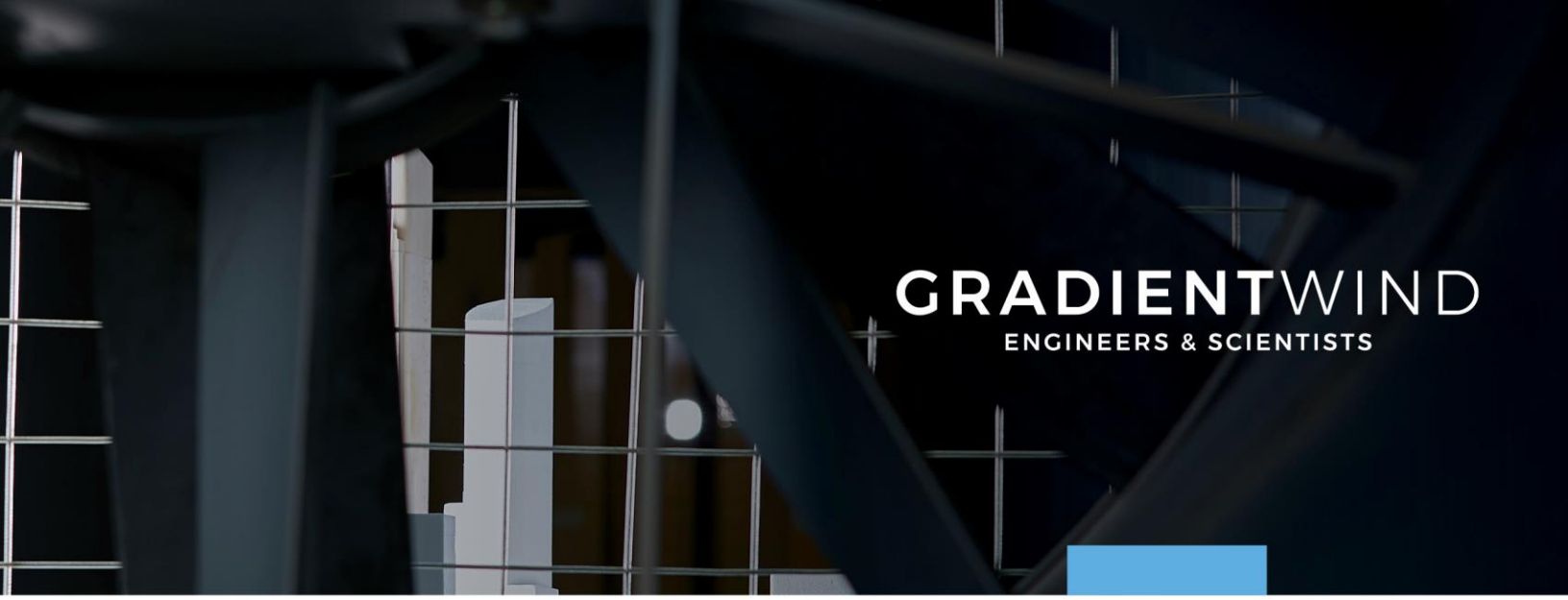
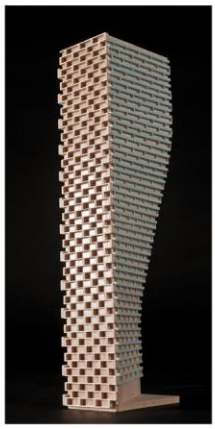


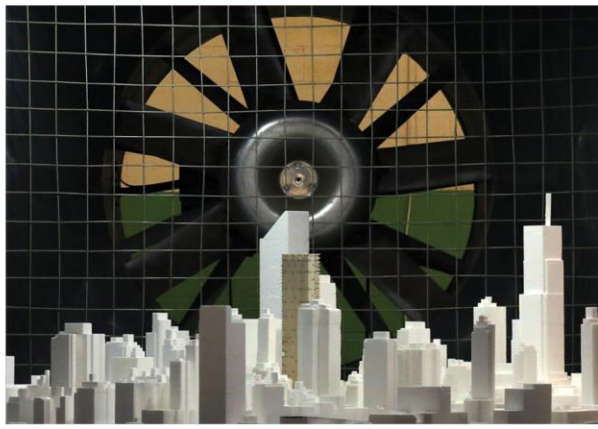
GRADIENTWIND
ENGINEERS & SCIENTISTS

ROADWAY TRAFFIC NOISE ASSESSMENT

424 Churchill Avenue North
Ottawa, Ontario

Report: 22-162–Traffic Noise





September 20, 2022

PREPARED FOR
GSI Properties
145 Select Avenue, Unit 5
Toronto, ON M1V 5M8

PREPARED BY
Efser Kara, MSc, LEED GA, Acoustic Scientist
Joshua Foster, P.Eng., Lead Engineer

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

EXECUTIVE SUMMARY

This report describes a traffic noise assessment undertaken for a proposed development located at 424 Churchill Avenue in Ottawa, Ontario. The study site is situated on the east side of a parcel of land bounded by Danforth Avenue to the north, Churchill Avenue North to the east, Byron Avenue to the south, and Roosevelt Avenue to the west.

The results of the analysis indicated that noise levels at Plane of Window (POW) receptors will range between 68 and 63 dBA during the daytime period (07:00-23:00) and between 61 and 55 dBA during the nighttime period (23:00-07:00). The highest noise level (68 and 67 dBA) occurs at the east and south façades of the study building which are nearest and most exposed to Churchill and Byron Avenues.

Upgraded building components will be required where noise levels exceed 65 dBA as illustrated in Figure 4. Building components compliant with the Ontario Building Code (OBC 2020) will be sufficient for the remaining dwellings of the development. In addition, a Type D Warning Clause will be required in all Lease, Purchase and Sale Agreements, as summarized in Section 6.

As the OLA receptor 7 located at the Level B1 Amenity Terrace is above the ENCG criteria, a 1.5-metre high noise barrier will be required to reduce the noise level below 60 dBA. The noise barrier for the terrace can be built as a solid glass railing, however, it shouldn't contain gaps (see Figure 5). As a general rule., noise barriers should be built with solid elements having a minimum surface mass of 20 kg/m² and should contain no gaps. In addition, a Type B Warning Clause will be required in all Lease, Purchase and Sale Agreements, as summarized in Section 6.

Gradient Wind conducted a survey of the study site, using the satellite view of the area; the study site is surrounded by a mix of low-rise residential and commercial buildings. The existing stationary noise sources are either small or the direct line of sight between them and the study site is blocked. Therefore, no significant stationary noise impact on the proposed development is anticipated.

