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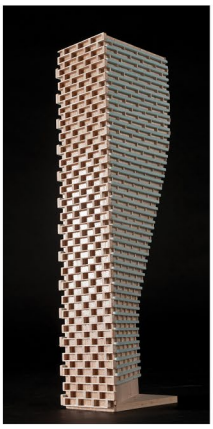
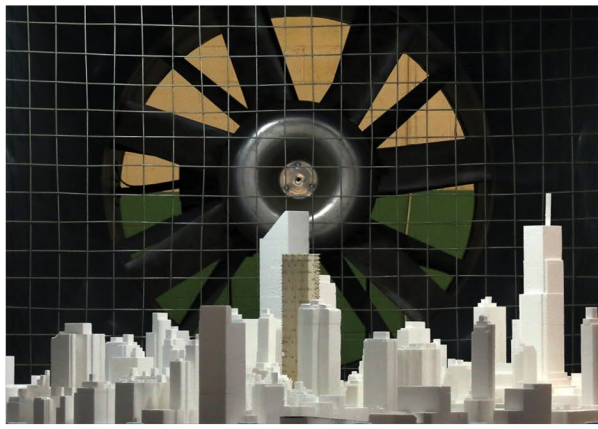
ENGINEERS & SCIENTISTS

TRANSPORTATION NOISE FEASIBILITY ASSESSMENT

3265 Jockvale Road
Ottawa, Ontario

Report: 25-187 Transportation Noise Feasibility R1





August 11, 2026

DRAFT

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EXECUTIVE SUMMARY

This report describes a transportation noise assessment undertaken to satisfy a Zoning By-law Amendment (ZBA) application and a Plan of Subdivision application for the proposed suburban development, referred to as Barrhaven Town Centre Stage 2, located at 3265 Jockvale Road in Ottawa, Ontario. The major sources of traffic noise on the development are the future Greenbank Road (4-lane divided arterial) with a bus rapid transit (BRT) system in the median, Riocan Avenue (2-lane collector), Jockvale Road (2-lane undivided arterial), Longfields Drive (4-lane divided arterial), an extension to Chapman Mills Drive (2-land major collector) with its own BRT in the median, and a planned LRT terminus north of the proposed development.

The assessment is based on (i) theoretical noise prediction methods that conform to the Ministry of the Environment, Conservation and Parks (MECP) NPC-300, Ministry of Transportation Ontario (MTO), and City of Ottawa Environmental Noise Control Guidelines (ENCG); (ii) future vehicular traffic volumes corresponding to roadway classifications and roadway traffic volumes obtained from the City of Ottawa; and (iii) a concept plan provided by Minto Communities in August 2026.

The results of the current analysis indicate that Plane of Window (POW) noise levels will range between 58 and 68 dBA during the daytime period (07:00-23:00) and between 50 and 61 dBA during the nighttime period (23:00-07:00). The highest noise level (68 dBA) occurs simultaneously at the intersection of Chapman Mills Drive and Longfields Drive, the north of Riocan Avenue, and the south portion of Longfields Drive.

Upgraded ventilation, along with Type C and Type D Warning Clauses are required on the units outlined in Figure 4. Due to some receptors exceeding 65 dBA, noise mitigation measures at the POW are required. The units requiring the Type D Warning Clause will require upgraded window STC levels for sensitive bedrooms and living rooms.

Results showed that the OLAs occasionally exceeded 60 dBA. Noise mitigation is to be carried out with noise barriers. The noise barriers should be built with solid elements having a minimum surface density of 20 kg/m² or providing an STC rating of 30, and they should not contain any gaps. The locations of potential noise barriers are presented in Figure 5. A height analysis of the potential barriers alongside potential requirements for a Type B Warning Clause will be investigated at a more detailed design stage. For OLAs with noise levels between 55 dBA and 60 dBA (Block s 21-24 and Block 28.), a Type A Warning Clause will be required on all Purchase, Sale and Lease Agreements, as summarized in Section 6.

With regards to on-site stationary noise impacts of surroundings onto the study site, Gradient Wind conducted a survey of the site using aerial imagery and no significant off-site sources of stationary noise were identified.

Regarding stationary noise impacts of the study site on its surroundings, its nature as a subdivision of suburban residential dwellings means that the study site is not anticipated to have any significant impacts on its surroundings.

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1. INTRODUCTION

Gradient Wind Engineering Inc. (Gradient Wind) was retained by Minto Communities to undertake a transportation noise assessment, to satisfy the Zoning By-law Amendment (ZBA) application and a Plan of Subdivision application requirements for the proposed suburban development, referred to as Barrhaven Town Centre Stage 2, located at 3265 Jockvale Road in Ottawa, Ontario. This report summarizes the methodology, results, and recommendations related to the assessment of exterior noise levels generated by local transportation 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]. Noise calculations were based on a concept plan, provided by Minto in August 2026, with future traffic volumes corresponding to roadway classification and theoretical roadway capacities, and recent satellite imagery.

2. TERMS OF REFERENCE

The site comprises several executive townhomes, as well as back-to-back townhomes, a park along Jockvale Road, new streets, and outdoor parking along the future Chapman Mills Drive. The site is bounded to the north by the extension to Chapman Mills Drive, to the west by Jockvale Road, and to the east by Longfields Drive. Medium density blocks line the subject site along its north edge, south of Chapman Mills Drive. The centre of the subject site is populated by the back-to-back townhomes. The remaining housing is occupied by the executive townhomes.

The major sources of traffic noise on the development are the future Greenbank Road (4-lane divided arterial) with a bus rapid transit (BRT) system in the median, Riocan Avenue (2-lane major collector), Jockvale Road (2-lane undivided arterial), Longfields Drive (4-lane divided arterial), an extension to Chapman Mills Drive (2-land major collector) with its own BRT in the median, and a future LRT terminus north of the site.

[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*", August 2021
[3] City of Ottawa Environmental Noise Control Guidelines, January 2016

3. OBJECTIVES

The principal objectives of this study are to (i) calculate the future noise levels on the study building produced by local transportation sources, and (ii) explore potential noise mitigation where required.

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 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

The transportation noise considered in this study is limited to roadway and LRT traffic. The eastern portion of the proposed subdivision lies within the Airport Vicinity Development Zone (AVDZ). However, the proposed subdivision is outside the NEF/NEP 25 contour, so aircraft noise on the subject site is too low to require additional consideration for mitigation. Being within the AVDZ does require an Aircraft Noise Warning Clause.

4.2.1 Criteria for Transportation 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. NPC-300 specifies that the recommended indoor noise limit for various spaces in the development are listed in Table 1.

TABLE 1: INDOOR SOUND LEVEL CRITERIA

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 a standard closed window is capable of providing a minimum 20 dBA noise reduction[4]. A closed window due to a ventilation requirement will bring noise levels down to achieve an acceptable indoor environment[5]. 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[6].

The sound level criterion for outdoor living areas (OLA) is 55 dBA, which applies during the daytime (07:00 to 23:00). According to the NPC-300, where 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. While it is preferred to use noise mitigation measures to lower OLA noise levels below 55 dBA, Ottawa's ENCG[7] stipulates noise barriers become required once noise levels exceed 60 dBA. Thus, all prescriptions of noise barriers in this feasibility study use the 60 dBA OLA criterion.

