environmental Guide for Noise*" prepared by the Ministry of Transportation Ontario (MTO)[10]. This computer program can represent three-dimensional surfaces and the first reflections of sound waves over a suitable spectrum for human hearing. A set of comparative calculations were performed in the current Ontario traffic noise prediction model, STAMSON, for comparisons to Predictor simulation results.

[7] Burberry, P.B. (2014). Mitchell's Environment and Services. Routledge, Page 125
[8] MECP, Environmental Noise Guidelines, NPC 300 – Part C, Section 7.8
[9] MECP, Environmental Noise Guidelines, NPC 300 – Part C, Section 7.1.3
[10] Environmental Guide for Noise, February 2022. Ministry of Transportation Ontario

The STAMSON model is, however, older and requires each receptor to be calculated separately. STAMSON also does not accurately account for building reflections and multiple screening elements, and curved road geometry. A total of 18 receptor locations were identified around the site, as illustrated in Figure 2.

Roadway noise calculations were performed by treating each road segment as separate line sources of noise, and by using existing and proposed 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 for all streets.
- The ground surface was conservatively modelled as hard (reflective) ground to account for the hard, packed soil present at the site.
- Receptor heights were taken to be 12.5 m, 18.5 m, and 27.5 m above grade for the Plane of Window (POW), as well as 1.5 m above the walking surface at the Level 7 amenity area.
- The study site was treated as having flat or gently sloping topography.
- Massing associated with the study site and surrounding buildings were included as potential noise screening elements.
- 18 receptors were strategically placed throughout the study area, as shown in Figure 2.

4.2.3 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[11] 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.

[11] City of Ottawa Transportation Master Plan, November 2013

TABLE 2: ROADWAY TRAFFIC DATA

Segment	Roadway Traffic Data	Speed Limit (km/h)	Traffic Volumes
Hemlock Road	2-Lane Major Collector	50	**12,000**
Codd's Road	2-Lane Urban Collector	50	**8,000**

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 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 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 are achieved. The calculation procedure[12] 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 research[13], 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

[12] Building Practice Note: Controlling Sound Transmission into Buildings by J.D. Quirt, National Research Council of Canada, September 1985
[13] CMHC, Road & Rail Noise: Effects on Housing

information available at the time of the study, detailed floor layouts 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

5.1 Roadway Traffic Noise Levels

The results of the roadway traffic noise calculations are summarized in Table 3 below.

TABLE 3: EXTERIOR NOISE LEVELS DUE TO ROADWAY TRAFFIC

Receptor Number	Receptor Height Above Grade (m)	Receptor Location	Predictor-Lima Noise Level (dBA)	
			Day	Night
BUILDING 1				
R1	27.5	POW - B1 - East Facade	59	51
R2	27.5	POW - B1 - South Facade	62	55
R3	12.5	POW - B1 - South Facade	63	56
R4	12.5	POW - B1 - South Facade	63	56
R5	27.5	POW - B1 - South Facade	62	55
R6	27.5	POW - B1 - West Facade	59	52
R7	27.5	POW - B1 - West Facade	59	52
R8	27.5	POW - B1 - East Facade	59	52
BUILDING 2				
R9	12.5	POW - B2 - East Facade	61	53
R10	18.5	POW - B2 - South Facade	63	55
R11	27.5	POW - B2 - East Facade	60	52
R12	27.5	POW - B2 - South Facade	63	55
R13	27.5	POW - B2 - West Facade	60	52
R14	12.5	POW - B2 - West Facade	61	53
R15	12.5	POW - B2 - South Facade	64	56

TABLE 4 (CONT.): EXTERIOR NOISE LEVELS DUE TO ROADWAY TRAFFIC

Receptor Number	Receptor Height Above Grade (m)	Receptor Location	Predictor-Lima Noise Level (dBA)	
			Day	Night
BUILDING 3				
R16	27.5	POW - B3 - South Facade	55	47
R17	27.5	POW - B3 - West Facade	54	46
OUTDOOR AMENITY AREA				
R18	1.5	OLA- B1 - Amenity Terrace	44	N/A*

*Nighttime noise levels at the OLA are not considered as per ENCG.