With regards to the impacts of the proposed building on the surroundings and itself, by careful placing and judicious selection of noise-generating equipment like cooling towers, chillers, and generators, stationary noise impact from the proposed building can comply with the sound level limits defined in NPC-300. Where necessary, noise screens, silencers, and other noise control measures can be added.

TABLE OF CONTENTS

1. INTRODUCTION

Gradient Wind Engineering Inc. (Gradient Wind) was retained by GSI Properties to undertake a roadway traffic noise assessment for a proposed subdivision development located at 424 Churchill Avenue 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.

Our work is based on theoretical noise calculation methods conforming to the City of Ottawa[1] and Ministry of the Environment, Conservation and Parks (MECP)[2] guidelines. Noise calculations were based on site plans provided by Open Plan Architects Inc., dated August 2022, with future traffic volumes corresponding to the City of Ottawa's Official Plan (OP) roadway classifications and theoretical capacities.

2. TERMS OF REFERENCE

The focus of this traffic noise assessment is a proposed development located at 424 Churchill Avenue in Ottawa, Ontario; situated on the east side of a parcel of land bounded by Danforth Avenue to the north, Churchill Avenue North to the east, Byron Avenue to the south, and Roosevelt Avenue to the west. The noted parcel of land slopes from the southeast downwards towards the northwest side of the subject site. The proposed development comprises a near trapezoidal seven-storey residential building.

ARCHITECTURAL RENDERING, SOUTHEAST PERSPECTIVE (COURTESY OF OPEN PLAN ARCHITECTS INC.)

The proposed development is served by three basement levels: levels B3, B2, and B1. Levels B3 and B2 are reserved for parking spaces and shared building support spaces. Level B1 includes bike storage to the west, an indoor amenity at the northwest corner, an elevator core and mechanical space to the north, a fitness room at the northeast corner, and a storage room to the south. This level is also served by an

[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

amenity terrace along the west side. Owing to the topography of the subject site, Level B2 includes entrances fronting Danforth Avenue. The ground level of the proposed development includes the main entrance and shared building support spaces to the south, a staircase at the southwest corner, a main entrance and staircase to the east, and residential units throughout the remainder of the level. Balconies are situated to the north and at the northeast corner at this level. Levels 2-7 are reserved for residential use and include balconies to the north, at the northeast corner, to the south, and at the southwest corner on each level.

ENCG considers balconies and elevated terraces (e.g., rooftops), with a minimum depth of 4 metres, as outdoor living areas (OLA). Therefore, the Level B1 amenity terrace was included in this study, the balconies were not included.

The surroundings of the study site include a mix of low-rise residential and commercial buildings in all directions with a church to the north-northwest, a mid-rise commercial building to the northeast, and a church, school, and rows of townhouses to the south. Notably, a six-storey mixed-use residential building has been approved for SPA at 433-435 Churchill Avenue, approximately 55 m to the southeast of the subject site. In addition, a nine-storey mixed-use residential building is proposed (awaiting SPA approval) at 319 Richmond Road, approximately 130 m to the north of the subject site, and a three-storey mixed-use residential building is proposed (awaiting SPA approval) at 349 Danforth Avenue, to the immediate northwest of the subject site.

The primary sources of roadway traffic noise impacting the study site are Richmond Road, Churchill Avenue, and Byron Avenue. Figure 1 illustrates the study site with the surrounding context.

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 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)[3]

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). When noise levels exceed 55 dBA but are less than 60 dBA, mitigation should be provided to reduce noise levels where technically and administratively feasible to acceptable levels at or below the criterion. Where noise levels exceed 60 dBA noise mitigation is required. If these measures are not provided, prospective purchasers or tenants should be informed of potential noise problems by a warning clause.

[3] Adapted from ENCG 2016 – Tables 2.2b and 2.2c
[4] Burberry, P.B. (2014). Mitchell's Environment and Services. Routledge, Page 125
[5] MECP, Environmental Noise Guidelines, NPC 300 – Part C, Section 7.8
[6] MECP, Environmental Noise Guidelines, NPC 300 – Part C, Section 7.1.3

4.2.2 Theoretical Roadway Noise Predictions

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

Roadway traffic noise calculations were performed by treating each roadway segment as separate line sources of noise. In addition to the traffic volumes summarized in Table 2, theoretical noise predictions were based on the following parameters:

- Truck traffic on all roadways was taken to comprise 5% heavy trucks and 7% medium trucks, as per ENCG requirements for noise level predictions.
- The day/night split for all streets was taken to be 92%/8%, respectively.
- Ground surfaces were taken to be reflective due to the presence of hard ground (pavement and concrete).
- Richmond Road was taken to be 7 metres below the grade level of the study site.
- Noise receptors were strategically placed at 7 locations around the study area (see Figure 2).
- Receptor heights were taken to be 21.88 metres at the centre of the highest level window, based on ENCG recommendations.
- The OLA receptor at the Level B1 amenity terrace was positioned at 2.28 metres above ground??
- Receptor locations are illustrated in Figure 2 and distances and exposure angles are illustrated in Figure 3.

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[7] 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.

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

TABLE 2: ROADWAY TRAFFIC DATA

Segment	Roadway Traffic Data	Speed Limit (km/hr)	Traffic Volumes
Richmond Road	2-Lane Urban Arterial (2-UAU)	50	15,000
Churchill Avenue	2-Lane Major Collector (2-UMCU)	50	12,000
Byron Avenue	2-Lane Urban Collector (2-UCU)	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 (2020) 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[8] 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 vary according to the intended use of a space

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

Based on published research[9], 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).

5. RESULTS

5.1 Roadway Traffic Noise Levels

The results of the roadway traffic noise calculations are summarized in Table 3 below. The results of the analysis indicated that noise levels at Plane of Window (POW) receptors will range between 68 and 63 dBA during the daytime period (07:00-23:00) and between 61 and 55 dBA during the nighttime period (23:00-07:00). The highest noise level (68 and 67 dBA) occurs at the east and south façades of the study building which are nearest and most exposed to Churchill and Byron Avenues.

TABLE 3: EXTERIOR NOISE LEVELS DUE TO ROADWAY TRAFFIC

Receptor ID	Receptor Type / Location	Receptor Height (m)	STAMSON Noise Level (dBA)	
			Day	Night
R1	POW / North Façade	21.88	63	55
R2	POW / North Façade	21.88	65	57
R3	POW / East Façade	21.88	68	61
R4	POW / South Façade	21.88	68	60
R5	POW / South Façade	21.88	67	59
R6	POW / West Façade	21.88	63	55
R7	OLA / Level B1 Amenity Terrace	2.28	64	N/A*

* Outdoor Living Areas (OLA) during the nighttime are not considered as per the ENCG

[9] CMHC, Road & Rail Noise: Effects on Housing

The noise level at the OLA receptor 7 located at the Level B1 Amenity Terrace is higher than 60 dBA, therefore a barrier study was conducted to reduce the noise level below 60 dBA.

