

**ROADWAY TRAFFIC NOISE
DETAILED ASSESSMENT**

1186-1194 Wellington Street West
Ottawa, Ontario

REPORT: GW21-113-Traffic Noise Detailed



June 29, 2022

PREPARED FOR
Welldale Limited Partnership
200-180 Kent Street
Ottawa, Ontario K1P 0B6

PREPARED BY
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EXECUTIVE SUMMARY

This report describes a roadway traffic noise detailed assessment in support of a Site Plan control Application (SPA) for the proposed residential development located at 1186-1194 Wellington Street West in Ottawa, Ontario. The proposed development comprises a 16-storey mixed-use residential building, inclusive of a 6-storey podium. The surroundings comprise of dominantly lo-rise residential buildings with some mid-rise buildings to the northeast. The primary sources of roadway traffic noise include Wellington Street West to the north and Parkdale Avenue to the east, as well as Highway 417 to the south. Figure 1 illustrates a complete site plan with surrounding context.

The assessment is based on (i) theoretical noise prediction methods that conform to the Ministry of the Environment, Conservation and Parks (MECP) and City of Ottawa requirements; (ii) noise level criteria as specified by the City of Ottawa's Environmental Noise Control Guidelines (ENCG); (iii) future vehicular traffic volumes based on the City of Ottawa's Official Plan roadway classifications; and (iv) site plan drawings prepared by DIALOG, in April 2022.

The results of the current analysis indicate that noise levels will range between 65 and 69 dBA during the daytime period (07:00-23:00) and between 57 and 62 dBA during the nighttime period (23:00-07:00) for plane of window receptors. The highest noise level (69 dBA) occurs at the north and east façades, which are most exposed to Wellington Street West and Parkdale Avenue. Building components with a higher Sound Transmission Class (STC) rating will be required where exterior noise levels exceed 65 dBA, as indicated in Figure 9.

Results of the calculations also indicate that the development will require central air conditioning, which will allow occupants to keep windows closed and maintain a comfortable living environment. A Type D and Type A Warning Clause will also be required be placed on all Lease, Purchase and Sale Agreements, as summarized in Section 6.

At the rooftop terrace on level 2 (receptor 6), the daytime noise level is 58 dBA, and at the rooftop terrace on level 7 (receptor 7), the daytime noise level is 60 dBA. If these areas are to be used as outdoor living areas, noise control measures are required to reduce the L_{eq} to 60 dBA and as close to 55 dBA as is feasible. Due to Highway 417 being the dominant source of noise impacting the OLAs, which already contains a



noise barrier on MTO land, further noise screening at the study site is not expected to have a significant impact on terrace noise levels and is therefore not considered to be feasible.

Regarding stationary noise, impacts from the surroundings on the study building are expected to be minimal. Sources associated with commercial buildings to the east are at a sufficient setback distance, and smaller units associated with adjacent residential are expected to be in compliance with the MECP's noise guideline NPC-216 - Residential Air Conditioning and City of Ottawa Noise By-Law No. 2017-255.

Impacts from the development on the surroundings can be minimized by judicious placement mechanical equipment such as its placement on a roof or in a mechanical penthouse, or the incorporation of silencers and noise screens as necessary. It is recommended that any large pieces of HVAC equipment be placed in the middle of the roof, avoiding line of site with the surrounding residential dwellings.



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1. INTRODUCTION

Gradient Wind Engineering Inc. (Gradient Wind) was retained by Welldale Limited Partnership to undertake a roadway traffic noise feasibility assessment in support of a Site Plan control Application (SPA) for the proposed residential development located at 1186-1194 Wellington Street West 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 Ottawa¹ and Ministry of the Environment, Conservation and Parks (MECP)² guidelines. Noise calculations were based on architectural drawings prepared by DIALOG, in April 2022, with future traffic volumes corresponding to the City of Ottawa's Official Plan (OP) roadway classifications.