The results of the current analysis indicated that noise levels will range between 44 and 64 dBA during the daytime period (07:00-23:00) and between 46 and 56 dBA during the nighttime period (23:00-07:00). The highest noise level (64 dBA) occurs at the south façade of Building 2, which is nearest and most exposed to Hemlock Road and Codd's Road. Figures 4 and 5 illustrate daytime and nighttime noise contours throughout the site at a height of 10 m above grade.

Table 4 shows a comparison in results between Predictor-Lima and STAMSON. Noise levels calculated in STAMSON were found to have a good correlation with Predictor-Lima and variability between the two programs was within an acceptable level of ±0-3 dBA. Sample calculations are presented in Appendix A.

TABLE 4: RESULTS OF STAMSON/PREDICTOR-LIMA CORRELATION

Receptor ID	Receptor Location	Receptor Height (m)	STAMSON 5.04 Noise Level (dBA)		PREDICTOR-LIMA Noise Level (dBA)	
			Day	Night	Day	Night
R7	POW - B1 - West Facade	27.5	62	55	59	52
R9	POW - B2 - East Facade	12.5	63	56	61	53

5.2 Noise Control Measures

The noise levels predicted due to roadway traffic are expected to fall between 55 dBA and 65 dBA for Building 1 and 2, and below 55 dBA at Building 3. Since noise levels are less than 65 dBA at all the building façades, standard building components in compliance with Ontario Building Code standards will be

sufficient to attenuate noise levels indoors when windows are closed for Buildings 1, 2, and 3. However, Building 1 and 2 will need forced air heating with provisions for central air conditioning as a minimum requirement which, if installed at the owner's discretion, will allow building occupants to keep windows closed and maintain a comfortable living environment. In addition to ventilation requirements, a Type C Warning Clause will also be required in all Lease, Purchase and Sale Agreements, as summarized in Section 6. Ventilation requirements for Building 3 are not necessary for noise mitigation purposes.

As for the Building 1 Level 7 amenity area, noise levels are expected to fall below the noise level criteria for OLAs. Therefore, no acoustic mitigation is required.

6. CONCLUSIONS AND RECOMMENDATIONS

The results of the current analysis indicated that noise levels will range between 44 and 64 dBA during the daytime period (07:00-23:00) and between 46 and 56 dBA during the nighttime period (23:00-07:00). The highest noise level (64 dBA) occurs at the south façade of Building 2, which is nearest and most exposed to Hemlock Road and Codd's Road. Since noise levels are less than 65 dBA at all the building façades, standard building components in compliance with Ontario Building Code standards will be sufficient to attenuate noise levels indoors when windows are closed for Buildings 1, 2, and 3.

Noise levels predicted due to roadway traffic are expected to fall between 55 dBA and 65 dBA for Building 1 and 2, and below 55 dBA at Building 3. As such, Building 1 and 2 will need forced air heating with provisions for central air conditioning as a minimum requirement which, if installed at the owner's discretion, will allow building occupants to keep windows closed and maintain a comfortable living environment. Ventilation requirements for Building 3 are not necessary for noise mitigation purposes. In addition to ventilation requirements, a Type C Warning Clause will also be required in all Lease, Purchase and Sale Agreements, as summarized below:

Type C

> *"This dwelling unit has been designed with the provision for adding central air conditioning at the occupant's discretion. Installation of central air conditioning by the occupant in low and medium density developments will allow windows and exterior doors to remain*

closed, thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment, Conservation and Parks."

As for the Building 1 Level 7 amenity area, noise levels are expected to fall below the noise level criteria for OLAs. Therefore, no acoustic mitigation is required.

Moreover, the stationary noise impacts of the buildings on the surroundings would be considered at a future stage once the mechanical design has progressed and equipment has been selected. Stationary noise sources associated with the development could include rooftop air handling units, cooling towers or dry coolers, and emergency generators. Should noise levels from these units exceed the criteria established in NPC-300 and ENCG, noise from these sources can be controlled to acceptable limits by judicious selection of the equipment, locating the equipment on a high roof away from nearby residential receptors, and where necessary, installing silencers or noise screens.