5.2 Noise Control Measures

The noise levels predicted due to roadway traffic exceed the criteria listed in Section 4.2 for building components. As discussed in Section 4.2.1, the anticipated STC requirements for windows and walls have been estimated based on the overall noise reduction required for each intended use of space (STC = Outdoor Noise Level – Targeted Indoor Noise Levels). The STC requirements for the windows are summarized below for various units within the development (see Figure 5):

- **Bedroom Windows**
  - (i) Bedroom windows facing east and south will require a minimum STC of 31
  - (ii) All other bedroom windows are to satisfy Ontario Building Code (OBC 2020) requirements

- **Living Room Windows**
  - (i) Living room windows facing east and south will require a minimum STC of 26
  - (ii) All other living room windows are to satisfy Ontario Building Code (OBC 2020) requirements

- **Exterior Walls**
  - (i) Exterior wall components on the facades mentioned above will require a minimum STC of 45, which will be achieved with brick cladding or an acoustical equivalent according to NRC test data.[10]

Exterior wall components on these façades are recommended to have a minimum STC of 45, which is achievable with a wood frame exterior wall construction with resilient channel placed on the inside of the studs and using two layers of 16 mm gypsum board. Alternatively, a brick cladding could be used. A review of window supplier literature indicates that the specified STC ratings can be achieved by a variety of window systems that have a combination of glass thickness and inter-pane spacing. It is the responsibility of the manufacturer to ensure that the specified window achieves the required STC. This can only be

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

assured by using window configurations that have been certified by laboratory testing. The requirements for STC ratings assume that the remaining components of the building are constructed and installed according to the minimum standards of the Ontario Building Code. The specified STC requirements also apply to the swinging and/or sliding patio doors.

5.2.1 Noise Barrier Calculations

The noise level at the OLA receptor 7 located at the Level B1 Amenity Terrace is higher than 60 dBA, therefore a barrier investigation was conducted to reduce the noise level at or below 60 dBA.

The result of the analysis shows that a 1.5-metre high barrier will be sufficient for the Level B1 Amenity Terrace. The noise barrier for the terrace can be built as a solid glass railing, however, it shouldn't contain gaps. As a general rule., noise barriers should be built with solid elements having a minimum surface mass of 20 kg/m² and should contain no gaps.

In addition, a Type B warning clause will be required in all Lease, Purchase and Sale Agreements, as summarized in Section 6. Table 5 summarizes the results of the barrier.

TABLE 5: RESULTS OF NOISE BARRIER INVESTIGATION

Receptor ID	Above Grade Receptor Height (m)	Receptor Location	Barrier Height Above Walking Surface (m)	Daytime L_{eq} Noise Levels (dBA)	
				Without Barrier	With Barrier
R7	2.28 (Terrace surface + 1.5 m)	Level B1 Amenity Terrace	1.5	64	58

6. CONCLUSIONS AND RECOMMENDATIONS

The results of the analysis indicated that noise levels at Plane of Window (POW) receptors will range between 68 and 63 dBA during the daytime period (07:00-23:00) and between 61 and 55 dBA during the nighttime period (23:00-07:00). The highest noise level (68 and 67 dBA) occurs at the east and south façades of the study building which are nearest and most exposed to Churchill and Byron Avenues.

Upgraded building components will be required where noise levels exceed 65 dBA as illustrated in Figure 4. Building components compliant with the Ontario Building Code (OBC 2020) will be sufficient for the remaining dwellings of the development. In addition, a Type D warning clause will be required in all Lease, Purchase and Sale Agreements, as summarized below:

Type D

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

As the OLA receptor 7 located at the Level B1 Amenity Terrace is above the ENCG criteria, a 1.5-metre high noise barrier will be required to reduce the noise level below 60 dBA. The noise barrier for the terrace can be built as a solid glass railing, however, it shouldn't contain gaps (see Figure 5). As a general rule, noise barriers should be built with solid elements having a minimum surface mass of 20 kg/m² and should contain no gaps. In addition, a Type B warning clause will be required in all Lease, Purchase and Sale Agreements, as summarized below:

Type B

> *"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 road traffic (rail traffic) (air traffic) may on occasions 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."*

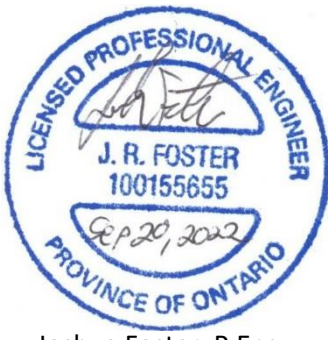
Gradient Wind conducted a survey of the study site, using the satellite view of the area; the study site is surrounded by a mix of low-rise residential and commercial buildings. The existing stationary noise sources are either small or the direct line of sight between them and the study site is blocked. Therefore, no significant stationary noise impact on the proposed development is anticipated.

With regards to the impacts of the proposed building on the surroundings and itself, by careful placing and judicious selection of noise-generating equipment like cooling towers, chillers, and generators, stationary noise impact from the proposed building can comply with the sound level limits defined in NPC-300. Where necessary, noise screens, silencers, and other noise control measures can be added.