2. TERMS OF REFERENCE

The subject site is located at 1186-1194 Wellington Street West in Ottawa; situated on the north end of a rectangular parcel of land bordered by Wellington Street West to the north, Parkdale Avenue to the east, and Hamilton Avenue North to the west.

The proposed development comprises a 16-storey mixed-use residential building, inclusive of a 6-storey podium. Above three below-grade parking levels, the ground floor comprises a rectangular planform and includes a residential main entrance and indoor amenity at the southeast corner, bicycle storage, loading space, and building services to the south, commercial spaces

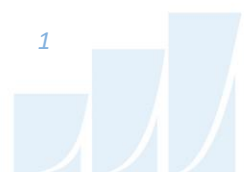


*Architectural Rendering, Northeast Perspective
(Courtesy of DIALOG)*

from the west clockwise to northeast, an elevator core to the east, and shared building support spaces to

¹ City of Ottawa Environmental Noise Control Guidelines, January 2016

² Ontario Ministry of the Environment and Climate Change – Environmental Noise Guidelines, Publication NPC-300, Queens Printer for Ontario, Toronto, 2013



the east and southeast. Access to below-grade parking is provided by a ramp to the south via a laneway along the south elevation of the proposed development which extends east-west from Hamilton Avenue North and Parkdale Avenue, respectively. Levels 2-16 include residential use. Floorplate setbacks are situated at the southwest corner at Level 2, to the east and west at Level 5, and to the east at Level 6. Level 7 includes indoor amenities to the west and at the northwest corner and residential units throughout the remainder of the floor. This level is also served by an outdoor amenity terrace to the west. Levels 7-16 comprise a near square planform.

The surroundings comprise of dominantly lo-rise residential buildings with some mid-rise buildings to the northeast. The primary sources of roadway traffic noise include Wellington Street West to the north and Parkdale Avenue to the east, as well as Highway 417 to the south. Figure 1 illustrates a complete site plan with 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) specifies 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	Leq (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 reduction⁴. A closed window due to a ventilation requirement will bring noise levels down to achieve an acceptable indoor environment⁵. 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

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



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 attenuation⁶.

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

4.2.2 Theoretical Roadway Noise Predictions

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

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

- Truck traffic on all roadways was taken to comprise 5% heavy trucks and 7% medium trucks, as per ENCG requirements for noise level predictions.
- The day/night split for all streets was taken to be 92%/8%, respectively.
- Ground surfaces were taken to be reflective due to the presence of hard (paved) ground.
- Topography was assumed to be a flat/gentle slope surrounding the study building.
- Noise receptors were strategically placed at 7 locations around the study area (see Figure 2).
- Receptor distances and exposure angles are illustrated in Figures 3-8.

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 Plan⁷ which provide additional details on future roadway expansions. Average Annual Daily Traffic (AADT) volumes

⁶ MECP, Environmental Noise Guidelines, NPC 300 – Part C, Section 7.1.3

⁷ City of Ottawa Transportation Master Plan, November 2013



are then based on data in Table B1 of the ENCG for each roadway classification. Table 2 (below) summarizes the AADT values used for each roadway included in this assessment.

TABLE 2: ROADWAY TRAFFIC DATA

Segment	Roadway Traffic Data	Speed Limit (km/h)	Traffic Volumes
Wellington Street West	2-Lane Urban Arterial Undivided (2-UAU)	50	15,000
Parkdale Avenue	2-Lane Urban Arterial Undivided (2-UAU)	40	15,000
Highway 417	400 Series Highway	100	144,000

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 and rail sources) at the plane of the window exceed 65 dBA, calculations must be performed to evaluate the sound transmission quality of the building components to ensure acceptable indoor noise levels. The calculation procedure⁸ 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

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



- Indoor sound level criteria, which varies according to the intended use of a space

Based on published research⁹, exterior walls possess specific sound attenuation characteristics that are used as a basis for calculating the required STC ratings of windows in the same partition. Due to the limited information available at the time of the study, which was prepared for site plan approval, detailed floor layouts and building elevations have not been finalized; therefore, detailed STC calculations could not be performed at this time. As a guideline, the anticipated STC requirements for windows have been estimated based on the overall noise reduction required for each intended use of space (STC = outdoor noise level – targeted indoor noise levels).