This concludes our roadway 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.

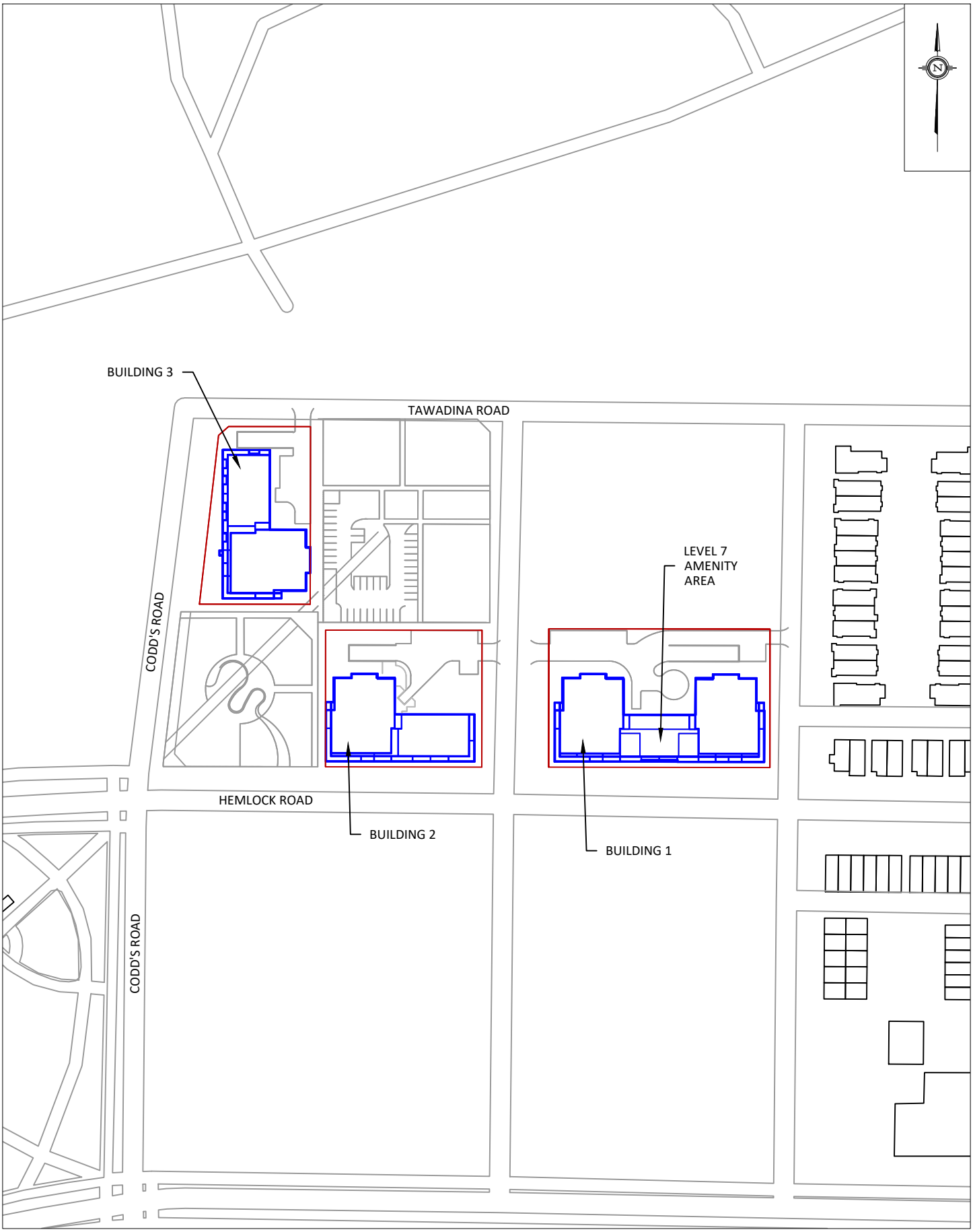
Sincerely,

Gradient Wind Engineering Inc.