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,

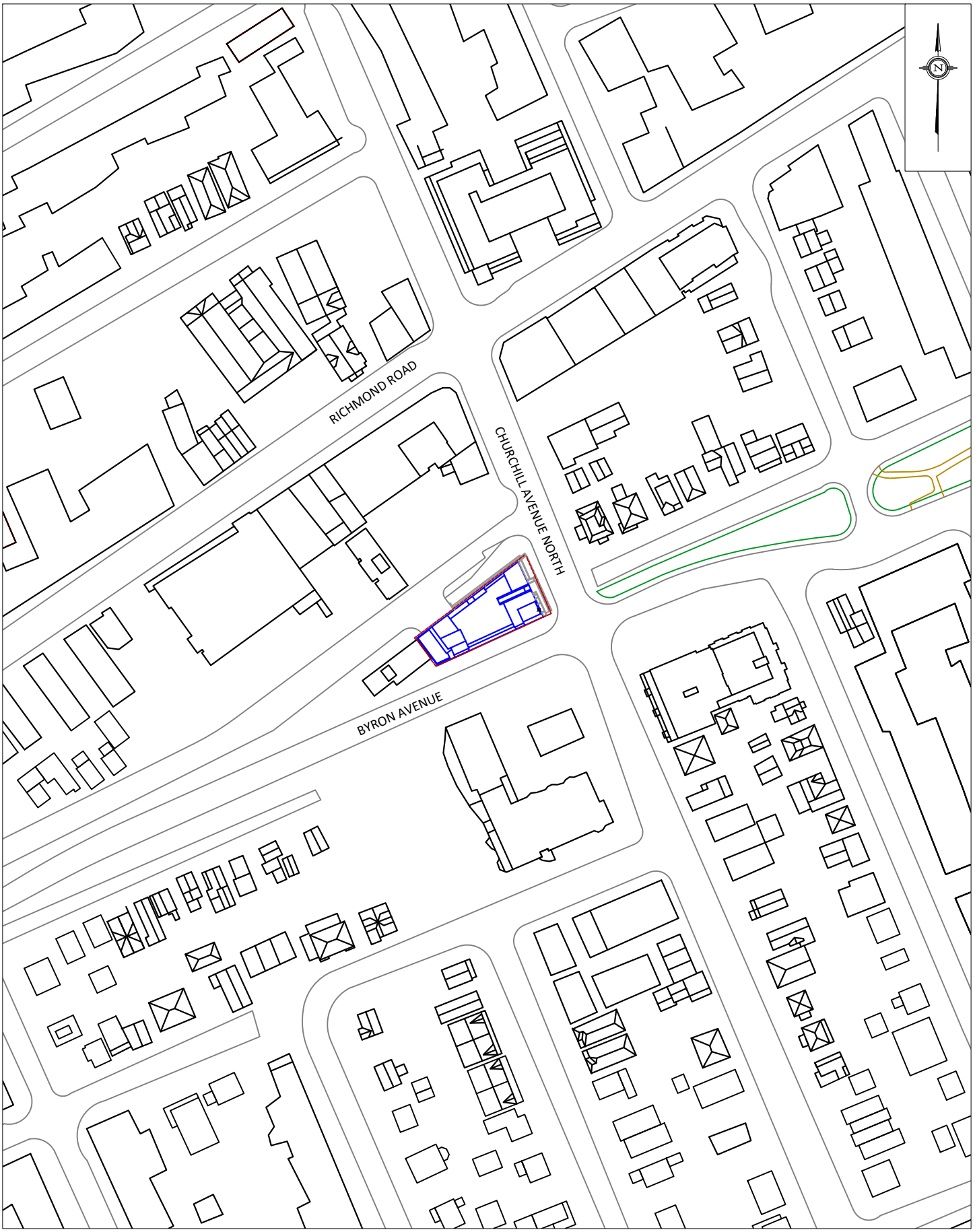
Gradient Wind Engineering Inc.



Efser Kara, MSc, LEED GA
Acoustic Scientist

Joshua Foster, P.Eng.
Lead Engineer

Gradient Wind File #22-162-Traffic Noise

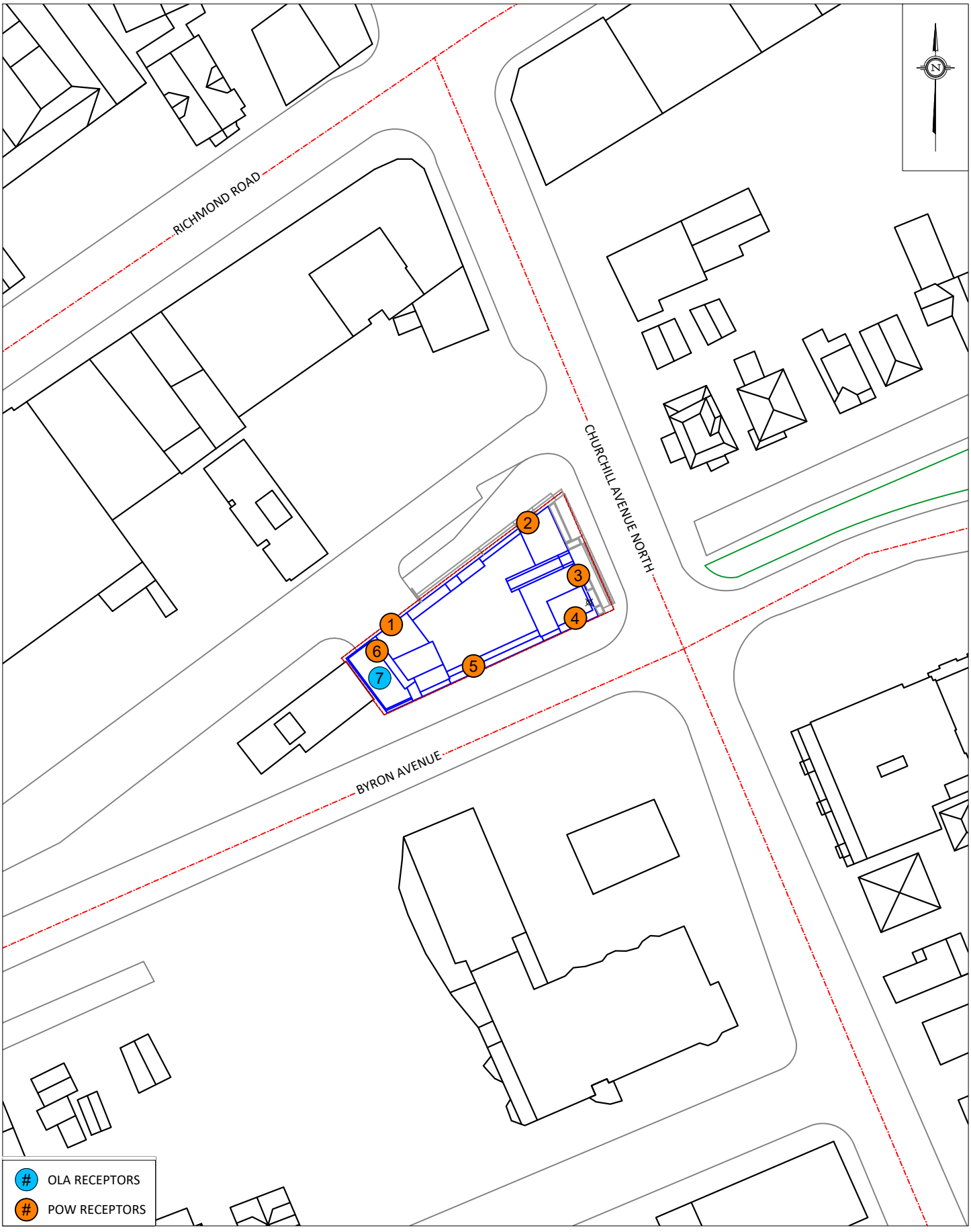


GRADIENTWIND
ENGINEERS & SCIENTISTS

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

PROJECT	424 CHURCHILL AVENUE, OTTAWA ROADWAY TRAFFIC NOISE ASSESSMENT		DESCRIPTION
SCALE	1:2000 (APPROX.)	DRAWING NO.	22-162- 1
DATE	SEPTEMBER 2, 2022	DRAWN BY	E.K.