[4] Burberry, P.B. (2014). Mitchell's Environment and Services. Routledge, Page 125
[5] MOECP, Environmental Noise Guidelines, NPC 300 – Part C, Section 7.8
[6] MOECP, Environmental Noise Guidelines, NPC 300 – Part C, Section 7.1.3
[7] City of Ottawa Environmental Noise Control Guidelines Section 3.2, January 2016

4.2.2 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, roadway traffic volumes are based on the roadway classifications outlined in the City of Ottawa's Official Plan (OP) and Transportation Master Plan[8] 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 the roadways included in this assessment. The terminus of an LRT line is also considered, as the City of Ottawa's Master Plan outlines a planned LRT to end just north of the proposed development.

TABLE 2: ROADWAY TRAFFIC DATA

Segment	Roadway Traffic Classification	Speed Limit (km/h)	Traffic Volumes
Chapman Mills Drive	2-Lane Collector	50	**12,000**
Chapman Mills Transitway	Bus Rapid Transit	50	**191/67***
Longfields Drive	4-Lane Urban Arterial (Divided)	60	**35,000**
Jockvale Road	2-Lane Urban Arterial (Undivided)	60	**15,000**
Riocan Avenue	2-Lane Collector	50	**8,000**
Realigned Greenbank Road	4-Lane Urban Arterial (Divided)	70	**35,000**
Southwest Transitway	Bus Rapid Transit	70	**191/67***
Confederation Line 1	LRT	70	**540/60****

* Daytime and nighttime volumes based on correspondence with the City of Ottawa

** Day and Nighttime volumes are based on existing volumes along the Line 1

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

4.2.3 Theoretical Roadway Traffic Noise Predictions

The impact of transportation noise sources on the development was determined by computer modelling. Transportation noise source modelling is based on the software program *CadnaA,* which utilizes the United States Federal Highway Administration's Traffic Noise Model (TNM) to represent the roadway line sources. The TNM model is also being accepted in the updated Environmental Guide for Noise of Ontario, 2022 by the Ministry of Transportation (MTO) [9]. This computer program can represent three-dimensional surfaces and three orders of reflections of sound waves over a suitable spectrum for human hearing. The following were considered when determining roadway traffic and site surroundings:

- 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 where assumed to be absorptive due to the presence of lawns in the back and side yards.
- Topography was assumed to be a flat/gentle slope surrounding the study building.
- Noise receptors were strategically placed at 30 locations around the study area (see Figure 2).
- POW receptors are placed at second floor windows for the executive townhomes (4.5 m above grade) and in the 3rd floor windows of the medium density blocks (9 m above grade).
- OLA receptors are placed in the backyard portion of the Lots, 1.5 m above grade.

Noise predictions were also correlated to STAMSON, an MECP computerized noise assessment program, for road analysis. Appendix A includes the STAMSON 5.04 input and output data. Traffic noise calculations were performed by treating each roadway segment as separate line sources of noise. The receptor distances to sources and exposure angles are portrayed in Figure A1.

[9] Ministry of Transportation Ontario, "*Environmental Guide for Noise*", August 2022, pg. 16

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 (2024) 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 4.2.1, when daytime noise levels from road sources at the plane of the window exceed 65 dBA, or nighttime noise levels exceed 60 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[10] 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[11], 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, 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 + Safety Factor).

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

5. RESULTS

5.1 Roadway Traffic Noise Levels

The results of the roadway traffic noise calculations presented as the receptor sound levels as calculated in *CadnaA* are summarized in Tables 3 and 4 below. Noise contours at 4 m of elevation for daytime and nighttime may be found in Figures 6-9.

TABLE 3: EXTERIOR NOISE LEVELS DUE TO ROADWAY TRAFFIC SOURCES

Receptor Number	Receiver Height Above Grade (m)	Receptor Location	CadnaA Noise Level (dBA)	
			Day	Night
1	9	POW – East Building of Block 3 East Façade – Level 3	68	60
2	9	POW – East Building of Block 3 North Façade – Level 3	64	57
3	9	POW – Centre Building of Block 3 North Façade – Level 3	62	55
4	9	POW – Central Building of Block 2 North Façade – Level 3	62	55
5	9	POW – West Building of Block 2 West Façade – Level 3	65	58
6	9	POW – East Building of Block 1 North Façade – Level 3	65	58
7	9	POW – West Building of Block 1 North Façade – Level 3	63	56
8	4.5	POW – Block 18 - Southwest Façade – Level 2	64	56
9	4.5	POW – Block 17 - South Façade – Level 2	65	58
10	4.5	POW – Block 14 – East Façade – Level 2	63	55
11	4.5	POW – Block 15– South Façade – Level 2	57	50
12	4.5	POW – Block 22 – West Façade – Level 2	61	53
13	4.5	POW – Block 31 – East Façade – Level 2	65	58
14	4.5	POW – Block 7– East Façade – Level 2	68	60
15	7.5s	POW – Block 42 – East Façade – Level 3	66	58
16	4.5	POW – Block 6 – South Façade – Level 2	64	57
17	4.5	POW – Block 6 –East Façade – Level 2	68	61

TABLE 4: EXTERIOR NOISE LEVELS DUE TO ROADWAY TRAFFIC SOURCES - CONTINUED

Receptor Number	Receiver Height Above Grade (m)	Receptor Location	CadnaA Noise Level (dBA)	
			Day	Night
18	1.5	OLA – Backyard of the western Townhome of Block 28	57	N/A*
19	1.5	OLA – Backyard of the southern Townhome of Block 18	50	N/A*
20	1.5	OLA – Backyard of the western Townhome of Block 17	66	N/A*
21	1.5	OLA – Backyard of central Townhome of Block 15	54	N/A*
22	1.5	OLA – Backyard of western Townhome of Block 13	63	N/A*
23	1.5	OLA – Backyard of eastern Townhome of Block 24	59	N/A*
24	1.5	OLA – Backyard of western Townhome of Block 22	57	N/A*
25	1.5	OLA – Backyard of eastern Townhome of Block 31	65	N/A*
26	1.5	OLA – Backyard of eastern Townhome of Block 7	70	N/A*
27	1.5	OLA – Backyard of eastern Townhome of Block 6	65	N/A*
28	7.5	POW – Block 42 – South Façade – Level 3	63	55
29	7.5	POW – Block 42 – North Façade – Level 3	58	50

*Nighttime noise levels are not considered as per NPC-300

Table 5 on the proceeding page provides a comparison between *CadnaA* and STAMSON. Noise levels calculated in STAMSON are generally greater than in *CadnaA*, being within the range of ±3 dBA. These discrepancies are within reason. Due to the complicated geometry of the study site and its surroundings, STAMSON is not equipped to accurately analyse the sound. Thus, recommendations are made based on the *CadnaA* results.