5. RESULTS AND DISCUSSION

5.1 Roadway Traffic Noise Levels

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

TABLE 3: EXTERIOR NOISE LEVELS DUE TO ROAD TRAFFIC

Receptor Number	Receptor Height Above Grade (m)	Receptor Location	STAMSON 5.04 Noise Level (dBA)	
			Day	Night
1	19.5	POW – 6 th Floor – North Façade	69	61
2	55.5	POW – 18 th Floor – North Façade	69	61
3	55.5	POW – 18 th Floor – East Façade	69	61
4	19.5	POW – 6 th Floor – South Façade	66	62
5	19.5	POW – 6 th Floor – West Façade	65	57
6	7.5	OLA – 2 nd Floor – Amenity Terrace	58	N/A
7	22.5	OLA – 7 th Floor – Amenity Terrace	60	N/A

⁹ CMHC, Road & Rail Noise: Effects on Housing



The results of the current analysis indicate that noise levels will range between 65 and 69 dBA during the daytime period (07:00-23:00) and between 57 and 62 dBA during the nighttime period (23:00-07:00) for plane of window receptors. The highest noise level (69 dBA) occurs at the north and east façades, which are most exposed to Wellington Street West and Parkdale Avenue.

5.2 Noise Control Measures

The noise levels predicted due to roadway traffic exceed the criteria listed in Section 4.2 for building components. As discussed in Section 4.3, the anticipated STC requirements for windows have been estimated based on the overall noise reduction required for each intended use of space (STC = outdoor noise level – targeted indoor noise levels). As per city of Ottawa requirements, detailed STC calculations will be required to be completed prior to building permit application for each unit type. The STC requirements for the windows are summarized below for various units within the development (see Figure 9):

- **Bedroom Windows**
 - (i) Bedroom windows facing north and east will require a minimum STC of 32
 - (ii) Bedroom windows facing south will require a minimum STC of 29
 - (iii) All other bedroom windows are to satisfy Ontario Building Code (OBC 2020) requirements
- **Living Room Windows**
 - (i) Living room windows facing north and east will require a minimum STC of 27
 - (ii) Living room windows facing south will require a minimum STC of 27
 - (iii) All other living room windows are to satisfy Ontario Building Code (OBC 2020) requirements
- **Exterior Walls**
 - (i) Exterior wall components on the north, east and south façades will require a minimum STC of 45, which will be achieved with brick cladding or an acoustical equivalent according to NRC test data¹⁰

The STC requirements apply to windows, doors, spandrel panels and curtainwall elements. Exterior wall components on these façades are recommended to have a minimum STC of 45, where a window/wall

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

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

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

5.3 Noise Barrier Calculation

At the rooftop terrace on level 2 (receptor 6), the daytime noise level is 58 dBA, and at the rooftop terrace on level 7 (receptor 7), the daytime noise level is 60 dBA. If these areas are to be used as outdoor living areas, noise control measures are required to reduce the L_{eq} to 60 dBA and as close to 55 dBA as is feasible. Due to Highway 417 being the dominant source of noise impacting the OLAs, which already contains a noise barrier on MTO land, further noise screening at the study site is not expected to have a significant impact on terrace noise levels and is therefore not considered to be feasible.

6. CONCLUSIONS AND RECOMMENDATIONS

The results of the current analysis indicate that noise levels will range between 65 and 69 dBA during the daytime period (07:00-23:00) and between 57 and 62 dBA during the nighttime period (23:00-07:00) for plane of window receptors. The highest noise level (69 dBA) occurs at the north and east façades, which are most exposed to Wellington Street West and Parkdale Avenue. Building components with a higher Sound Transmission Class (STC) rating will be required where exterior noise levels exceed 65 dBA, as indicated in Figure 9.