Giuseppe Garro, MASc.
Environmental Scientist

Joshua Foster, P.Eng.
Lead Engineer

Gradient Wind File #22-113



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PROJECT	WATERIDGE BLOCK, OTTAWA ROADWAY TRAFFIC NOISE ASSESSMENT		DESCRIPTION
SCALE	1:2000 (APPROX.)	DRAWING NO.	GW22-113-1
DATE	MAY 16, 2022	DRAWN BY	G.G.

FIGURE 1:
SITE PLAN AND SURROUNDING CONTEXT

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SCALE	1:1300 (APPROX.)	DRAWING NO.	GW22-113-2
DATE	MAY 16, 2022	DRAWN BY	G.G.

FIGURE 2:
RECEPTOR LOCATIONS

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PROJECT	WATERIDGE BLOCK, OTTAWA ROADWAY TRAFFIC NOISE ASSESSMENT		DESCRIPTION
SCALE	1:1300 (APPROX.)	DRAWING NO.	GW22-113-3
DATE	MAY 16, 2022	DRAWN BY	G.G.

FIGURE 3:
VENTILATION REQUIREMENTS

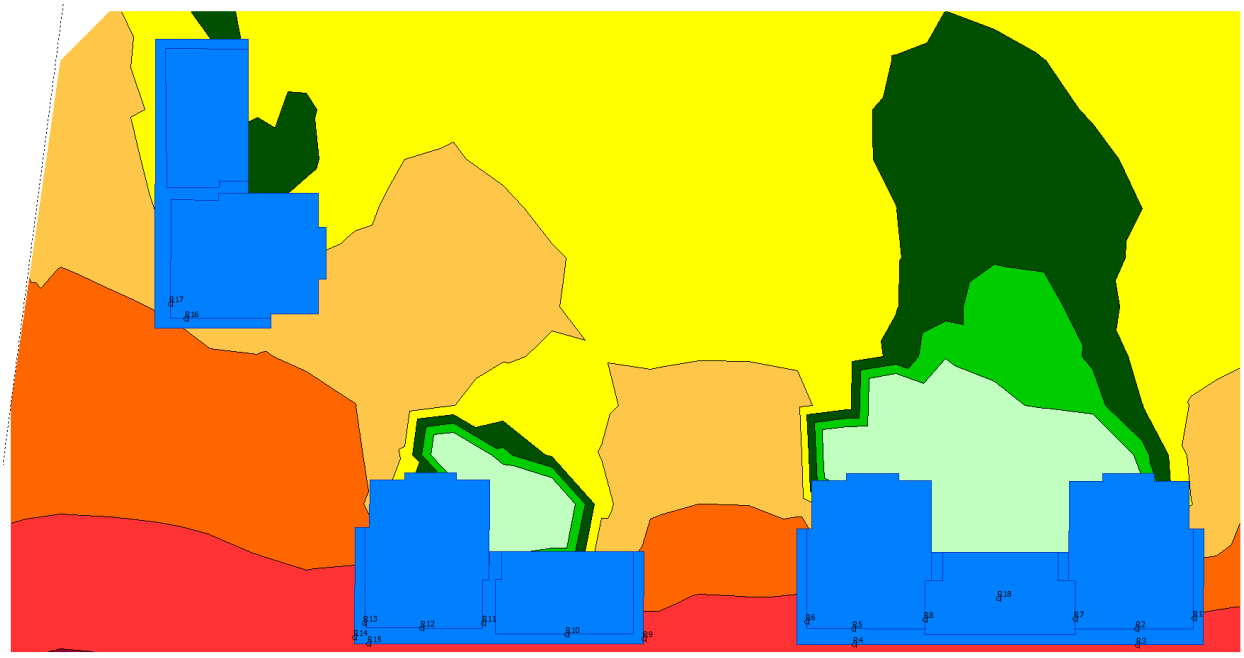

FIGURE 4: DAYTIME TRAFFIC NOISE CONTOURS (10 M ABOVE GRADE)