TABLE 5: RESULT CORRELATION WITH STAMSON

Receptor Number	Receptor Height Above Grade (m)	Receptor Location	CadnaA Noise Level (dBA)		STAMSON 5.04 Noise Level (dBA)	
			Day	Night	Day	Night
R1	9	POW – Block 10 - North Façade – Level 3	68	60	70	63
R3	9	POW – Block 9 - North Façade – Level 3	62	55	63	56
R15	7.5	POW – Block 42 – East Façade – Level 3	66	58	66	59
R27	1.5	OLA – Backyard of Northernmost Executive Townhome Along Longfields	65	N/A*	66	N/A*

*Nighttime noise levels are not considered as per NPC-300

The results of the current analysis indicate that POW noise levels will range between 58 and 68 dBA during the daytime period (07:00-23:00) and between 50 and 61 dBA during the nighttime period (23:00-07:00). The highest noise level (68 dBA) occurs simultaneously at the intersection of Chapman Mills Drive and Longfields Drive, the north of Riocan Avenue, and the south portion of Longfields Drive. Since several POW receptors exceed 65 dBA, all Lots that exceed 65 dBA at the POW will require upgraded window STC levels for sensitive bedrooms and living rooms. Exterior wall components on these façades are recommended to have a minimum STC of 45. 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. The specified window STC requirements also apply to swinging and/or sliding doors.

For the remainder of the development, exterior building components that comply with the Ontario Building Code (OBC 2024) requirements will be sufficient. The STC requirements apply to windows, doors, spandrel panels and curtainwall elements.

Results of the calculations also indicate that several dwellings will require a combination of design with the provision for adding central air conditioning, and a required installation of central air conditioning. Specific Warning Clauses will also be required on all Lease, Purchase and Sale Agreements for all buildings, as summarized in Section 6. Figure 4 outlines the impacted areas and the anticipated required Warning Clauses. Dwellings with POW sound levels ranging from 55-65 dBA will require a Type C Warning Clause, and dwellings with POW sound levels above 65 dBA will require a Type D Warning Clause. It is noted that the dwellings that require a Type D Warning Clause are the same that will require upgraded window

components. The dwellings experiencing noise levels over 65 dBA are Blocks 6, 7, the easternmost units of Block 42, and the eastern dwelling of medium density Block 3. Blocks 20, 25, 26, and 34-41 will not require either a Type C or D Warning Clause. The remaining Blocks require a Type C Warning Clause. Figure 4 presents the blocks which require Type C and D Warning Clauses.

Some OLA receptors exceed 60 dBA and require additional mitigation to reduce their sound levels below that threshold, per ENCG guidelines. Mitigation will be accomplished with the use of noise barriers. The noise barriers should be built with solid elements having a minimum surface density of 20 kg/m² or provid an STC rating of 30, and they should not contain any gaps. The proposed locations of the barriers are presented in Figure 5. A more detailed investigation into the heights of the barriers and the potential requirement for a Type B Warning Clause will be undertaken at a more detailed design stage. For OLAs with noise levels between 55 dBA and 60 dBA, A Type A Warning Clause will be required to avoid the installation of noise barriers. The blocks in which a Type A Warning Clause will be required for all Purchase, Sale, and Lease Agreements are Blocks 21-24 and Block 28.

6. CONCLUSIONS AND RECOMMENDATIONS

The results of the current analysis indicate that POW noise levels will range between 58 and 68 dBA during the daytime period (07:00-23:00) and between 50 and 61 dBA during the nighttime period (23:00-07:00). The highest noise level (68 dBA) occurs simultaneously at the intersection of Chapman Mills Drive and Longfields Drive, the north of Riocan Avenue, and the south portion of Longfields Drive. Since many receptors exceed 65 dBA, noise mitigation measures at the POW are required. All Lots that exceed 65 dBA at the POW will require upgraded window STC components for sensitive bedrooms and living rooms. Exterior wall components on these façades are recommended to have a minimum STC of 45.

Results of the calculations indicate that most lots, except for Blocks 20, 25, 26, and 34-41 exceed 55 dBA at their POW receptors and that many also exceed 65 dBA. Thus, those between 55-65 dBA must have provisions to be designed to allow future occupants to install air conditioning, and those above 65 dBA will require the installation of central air heating and conditioning, which allows for windows and exterior doors to remain closed. The distribution of Type C and D Warning Clauses is shown in Figure 4. The Type C and D Warning Clauses required on all Purchase, Sale and Lease Agreements of the applicable Blocks are 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."*

Type D:

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

Results showed that the OLAs occasionally exceeded 60 dBA. Noise mitigation is to be carried out with noise barriers. The noise barriers should be built with solid elements having a minimum surface density of 20 kg/m² or providing an STC rating of 30, and they should not contain any gaps. The locations of potential noise barriers are presented in Figure 5. A height analysis of the potential barriers alongside potential requirements for a Type B Warning Clause will be investigated at a more detailed design stage. For OLAs with noise levels between 55 dBA and 60 dBA (Blocks 21-24 and Block 28.), the following Type A Warning Clause will be required on all Purchase, Sale, and Lease Agreements:

Type A:

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

For the Blocks within the AVDZ, the following aircraft noise Warning Clause is required for all Purchase, Sale, and Lease Agreements:

> *"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*."

With regards to on-site stationary noise impacts of surroundings onto the study site, Gradient Wind conducted a survey of the site using aerial imagery and no significant off-site sources of stationary noise were identified.

Regarding stationary noise impacts of the study site on its surroundings, the development's nature as a suburban development means that these stationary noise impacts do not need to be considered.

This concludes our transportation noise feasibility 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.