Results of the calculations also indicate that the development will require central air conditioning, which will allow occupants to keep windows closed and maintain a comfortable living environment. The following Type D and Type A Warning Clauses¹¹ will also be required be placed on 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."

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."

At the rooftop terrace on level 2 (receptor 6), the daytime noise level is 58 dBA, and at the rooftop terrace on level 7 (receptor 7), the daytime noise level is 60 dBA. If these areas are to be used as outdoor living areas, noise control measures are required to reduce the L_{eq} to 60 dBA and as close to 55 dBA as is feasible. Due to Highway 417 being the dominant source of noise impacting the OLAs, which already contains a noise barrier on MTO land, further noise screening at the study site is not expected to have a significant impact on terrace noise levels and is therefore not considered to be feasible.

Regarding stationary noise, impacts from the surroundings on the study building are expected to be minimal. Sources associated with commercial buildings to the east are at a sufficient setback distance, and smaller units associated with adjacent residential are expected to be in compliance with the MECP's noise guideline NPC-216 - Residential Air Conditioning and City of Ottawa Noise By-Law No. 2017-255.

Impacts from the development on the surroundings can be minimized by judicious placement mechanical equipment such as its placement on a roof or in a mechanical penthouse, or the incorporation of silencers

¹¹ City of Ottawa Environmental Noise Control Guidelines, January 2016

and noise screens as necessary. It is recommended that any large pieces of HVAC equipment be placed in the middle of the roof, avoiding line of site with the surrounding residential dwellings.

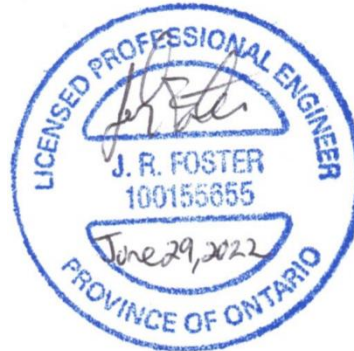
This concludes our traffic noise assessment and report. If you have any questions or wish to discuss our findings, please advise us. In the interim, we thank you for the opportunity to be of service.

Sincerely,

Gradient Wind Engineering Inc.