FIGURE 1:
SITE PLAN AND SURROUNDING CONTEXT



GRADIENTWIND
ENGINEERS & SCIENTISTS

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

PROJECT	424 CHURCHILL AVENUE, OTTAWA ROADWAY TRAFFIC NOISE ASSESSMENT		DESCRIPTION
SCALE	1:1000 (APPROX.)	DRAWING NO.	22-162- 2
DATE	SEPTEMBER 2, 2022	DRAWN BY	E.K.

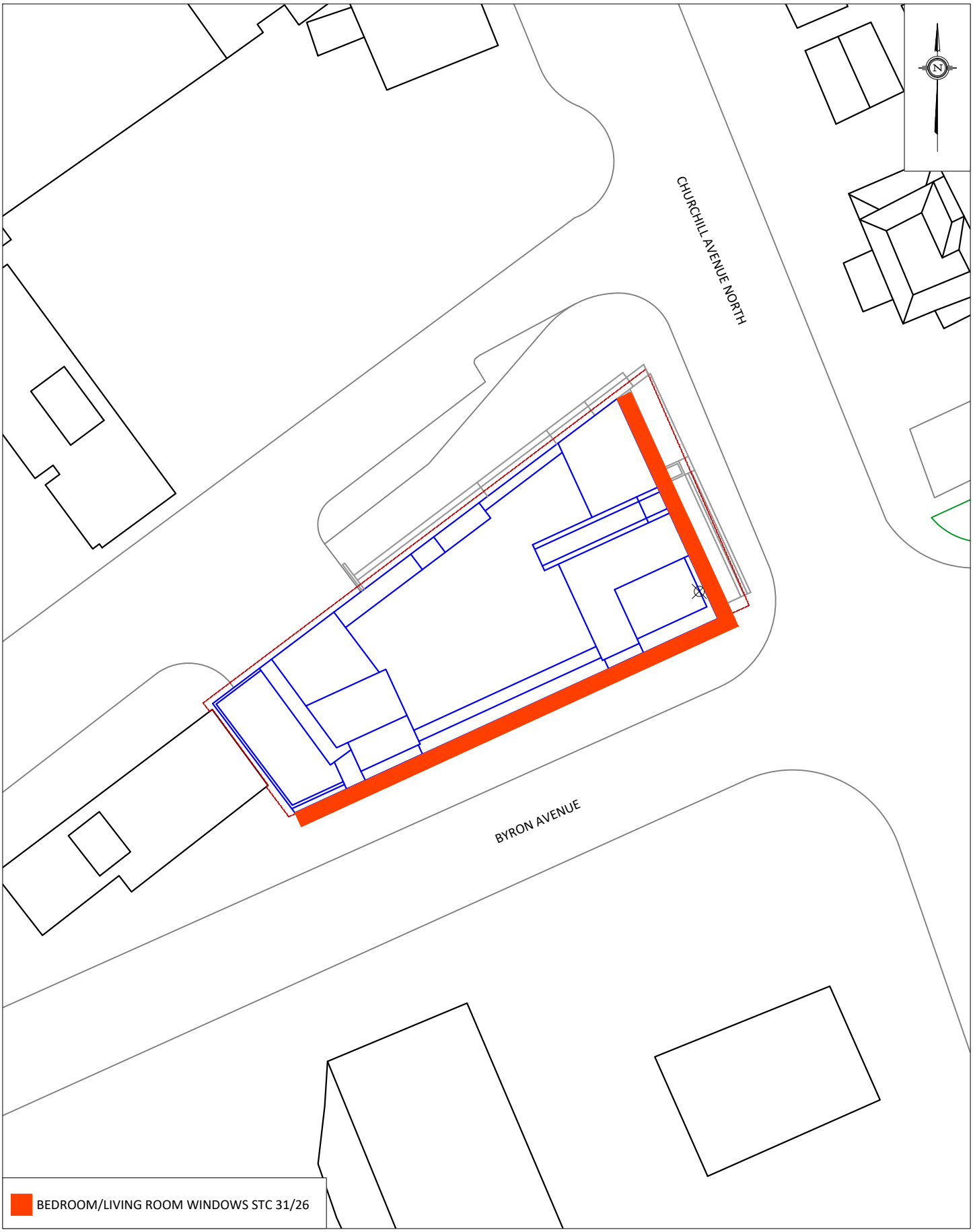
FIGURE 2:
RECEPTOR LOCATIONS

GRADIENTWIND
ENGINEERS & SCIENTISTS

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

PROJECT	424 CHURCHILL AVENUE, OTTAWA ROADWAY TRAFFIC NOISE ASSESSMENT		DESCRIPTION
SCALE	1:500 (APPROX.)	DRAWING NO.	22-162- 3
DATE	SEPTEMBER 2, 2022	DRAWN BY	E.K.