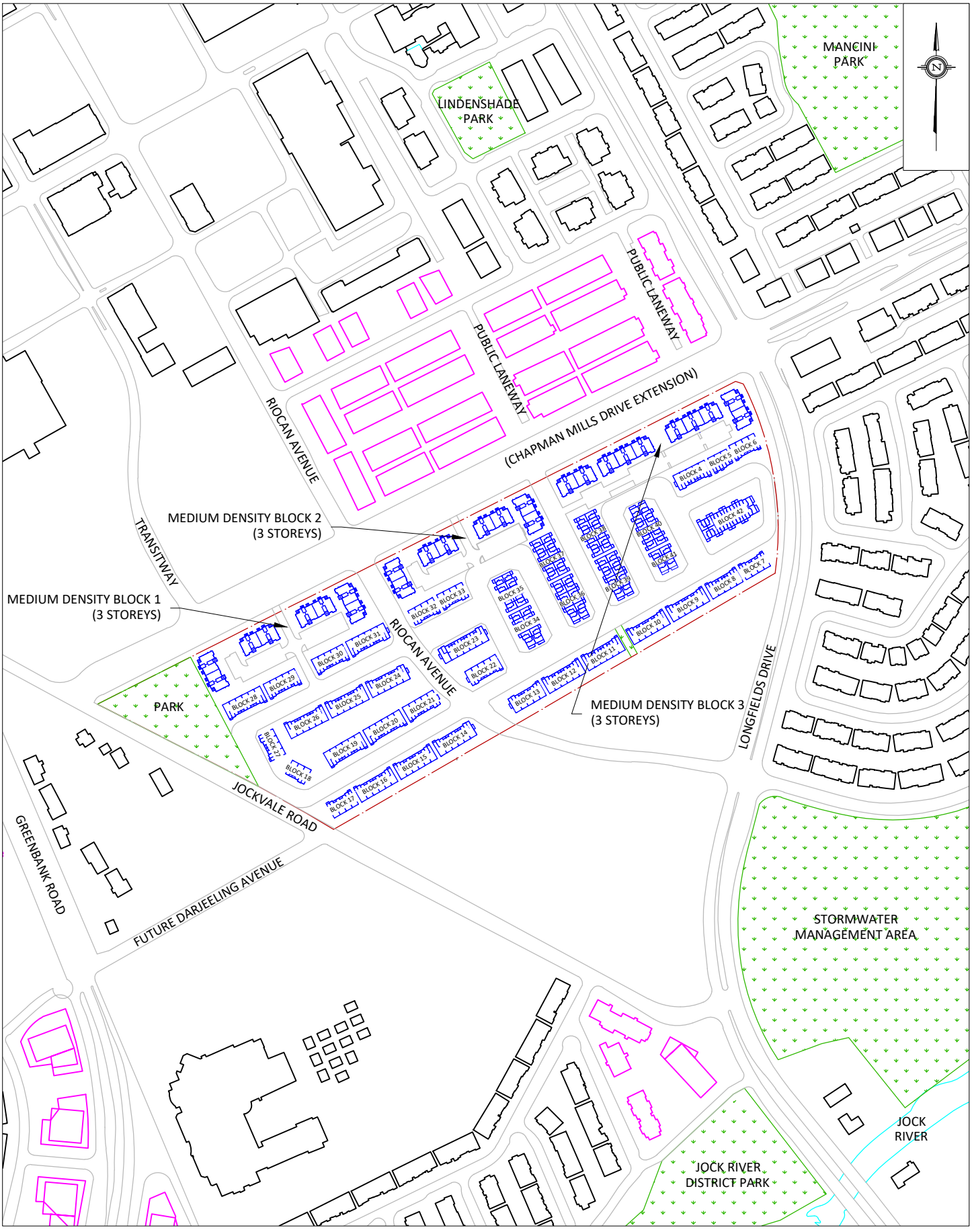
Sincerely,

Gradient Wind Engineering Inc.

Michael Pantano, M.A.Sc.
Junior ANV Scientist

Joshua Foster, P.Eng.
Lead Engineer

Gradient Wind File 25-187- Transportation Noise Feasibility R1



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PROJECT	3265 JOCKVALE ROAD, OTTAWA TRANSPORTATION NOISE FEASIBILITY ASSESSMENT
SCALE	1:4500 (APPROX.)
DRAWING NO.	25-187-ANV-1
DATE	AUGUST 7, 2026
DRAWN BY	M.P.

DESCRIPTION

FIGURE 1:
SITE PLAN AND SURROUNDING CONTEXT

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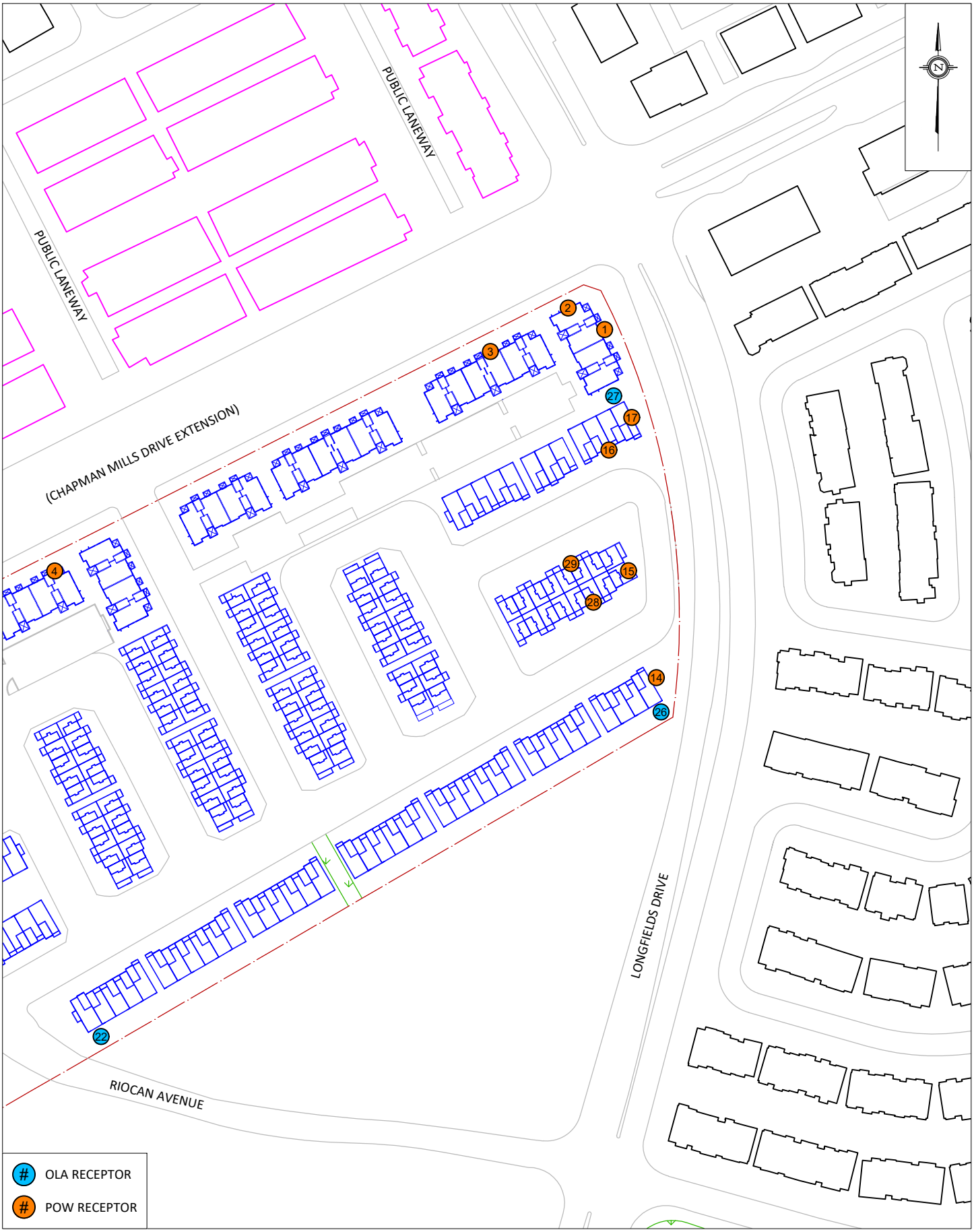
SCALE	1:2000 (APPROX.)	DRAWING NO.	25-187-ANV-2
DATE	JANUARY 21, 2026	DRAWN BY	M.P.

DESCRIPTION

FIGURE 2:
LOCATION OF RECEPTORS WEST OF RIOCAN AVENUE



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SCALE	1:2000 (APPROX.)	DRAWING NO.	25-187-ANV-3
DATE	AUGUST 7, 2026	DRAWN BY	M.P.

DESCRIPTION

FIGURE 3:
LOCATION OF RECEPTORS EAST OF RIOCAN AVENUE

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SCALE	1:3000 (APPROX.)
DRAWING NO.	25-187-ANV-4
DATE	AUGUST 10, 2026
DRAWN BY	M.P.
DESCRIPTION	FIGURE 4: TYPE C AND D WARNING CLAUSES

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DRAWING NO.	25-187-ANV-5
DATE	AUGUST 7, 2026
DRAWN BY	M.P.