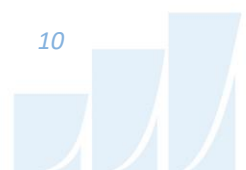


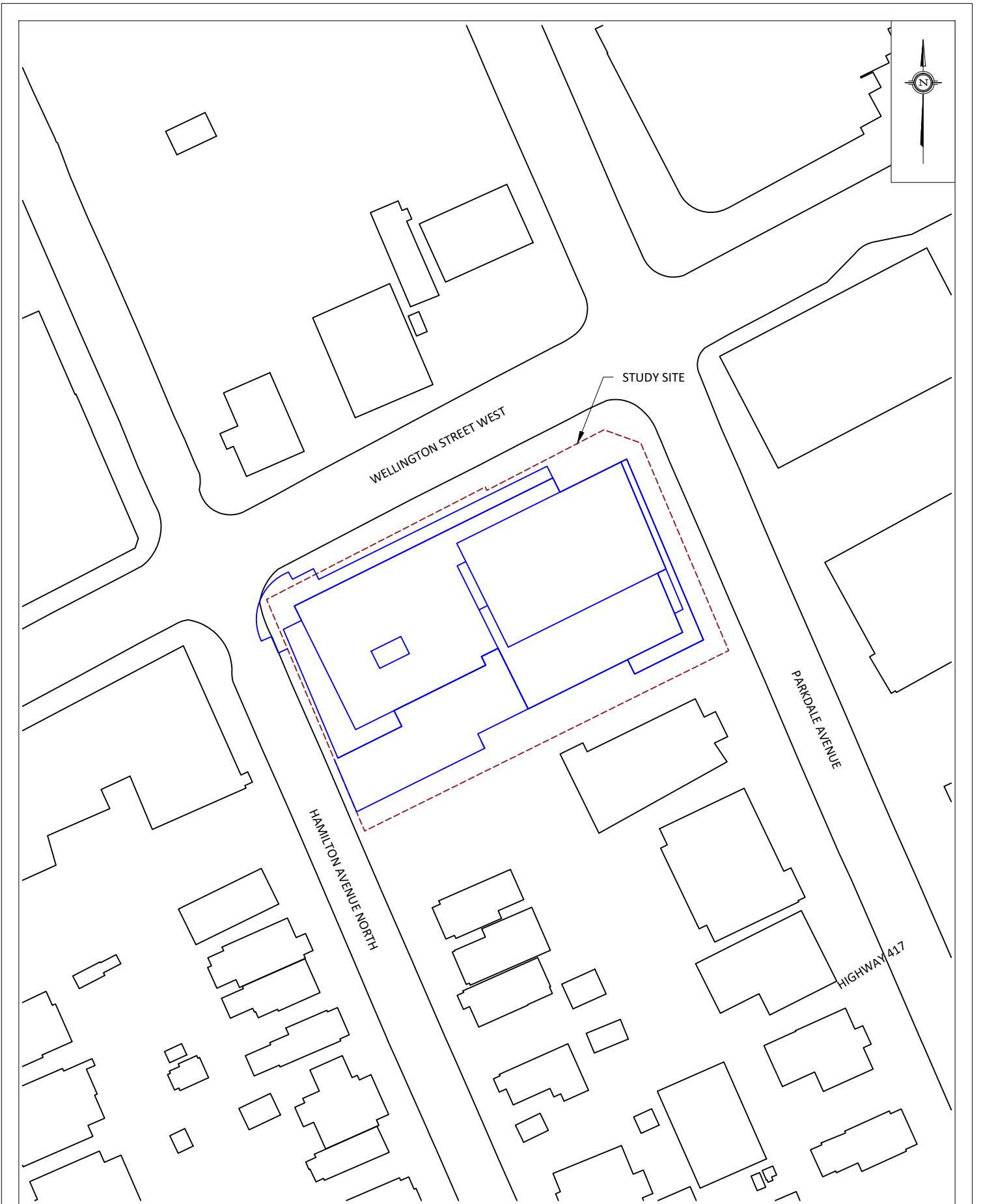
Michael Lafortune, C.E.T.
Environmental Scientist