FIGURE 3:
STAMSON INPUT DATA

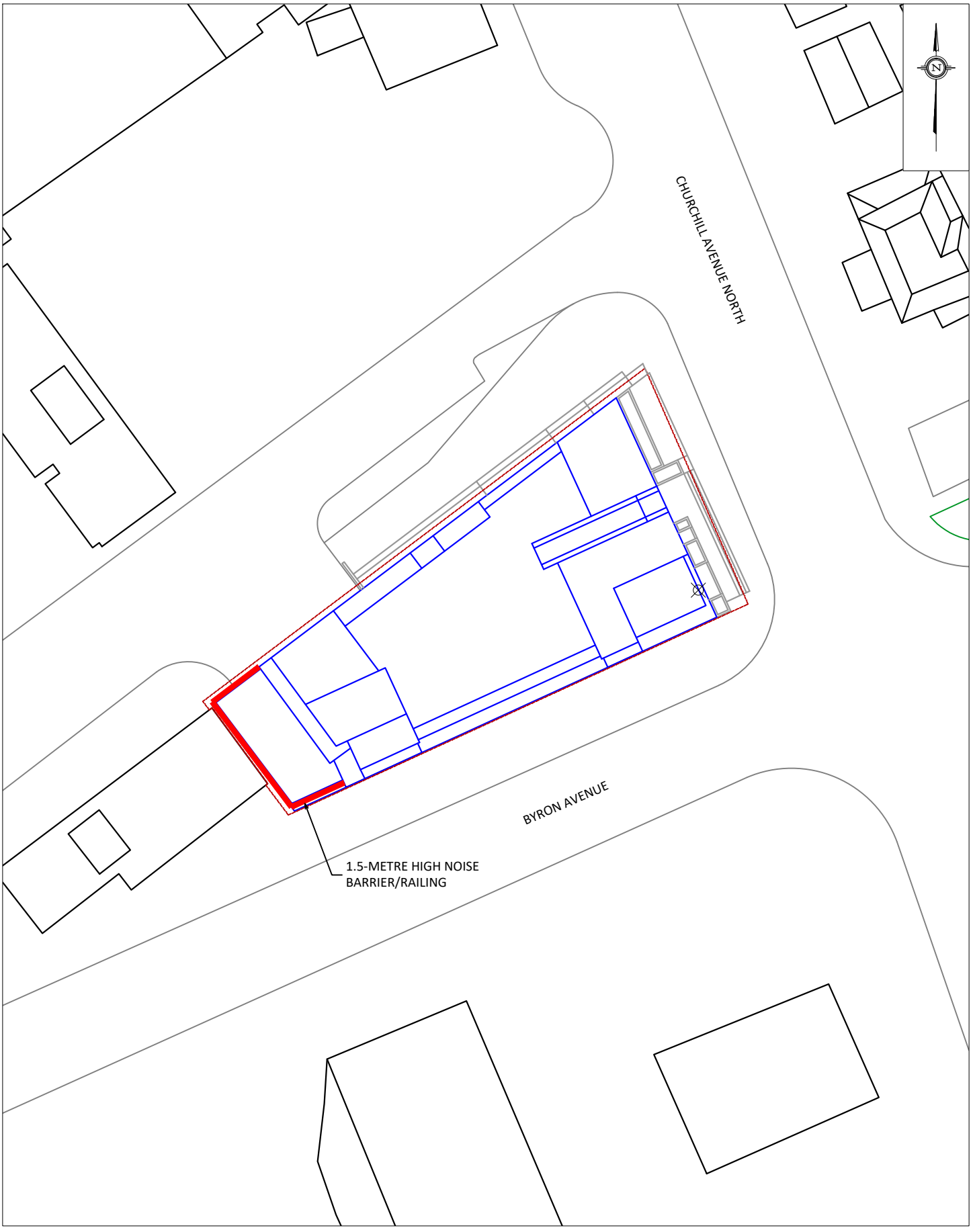


GRADIENTWIND
ENGINEERS & SCIENTISTS

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

PROJECT	424 CHURCHILL AVENUE, OTTAWA ROADWAY TRAFFIC NOISE ASSESSMENT		DESCRIPTION
SCALE	1:500 (APPROX.)	DRAWING NO.	22-162- 4
DATE	SEPTEMBER 2, 2022	DRAWN BY	E.K.

FIGURE 4:
STC REQUIREMENTS



GRADIENTWIND
ENGINEERS & SCIENTISTS

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

PROJECT	424 CHURCHILL AVENUE, OTTAWA ROADWAY TRAFFIC NOISE ASSESSMENT		DESCRIPTION
SCALE	1:500 (APPROX.)	DRAWING NO.	22-162- 5
DATE	SEPTEMBER 2, 2022	DRAWN BY	E.K.

FIGURE 5:
BARRIER LOCATION

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: 06-09-2022 15:25:39
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

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

Car traffic volume : 12144/1056 veh/TimePeriod *
Medium truck volume : 966/84 veh/TimePeriod *
Heavy truck volume : 690/60 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): 15000
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: Richmond Rd (day/night)

Angle1 Angle2 : -90.00 deg 87.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 88.00 / 88.00 m
Receiver height : 21.88 / 21.88 m
Topography : 4 (Elevated; with barrier)
Barrier angle1 : -90.00 deg Angle2 : 87.00 deg
Barrier height : 0.00 m
Elevation : 0.00 m
Barrier receiver distance : 10.00 / 10.00 m
Source elevation : -7.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

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

Angle1 Angle2 : -90.00 deg -14.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 51.00 / 51.00 m
Receiver height : 21.88 / 21.88 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Richmond Rd (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 ! 21.88 ! 18.77 ! 18.77

ROAD (0.00 + 60.72 + 0.00) = 60.72 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 87 0.00 68.48 0.00 -7.68 -0.07 0.00 0.00 -0.00 60.72*
-90 87 0.00 68.48 0.00 -7.68 -0.07 0.00 0.00 0.00 60.72
---

* Bright Zone !

Segment Leq : 60.72 dBA

Results segment # 2: Chuchill Ave (day)

Source height = 1.50 m

ROAD (0.00 + 58.45 + 0.00) = 58.45 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 -14 0.00 67.51 0.00 -5.31 -3.74 0.00 0.00 0.00 58.45

Segment Leq : 58.45 dBA

Total Leq All Segments: 62.74 dBA

Results segment # 1: Richmond Rd (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 ! 21.88 ! 18.77 ! 18.77

ROAD (0.00 + 53.13 + 0.00) = 53.13 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 87 0.00 60.88 0.00 -7.68 -0.07 0.00 0.00 -0.00 53.12*
-90 87 0.00 60.88 0.00 -7.68 -0.07 0.00 0.00 0.00 53.13
---

* Bright Zone !

Segment Leq : 53.13 dBA

Results segment # 2: Chuchill Ave (night)

Source height = 1.50 m

ROAD (0.00 + 50.85 + 0.00) = 50.85 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 -14 0.00 59.91 0.00 -5.31 -3.74 0.00 0.00 0.00 50.85

Segment Leq : 50.85 dBA

Total Leq All Segments: 55.15 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 62.74
(NIGHT): 55.15

STAMSON 5.0 NORMAL REPORT Date: 06-09-2022 15:39:53
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

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

Car traffic volume : 12144/1056 veh/TimePeriod *
Medium truck volume : 966/84 veh/TimePeriod *
Heavy truck volume : 690/60 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): 15000
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: Richmond Rd (day/night)

Angle1 Angle2 : -90.00 deg 87.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 86.00 / 86.00 m
Receiver height : 21.88 / 21.88 m
Topography : 4 (Elevated; with barrier)
Barrier angle1 : -90.00 deg Angle2 : 87.00 deg
Barrier height : 0.00 m
Elevation : 0.00 m
Barrier receiver distance : 10.00 / 10.00 m
Source elevation : -7.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

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

Angle1 Angle2 : -90.00 deg -14.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 19.00 / 19.00 m
Receiver height : 21.88 / 21.88 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Richmond Rd (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 ! 21.88 ! 18.70 ! 18.70

ROAD (0.00 + 60.82 + 0.00) = 60.82 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 87 0.00 68.48 0.00 -7.58 -0.07 0.00 0.00 -0.00 60.82*
-90 87 0.00 68.48 0.00 -7.58 -0.07 0.00 0.00 0.00 60.82
---

* Bright Zone !