DESCRIPTION

FIGURE 5:
NOISE BARRIER RECOMMENDATIONS

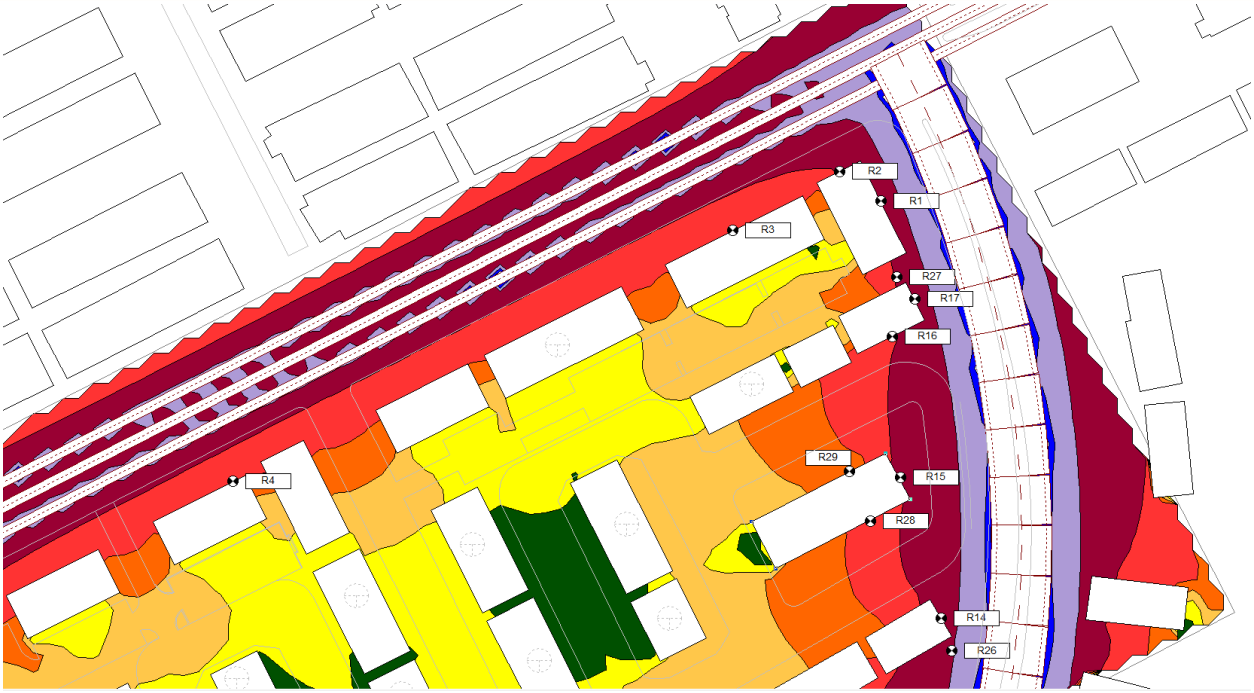


FIGURE 6: DAYTIME HORIZONTAL TRANSPORTATION NOISE CONTOURS EAST SIDE (4 METERS ABOVE GRADE)

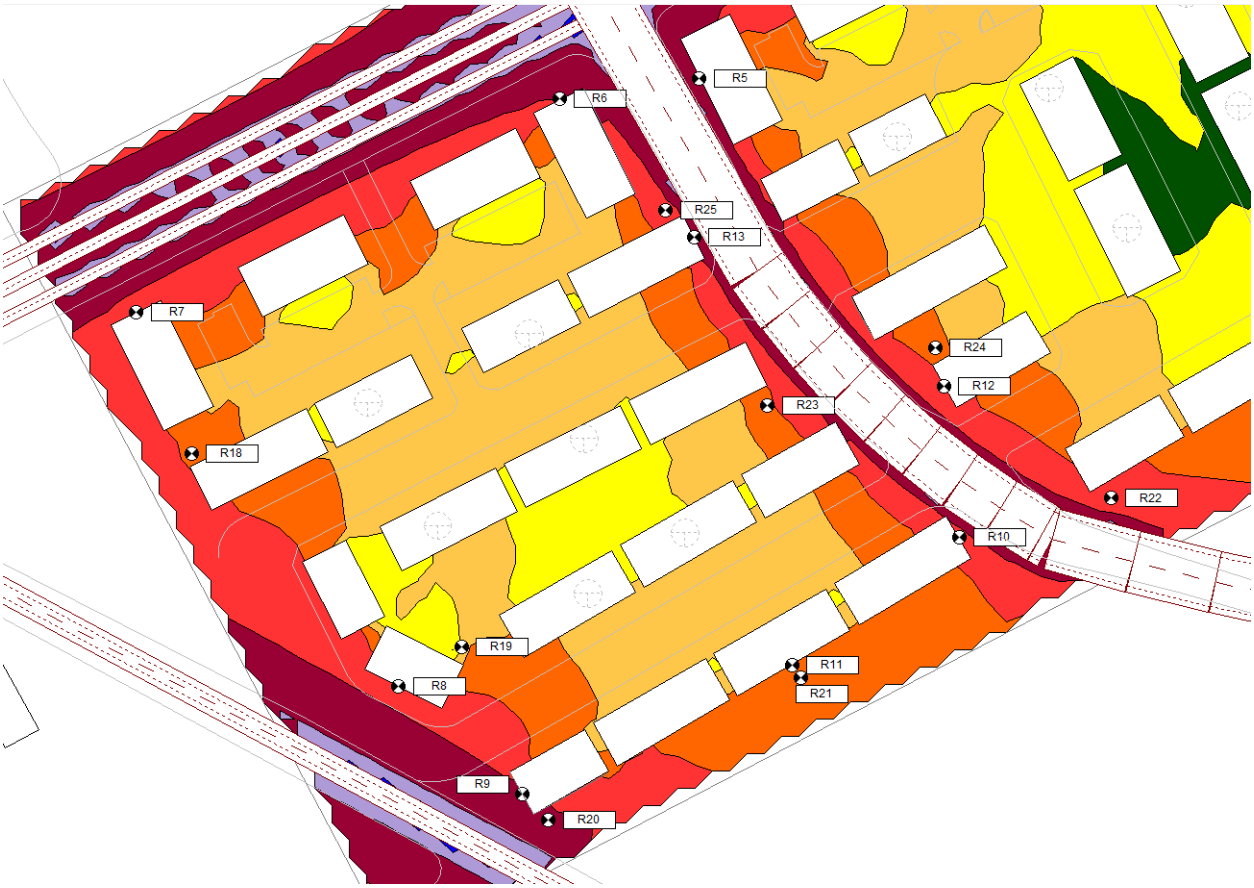


FIGURE 7: DAYTIME HORIZONTAL TRANSPORTATION NOISE CONTOURS WEST SIDE (4 METERS ABOVE GRADE)