Joshua Foster, P.Eng.
Lead Engineer

Gradient Wind File #21-113-Traffic Noise Detailed





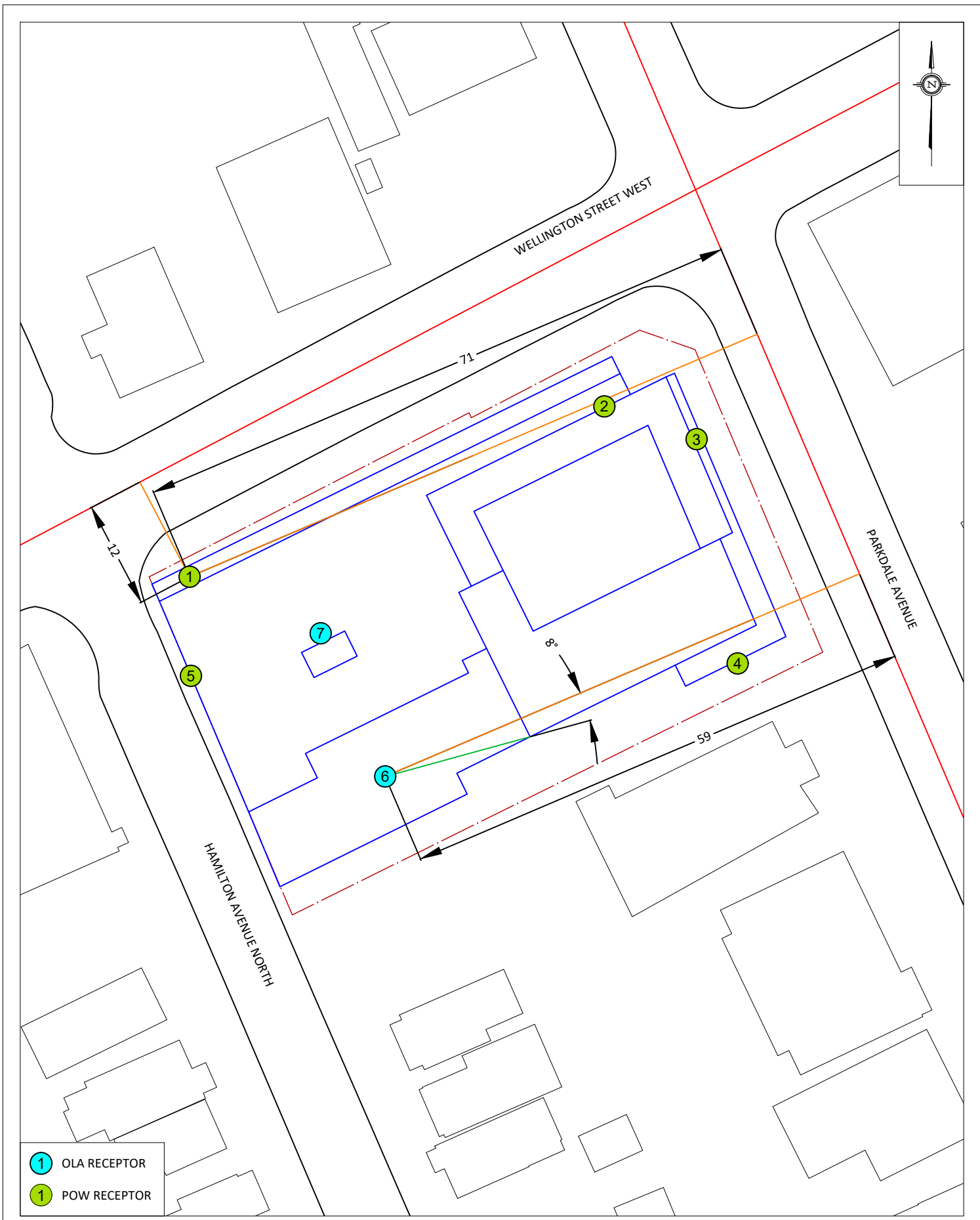
GRADIENTWIND ENGINEERS & SCIENTISTS 127 WALGREEN ROAD, OTTAWA, ON 613 836 0934 • GRADIENTWIND.COM	PROJECT	1186-1194 WELLINGTON STREET, OTTAWA ROADWAY TRAFFIC NOISE DETAILED ASSESSMENT	DESCRIPTION
	SCALE	1:830 (APPROX.)	DRAWING NO. GW21-113-1
	DATE	JUNE 7, 2022	DRAWN BY M.L.