Segment Leq : 60.82 dBA

Results segment # 2: Chuchill Ave (day)

Source height = 1.50 m

ROAD (0.00 + 62.74 + 0.00) = 62.74 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 -14 0.00 67.51 0.00 -1.03 -3.74 0.00 0.00 0.00 62.74

Segment Leq : 62.74 dBA

Total Leq All Segments: 64.90 dBA

Results segment # 1: Richmond Rd (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 ! 21.88 ! 18.70 ! 18.70

ROAD (0.00 + 53.23 + 0.00) = 53.23 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 87 0.00 60.88 0.00 -7.58 -0.07 0.00 0.00 -0.00 53.22*
-90 87 0.00 60.88 0.00 -7.58 -0.07 0.00 0.00 0.00 53.23
---

* Bright Zone !

Segment Leq : 53.23 dBA

Results segment # 2: Chuchill Ave (night)

Source height = 1.50 m

ROAD (0.00 + 55.14 + 0.00) = 55.14 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 -14 0.00 59.91 0.00 -1.03 -3.74 0.00 0.00 0.00 55.14

Segment Leq : 55.14 dBA

Total Leq All Segments: 57.30 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 64.90
(NIGHT): 57.30

STAMSON 5.0 NORMAL REPORT Date: 06-09-2022 15:55:03
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

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

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 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): 8000
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: Byron Avenue (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 : 22.00 / 22.00 m
Receiver height : 21.88 / 21.88 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

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

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 15.00 / 15.00 m
Receiver height : 21.88 / 21.88 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Byron Avenue (day)

Source height = 1.50 m

ROAD (0.00 + 61.08 + 0.00) = 61.08 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.00	65.75	0.00	-1.66	-3.01	0.00	0.00	0.00	61.08

Segment Leq : 61.08 dBA

Results segment # 2: Chuchill Ave (day)

Source height = 1.50 m

ROAD (0.00 + 67.51 + 0.00) = 67.51 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	67.51	0.00	0.00	0.00	0.00	0.00	0.00	67.51

Segment Leq : 67.51 dBA

Total Leq All Segments: 68.40 dBA

Results segment # 1: Byron Avenue (night)

Source height = 1.50 m

ROAD (0.00 + 53.48 + 0.00) = 53.48 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.00	58.16	0.00	-1.66	-3.01	0.00	0.00	0.00	53.48

Segment Leq : 53.48 dBA

Results segment # 2: Chuchill Ave (night)

Source height = 1.50 m

ROAD (0.00 + 59.91 + 0.00) = 59.91 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	59.91	0.00	0.00	0.00	0.00	0.00	0.00	59.91

Segment Leq : 59.91 dBA

Total Leq All Segments: 60.80 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 68.40
(NIGHT): 60.80

STAMSON 5.0 NORMAL REPORT Date: 06-09-2022 15:56:26
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

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

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 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): 8000
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: Byron Avenue (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 15.00 / 15.00 m
Receiver height : 21.88 / 21.88 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: Chuchill Ave (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: Chuchill Ave (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 : 17.00 / 17.00 m
Receiver height : 21.88 / 21.88 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Byron Avenue (day)

Source height = 1.50 m

ROAD (0.00 + 65.75 + 0.00) = 65.75 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	65.75	0.00	0.00	0.00	0.00	0.00	0.00	65.75

Segment Leq : 65.75 dBA

Results segment # 2: Chuchill Ave (day)

Source height = 1.50 m

ROAD (0.00 + 63.96 + 0.00) = 63.96 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	-0.54	-3.01	0.00	0.00	0.00	63.96

Segment Leq : 63.96 dBA

Total Leq All Segments: 67.96 dBA

Results segment # 1: Byron Avenue (night)

Source height = 1.50 m

ROAD (0.00 + 58.16 + 0.00) = 58.16 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	58.16	0.00	0.00	0.00	0.00	0.00	0.00	58.16

Segment Leq : 58.16 dBA

Results segment # 2: Chuchill Ave (night)

Source height = 1.50 m

ROAD (0.00 + 56.36 + 0.00) = 56.36 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	-0.54	-3.01	0.00	0.00	0.00	56.36

Segment Leq : 56.36 dBA

Total Leq All Segments: 60.36 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 67.96
(NIGHT): 60.36

STAMSON 5.0 NORMAL REPORT Date: 06-09-2022 15:57:25
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

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

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 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): 8000
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: Byron Avenue (day/night)

Angle1 Angle2 : -90.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 15.00 / 15.00 m
Receiver height : 21.88 / 21.88 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: Chuchill Ave (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: Chuchill Ave (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 : 40.00 / 40.00 m
Receiver height : 21.88 / 21.88 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Byron Avenue (day)

Source height = 1.50 m

ROAD (0.00 + 65.75 + 0.00) = 65.75 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	65.75	0.00	0.00	0.00	0.00	0.00	0.00	65.75

Segment Leq : 65.75 dBA

Results segment # 2: Chuchill Ave (day)

Source height = 1.50 m

ROAD (0.00 + 60.24 + 0.00) = 60.24 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	-4.26	-3.01	0.00	0.00	0.00	60.24

Segment Leq : 60.24 dBA

Total Leq All Segments: 66.83 dBA

Results segment # 1: Byron Avenue (night)

Source height = 1.50 m

ROAD (0.00 + 58.16 + 0.00) = 58.16 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	58.16	0.00	0.00	0.00	0.00	0.00	0.00	58.16

Segment Leq : 58.16 dBA

Results segment # 2: Chuchill Ave (night)

Source height = 1.50 m

ROAD (0.00 + 52.64 + 0.00) = 52.64 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	-4.26	-3.01	0.00	0.00	0.00	52.64

Segment Leq : 52.64 dBA

Total Leq All Segments: 59.23 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 66.83
(NIGHT): 59.23

STAMSON 5.0 NORMAL REPORT Date: 06-09-2022 16:00:26
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

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

Car traffic volume : 12144/1056 veh/TimePeriod *
Medium truck volume : 966/84 veh/TimePeriod *
Heavy truck volume : 690/60 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): 15000
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: Richmond Rd (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 : 90.00 / 90.00 m
Receiver height : 21.88 / 21.88 m
Topography : 4 (Elevated; with barrier)
Barrier angle1 : -90.00 deg Angle2 : 0.00 deg
Barrier height : 0.00 m
Elevation : 0.00 m
Barrier receiver distance : 10.00 / 10.00 m
Source elevation : -7.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

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

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 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): 8000
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: Byron Avenue (day/night)

Angle1 Angle2 : -13.00 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 : 21.88 / 21.88 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Results segment # 1: Richmond Rd (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 ! 21.88 ! 18.84 ! 18.84

ROAD (0.00 + 57.69 + 0.00) = 57.69 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 0 0.00 68.48 0.00 -7.78 -3.01 0.00 0.00 -0.01 57.68*
-90 0 0.00 68.48 0.00 -7.78 -3.01 0.00 0.00 0.00 57.69
---

* Bright Zone !