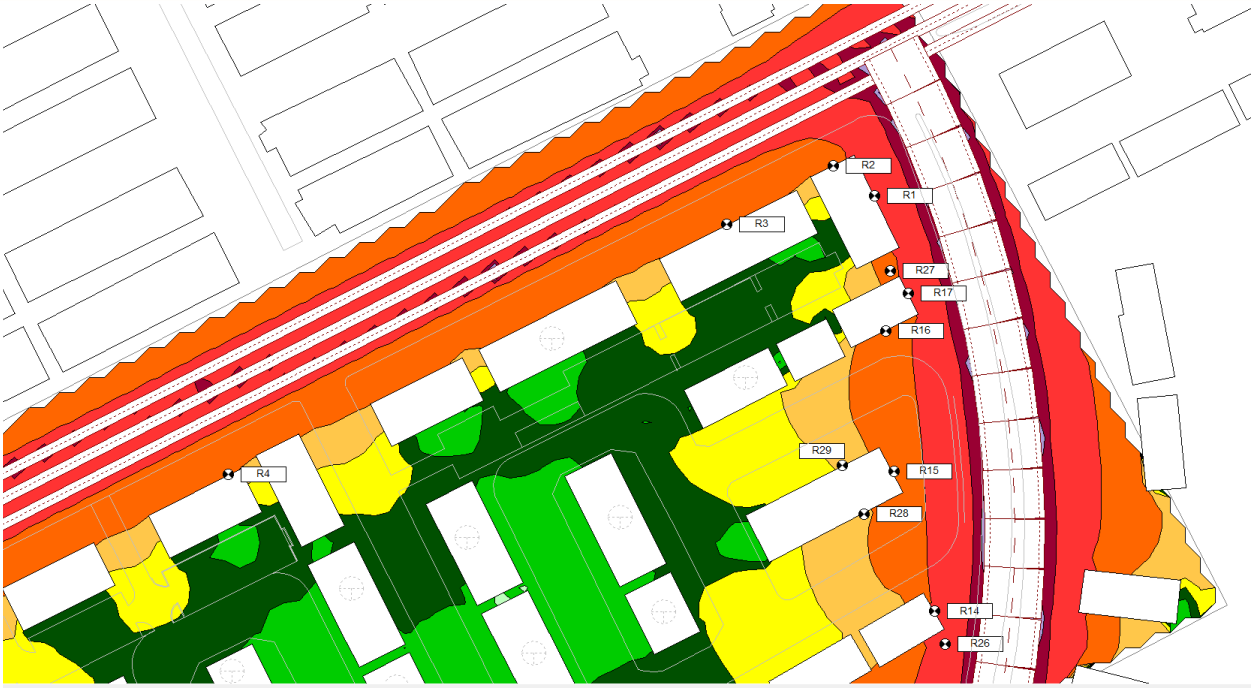


FIGURE 8: NIGHTTIME HORIZONTAL TRANSPORTATION NOISE CONTOURS EAST SIDE (4 METERS ABOVE GRADE)

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

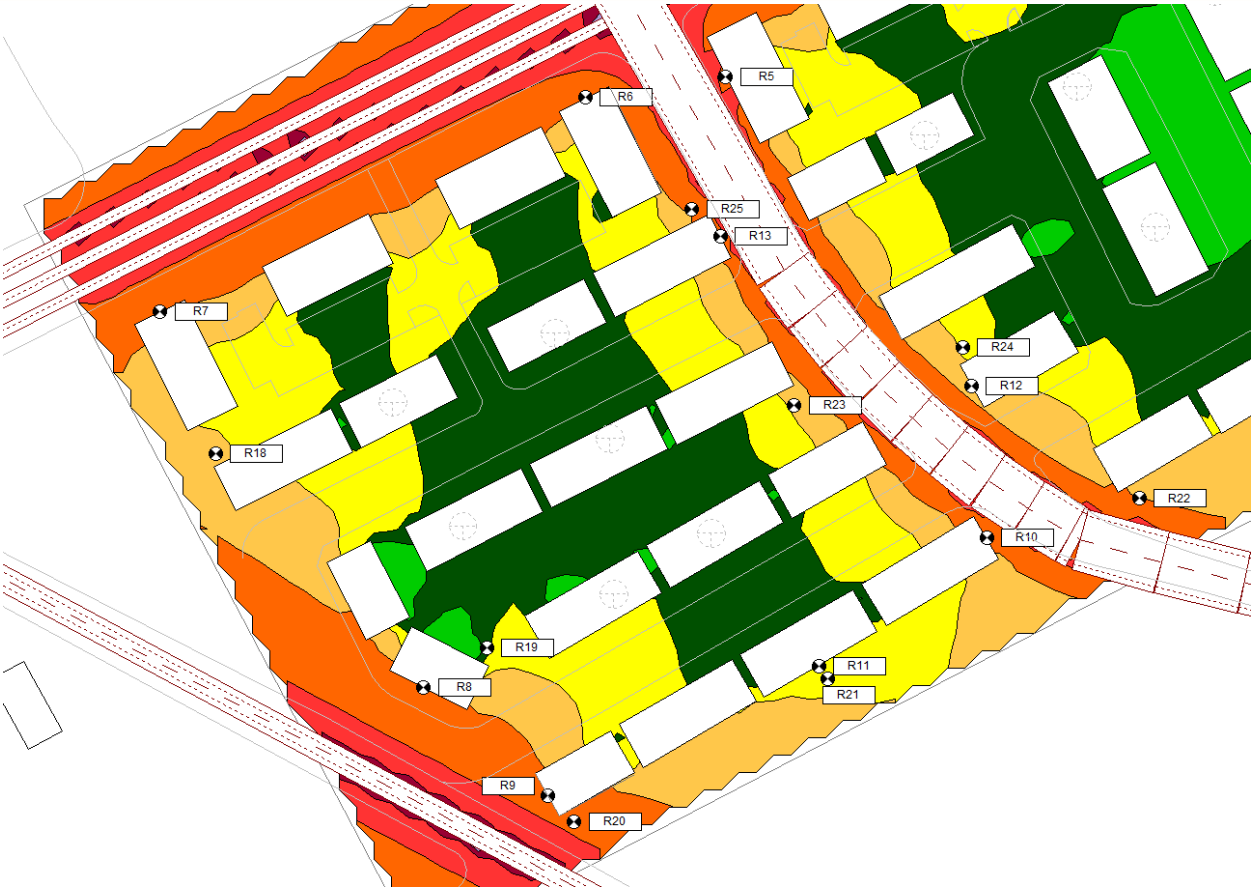
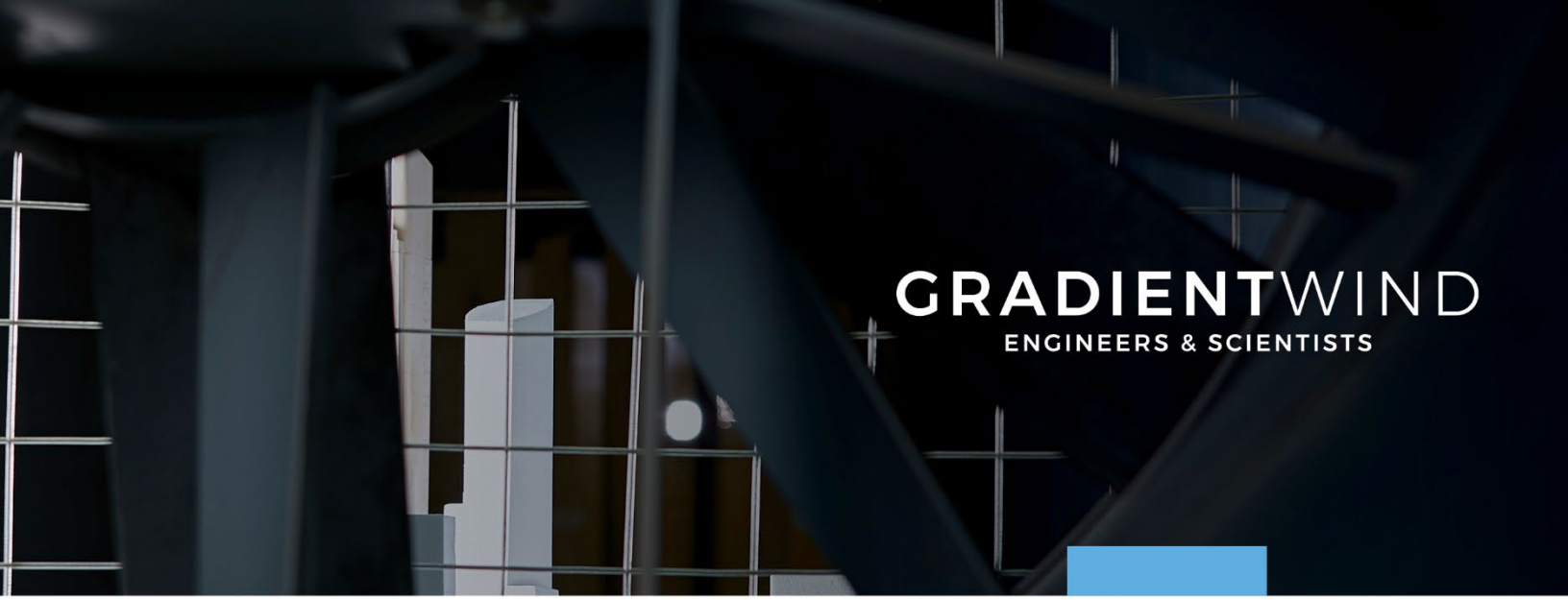
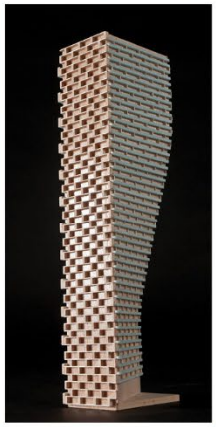