- *80 – 85 dB*
- *75 – 80 dB*
- *70 – 75 dB*
- *65 – 70 dB*
- *60 – 65 dB*
- *55 – 60 dB*
- *50 – 55 dB*
- *45 – 50 dB*
- *40 – 45 dB*
- *35 – 40 dB*
- *0 – 35 dB*

FIGURE 5: NIGHTTIME TRAFFIC NOISE CONTOURS (10 M ABOVE GRADE)

- *80 – 85 dB*
- *75 – 80 dB*
- *70 – 75 dB*
- *65 – 70 dB*
- *60 – 65 dB*
- *55 – 60 dB*
- *50 – 55 dB*
- *45 – 50 dB*
- *40 – 45 dB*
- *35 – 40 dB*
- *0 – 35 dB*

APPENDIX A

STAMSON 5.04 – INPUT AND OUTPUT DATA

127 WALGREEN ROAD, OTTAWA, ON, CANADA K0A 1L0 | 613 836 0934
GRADIENTWIND.COM

```
STAMSON 5.0        NORMAL REPORT        Date: 17-05-2022 17:26:28
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: HR (day/night)
----------------------------------
Car traffic volume  :  9715/845   veh/TimePeriod  *
Medium truck volume :   773/67    veh/TimePeriod  *
Heavy truck volume  :   552/48    veh/TimePeriod  *
Posted speed limit  :    50 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):  12000
    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: HR (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  :  24.00 / 24.00  m
Receiver height           :  27.50 / 27.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00


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

Source height = 1.50 m

ROAD (0.00 + 62.46 + 0.00) = 62.46 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
     0     90   0.00  67.51   0.00  -2.04  -3.01   0.00   0.00   0.00
62.46
-------------------------------------------------------------------------------
--
```

```
Segment Leq : 62.46 dBA

Total Leq All Segments: 62.46 dBA

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

Source height = 1.50 m

ROAD (0.00 + 54.86 + 0.00) = 54.86 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
     0     90   0.00  59.91   0.00  -2.04  -3.01   0.00   0.00   0.00
54.86
-------------------------------------------------------------------------
--

Segment Leq : 54.86 dBA

Total Leq All Segments: 54.86 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 62.46
                           (NIGHT): 54.86
```

```
STAMSON 5.0        NORMAL REPORT        Date: 17-05-2022 17:26:46
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: HR (day/night)
----------------------------------
Car traffic volume  :  9715/845   veh/TimePeriod  *
Medium truck volume :   773/67    veh/TimePeriod  *
Heavy truck volume  :   552/48    veh/TimePeriod  *
Posted speed limit  :    50 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):  12000
    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: HR (day/night)
------------------------------------
Angle1   Angle2           : -90.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      2       (Reflective ground surface)
Receiver source distance  :  20.00 / 20.00  m
Receiver height           :  12.50 / 12.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

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

Source height = 1.50 m

ROAD (0.00 + 63.25 + 0.00) = 63.25 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------------
--
   -90      0   0.00  67.51   0.00  -1.25  -3.01   0.00   0.00   0.00
63.25
-------------------------------------------------------------------------------
--
```

```
Segment Leq : 63.25 dBA

Total Leq All Segments: 63.25 dBA

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

Source height = 1.50 m

ROAD (0.00 + 55.65 + 0.00) = 55.65 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj
SubLeq
-------------------------------------------------------------------------
--
   -90      0   0.00  59.91   0.00  -1.25  -3.01   0.00   0.00   0.00
55.65
-------------------------------------------------------------------------
--

Segment Leq : 55.65 dBA

Total Leq All Segments: 55.65 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 63.25
                           (NIGHT): 55.65
```

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PROJECT	WATERIDGE BLOCK, OTTAWA ROADWAY TRAFFIC NOISE ASSESSMENT
SCALE	1:1300 (APPROX.)
DRAWING NO.	GW22-113-A1
DATE	MAY 16, 2022
DRAWN BY	G.G.

DESCRIPTION

FIGURE A1:
STAMSON INPUT PARAMETERS