Segment Leq : 57.69 dBA

Results segment # 2: Byron Avenue (day)

Source height = 1.50 m

ROAD (0.00 + 61.28 + 0.00) = 61.28 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-13 90 0.00 65.75 0.00 -2.04 -2.42 0.00 0.00 0.00 61.28

Segment Leq : 61.28 dBA

Total Leq All Segments: 62.86 dBA

Results segment # 1: Richmond Rd (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 ! 21.88 ! 18.84 ! 18.84

ROAD (0.00 + 50.09 + 0.00) = 50.09 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 0 0.00 60.88 0.00 -7.78 -3.01 0.00 0.00 -0.01 50.08*
-90 0 0.00 60.88 0.00 -7.78 -3.01 0.00 0.00 0.00 50.09
---

* Bright Zone !

Segment Leq : 50.09 dBA

Results segment # 2: Byron Avenue (night)

Source height = 1.50 m

ROAD (0.00 + 53.69 + 0.00) = 53.69 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-13 90 0.00 58.16 0.00 -2.04 -2.42 0.00 0.00 0.00 53.69

Segment Leq : 53.69 dBA

Total Leq All Segments: 55.26 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 62.86
(NIGHT): 55.26

STAMSON 5.0 COMPREHENSIVE REPORT Date: 06-09-2022 16:27:54
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

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

Car traffic volume : 12144/1056 veh/TimePeriod *
Medium truck volume : 966/84 veh/TimePeriod *
Heavy truck volume : 690/60 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): 15000
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: Richmond Rd (day/night)

Angle1 Angle2 : -90.00 deg 19.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 95.00 / 95.00 m
Receiver height : 2.28 / 2.28 m
Topography : 4 (Elevated; with barrier)
Barrier angle1 : -90.00 deg Angle2 : 19.00 deg
Barrier height : 0.78 m
Elevation : 0.00 m
Barrier receiver distance : 7.00 / 7.00 m
Source elevation : -7.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

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

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 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): 8000
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: Byron Avenue (day/night)

Angle1 Angle2 : -32.00 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 : 2.28 / 2.28 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -32.00 deg Angle2 : 90.00 deg
Barrier height : 0.78 m
Barrier receiver distance : 6.00 / 6.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

Segment # 1: Richmond Rd (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 ! 2.28 ! 1.71 ! 1.71

ROAD (0.00 + 58.29 + 0.00) = 58.29 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 19 0.00 68.48 0.00 -8.02 -2.18 0.00 0.00 -1.55 56.74*
-90 19 0.00 68.48 0.00 -8.02 -2.18 0.00 0.00 0.00 58.29
---

* Bright Zone !

Segment Leq : 58.29 dBA

Segment # 2: Byron Avenue (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 ! 2.28 ! 2.08 ! 2.08

ROAD (0.00 + 62.02 + 0.00) = 62.02 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-32 90 0.00 65.75 0.00 -2.04 -1.69 0.00 0.00 -0.34 61.68*
-32 90 0.00 65.75 0.00 -2.04 -1.69 0.00 0.00 0.00 62.02
---

* Bright Zone !

Segment Leq : 62.02 dBA

Total Leq All Segments: 63.55 dBA

Segment # 1: Richmond Rd (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 ! 2.28 ! 1.71 ! 1.71

ROAD (0.00 + 50.69 + 0.00) = 50.69 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 19 0.00 60.88 0.00 -8.02 -2.18 0.00 0.00 -1.55 49.14*
-90 19 0.00 60.88 0.00 -8.02 -2.18 0.00 0.00 0.00 50.69
---

* Bright Zone !

Segment Leq : 50.69 dBA

Segment # 2: Byron Avenue (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 ! 2.28 ! 2.08 ! 2.08

ROAD (0.00 + 54.43 + 0.00) = 54.43 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-32	90	0.00	58.16	0.00	-2.04	-1.69	0.00	0.00	-0.34	54.09*
-32	90	0.00	58.16	0.00	-2.04	-1.69	0.00	0.00	0.00	54.43

* Bright Zone !

Segment Leq : 54.43 dBA

Total Leq All Segments: 55.96 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 63.55
(NIGHT): 55.96

STAMSON 5.0 COMPREHENSIVE REPORT Date: 06-09-2022 16:29:37
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r7b.te Time Period: Day/Night 16/8 hours
Description:

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

Car traffic volume : 12144/1056 veh/TimePeriod *
Medium truck volume : 966/84 veh/TimePeriod *
Heavy truck volume : 690/60 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): 15000
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: Richmond Rd (day/night)

Angle1 Angle2 : -90.00 deg 19.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 90.00 / 90.00 m
Receiver height : 2.28 / 2.28 m
Topography : 4 (Elevated; with barrier)
Barrier angle1 : -90.00 deg Angle2 : 19.00 deg
Barrier height : 2.28 m
Elevation : 0.00 m
Barrier receiver distance : 7.00 / 7.00 m
Source elevation : -7.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

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

Car traffic volume : 6477/563 veh/TimePeriod *
Medium truck volume : 515/45 veh/TimePeriod *
Heavy truck volume : 368/32 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): 8000
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: Byron Avenue (day/night)

Angle1 Angle2 : -32.00 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 : 2.28 / 2.28 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -32.00 deg Angle2 : 90.00 deg
Barrier height : 2.28 m
Barrier receiver distance : 6.00 / 6.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

Segment # 1: Richmond Rd (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 ! 2.28 ! 1.67 ! 1.67

ROAD (0.00 + 52.59 + 0.00) = 52.59 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 19 0.00 68.48 0.00 -7.78 -2.18 0.00 0.00 -5.93 52.59

Segment Leq : 52.59 dBA

Segment # 2: Byron Avenue (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 ! 2.28 ! 2.08 ! 2.08

ROAD (0.00 + 56.86 + 0.00) = 56.86 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-32 90 0.00 65.75 0.00 -2.04 -1.69 0.00 0.00 -5.16 56.86

Segment Leq : 56.86 dBA

Total Leq All Segments: 58.24 dBA

Segment # 1: Richmond Rd (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 ! 2.28 ! 1.67 ! 1.67

ROAD (0.00 + 44.99 + 0.00) = 44.99 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-90 19 0.00 60.88 0.00 -7.78 -2.18 0.00 0.00 -5.93 44.99

Segment Leq : 44.99 dBA

Segment # 2: Byron Avenue (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 ! 2.28 ! 2.08 ! 2.08

ROAD (0.00 + 49.27 + 0.00) = 49.27 dBA
Angle1 Angle2 Alpha RefLeq P.Adj D.Adj F.Adj W.Adj H.Adj B.Adj SubLeq
---
-32 90 0.00 58.16 0.00 -2.04 -1.69 0.00 0.00 -5.16 49.27

Segment Leq : 49.27 dBA

Total Leq All Segments: 50.65 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 58.24
(NIGHT): 50.65