FIGURE 9: DAYTIME HORIZONTAL TRANSPORTATION NOISE CONTOURS WEST SIDE (4 METERS ABOVE GRADE)

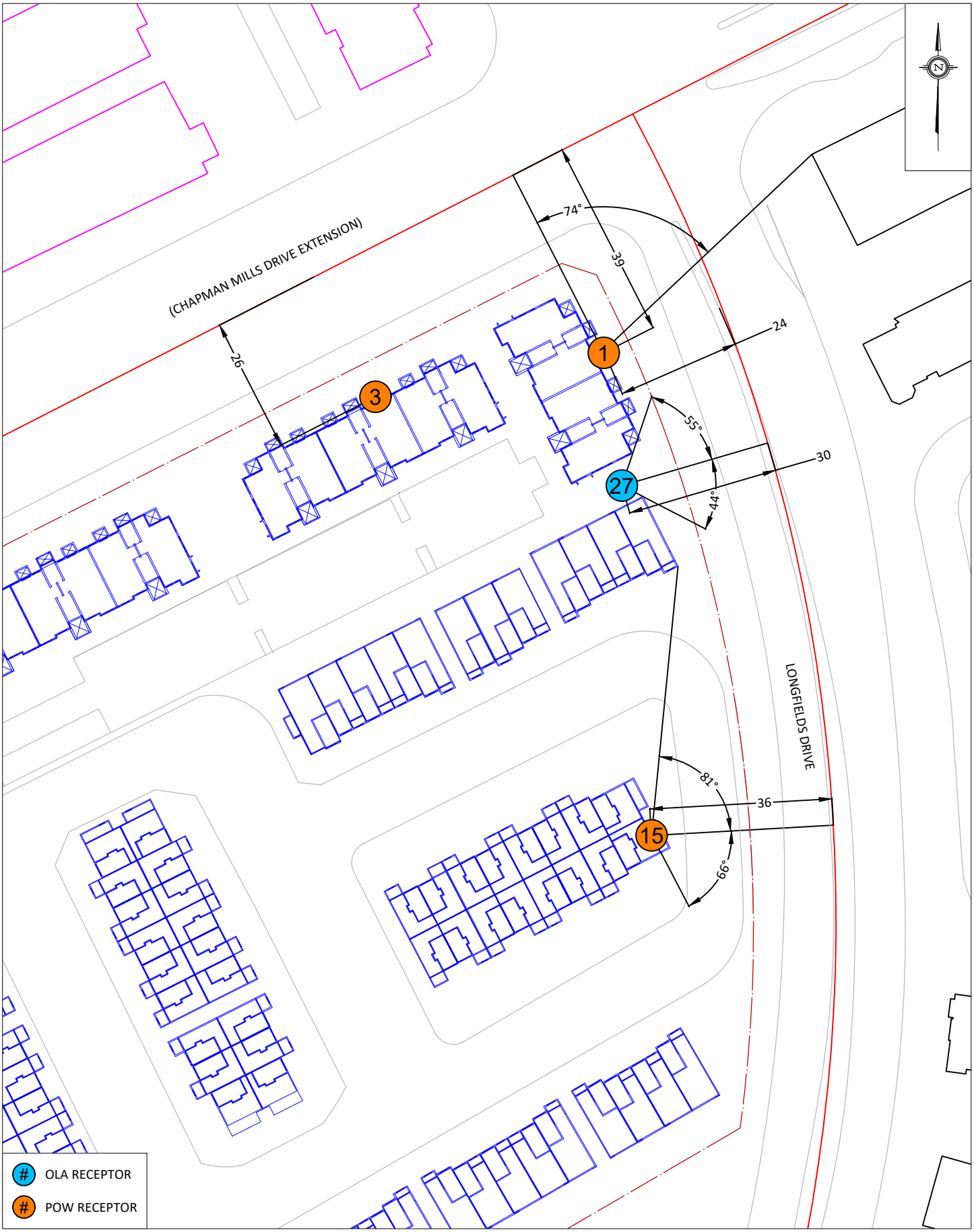




APPENDIX A

STAMSON 5.04 – INPUT AND OUTPUT DATA

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



GRADIENTWIND
ENGINEERS & SCIENTISTS

127 WALGREEN ROAD, OTTAWA, ON
613 836 0934 • GRADIENTWIND.COM

PROJECT	3265 JOCKVALE ROAD, OTTAWA TRANSPORTATION NOISE FEASIBILITY ASSESSMENT		
SCALE	1:1000 (APPROX.)	DRAWING NO.	25-187-ANV-A1
DATE	AUGUST 10, 2026	DRAWN BY	M.P.

DESCRIPTION

FIGURE A1:
STAMSON PARAMETERS
FOR PARAMETERS R1,3,15,27

```
STAMSON 5.0        NORMAL REPORT        Date: 01-12-2025 14:30:51
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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


Road data, segment # 1: Longfields (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: Longfields (day/night)
--------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  24.00 / 24.00  m
Receiver height           :   9.00 / 9.00   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Road data, segment # 2: Chapman (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 # 2: Chapman (day/night)
-----------------------------------------
Angle1   Angle2           : -74.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  30.00 / 30.00  m
Receiver height           :   9.00 / 9.00   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

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

Source height = 1.50 m

ROAD (0.00 + 69.70 + 0.00) = 69.70 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.44  73.68   0.00  -2.93  -1.05   0.00   0.00   0.00  69.70
-------------------------------------------------------------------------------

Segment Leq : 69.70 dBA

Results segment # 2: Chapman (day)
----------------------------------

Source height = 1.50 m

ROAD (0.00 + 58.72 + 0.00) = 58.72 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -74      0   0.44  67.51   0.00  -4.32  -4.47   0.00   0.00   0.00  58.72
-------------------------------------------------------------------------------

Segment Leq : 58.72 dBA

Total Leq All Segments: 70.03 dBA

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

Source height = 1.50 m

ROAD (0.00 + 62.10 + 0.00) = 62.10 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.44  66.08   0.00  -2.93  -1.05   0.00   0.00   0.00  62.10
-------------------------------------------------------------------------------

Segment Leq : 62.10 dBA
```

```
Results segment # 2: Chapman (night)
-----------------------------------

Source height = 1.50 m

ROAD (0.00 + 51.12 + 0.00) = 51.12 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -74      0   0.44  59.91   0.00  -4.32  -4.47   0.00   0.00   0.00  51.12
-------------------------------------------------------------------------------

Segment Leq : 51.12 dBA

Total Leq All Segments: 62.43 dBA

RT/Custom data, segment # 1: Chap Bus (day/night)
-------------------------------------------------
1 - Bus:
Traffic volume    :   191/67    veh/TimePeriod
Speed             :    50 km/h

Data for Segment # 1: Chap Bus (day/night)
------------------------------------------
Angle1   Angle2           : -74.00 deg   0.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  24.00 / 24.00  m
Receiver height           :   9.00 / 9.00   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

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

Source height = 0.50 m

RT/Custom (0.00 + 47.03 + 0.00) = 47.03 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -74      0   0.47  54.54  -2.99  -4.51   0.00   0.00   0.00  47.03
-------------------------------------------------------------------------

Segment Leq : 47.03 dBA

Total Leq All Segments: 47.03 dBA
```

```
Results segment # 1: Chap Bus (night)
-------------------------------------

Source height = 0.50 m

RT/Custom (0.00 + 45.49 + 0.00) = 45.49 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -74      0   0.47  53.00  -2.99  -4.51   0.00   0.00   0.00  45.49
-------------------------------------------------------------------------

Segment Leq : 45.49 dBA

Total Leq All Segments: 45.49 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 70.06
                           (NIGHT): 62.52
```

STAMSON 5.0 NORMAL REPORT Date: 01-12-2025 16:18:57
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

```
Road data, segment # 1: Chapman (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: Chapman (day/night)
-----------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  26.00 / 26.00  m
Receiver height           :   9.00 / 9.00   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

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

Source height = 1.50 m

ROAD (0.00 + 63.03 + 0.00) = 63.03 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.44  67.51   0.00  -3.43  -1.05   0.00   0.00   0.00  63.03
-------------------------------------------------------------------------------

Segment Leq : 63.03 dBA

Total Leq All Segments: 63.03 dBA
```

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

Source height = 1.50 m

ROAD (0.00 + 55.43 + 0.00) = 55.43 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.44  59.91   0.00  -3.43  -1.05   0.00   0.00   0.00  55.43
-------------------------------------------------------------------------------

Segment Leq : 55.43 dBA

Total Leq All Segments: 55.43 dBA

RT/Custom data, segment # 1: Chap Bus (day/night)
------------------------------------------------
1 - Bus:
Traffic volume    :   191/67    veh/TimePeriod
Speed             :    50 km/h

Data for Segment # 1: Chap Bus (day/night)
-----------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  26.00 / 26.00  m
Receiver height           :   9.00 / 9.00   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

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

Source height = 0.50 m

RT/Custom (0.00 + 49.93 + 0.00) = 49.93 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90     90   0.47  54.54  -3.50  -1.11   0.00   0.00   0.00  49.93
-------------------------------------------------------------------------

Segment Leq : 49.93 dBA

Total Leq All Segments: 49.93 dBA
```

```
Results segment # 1: Chap Bus (night)
-------------------------------------

Source height = 0.50 m

RT/Custom (0.00 + 48.39 + 0.00) = 48.39 dBA
Angle1 Angle2  Alpha RefLeq  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------
   -90     90   0.47  53.00  -3.50  -1.11   0.00   0.00   0.00  48.39
-------------------------------------------------------------------------

Segment Leq : 48.39 dBA

Total Leq All Segments: 48.39 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 63.24
                           (NIGHT): 56.21
```

STAMSON 5.0 NORMAL REPORT Date: 10-08-2026 10:38:18
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r15.te Time Period: Day/Night 16/8 hours
Description:

```
Road data, segment # 1: Longfields (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: Longfields (day/night)
---------------------------------------------
Angle1   Angle2           : -66.00 deg   81.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  36.00 / 36.00  m
Receiver height           :   7.50 / 7.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

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

Source height = 1.50 m

ROAD (0.00 + 66.48 + 0.00) = 66.48 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -66     81   0.48  73.68   0.00  -5.63  -1.57   0.00   0.00   0.00  66.48
-------------------------------------------------------------------------------

Segment Leq : 66.48 dBA

Total Leq All Segments: 66.48 dBA
```

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

Source height = 1.50 m

ROAD (0.00 + 58.88 + 0.00) = 58.88 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -66     81   0.48  66.08   0.00  -5.63  -1.57   0.00   0.00   0.00  58.88
-------------------------------------------------------------------------------

Segment Leq : 58.88 dBA

Total Leq All Segments: 58.88 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 66.48
                           (NIGHT): 58.88
```

STAMSON 5.0 NORMAL REPORT Date: 10-08-2026 10:35:46
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r27.te Time Period: Day/Night 16/8 hours
Description:

```
Road data, segment # 1: Longfields (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: Longfields (day/night)
---------------------------------------------
Angle1   Angle2           : -44.00 deg   55.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  30.00 / 30.00  m
Receiver height           :   1.50 / 1.50   m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

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

Source height = 1.50 m

ROAD (0.00 + 65.69 + 0.00) = 65.69 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -44     55   0.66  73.68   0.00  -5.00  -2.98   0.00   0.00   0.00  65.69
-------------------------------------------------------------------------------

Segment Leq : 65.69 dBA

Total Leq All Segments: 65.69 dBA
```

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

Source height = 1.50 m

ROAD (0.00 + 58.10 + 0.00) = 58.10 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -44     55   0.66  66.08   0.00  -5.00  -2.98   0.00   0.00   0.00  58.10
-------------------------------------------------------------------------------

Segment Leq : 58.10 dBA

Total Leq All Segments: 58.10 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 65.69
                           (NIGHT): 58.10
```