FIGURE 1:
SITE PLAN AND SURROUNDING CONTEXT



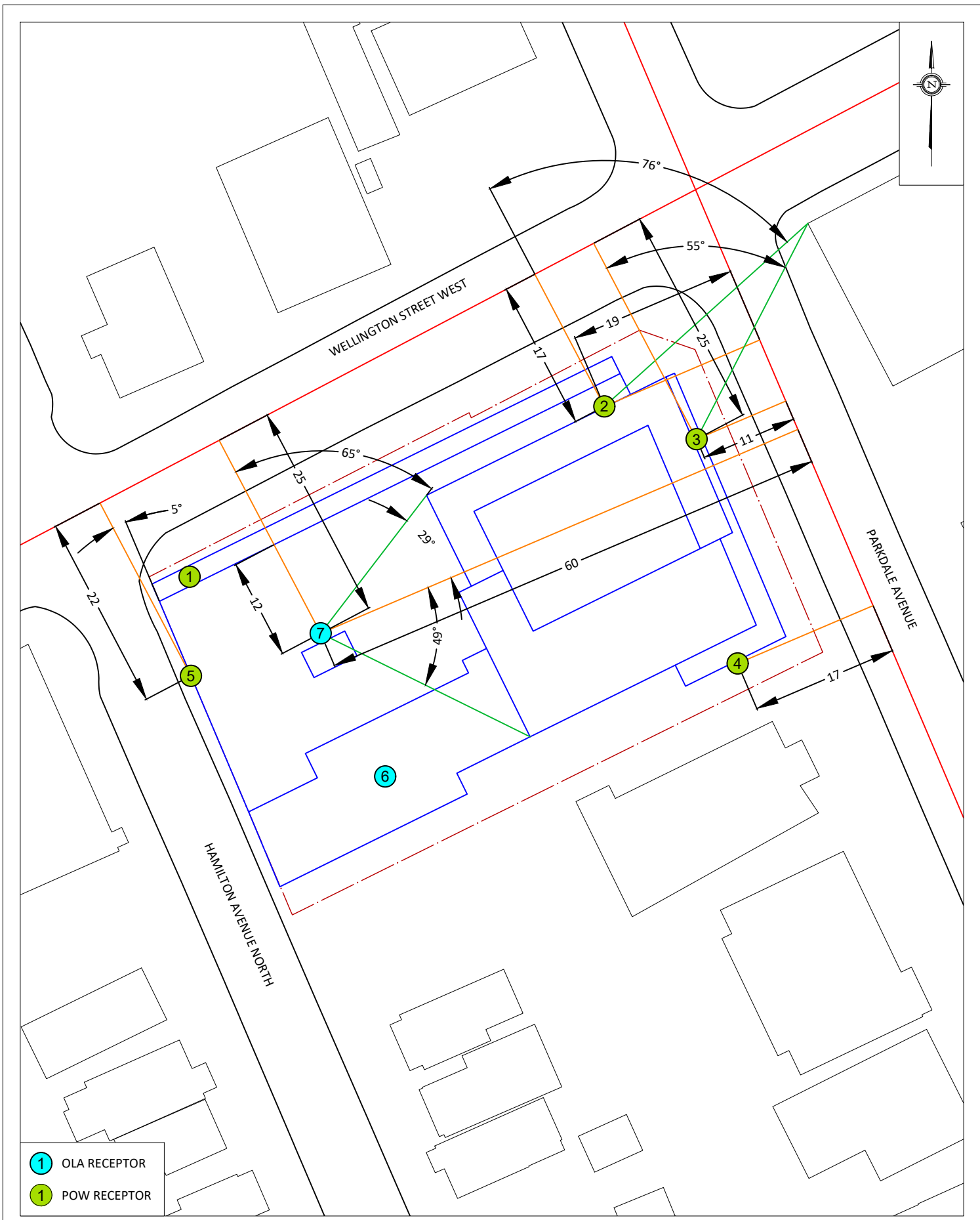
- 1 OLA RECEPTOR
- 1 POW RECEPTOR

GRADIENTWIND ENGINEERS & SCIENTISTS 127 WALGREEN ROAD, OTTAWA, ON 613 836 0934 • GRADIENTWIND.COM	PROJECT	1186-1194 WELLINGTON STREET, OTTAWA ROADWAY TRAFFIC NOISE DETAILED ASSESSMENT		DESCRIPTION FIGURE 2: RECEPTOR LOCATIONS	
	SCALE	1:1000 (APPROX.)	DRAWING NO.		21-113-2
	DATE	JUNE 17, 2021	DRAWN BY		C.A.



- 1 OLA RECEPTOR
- 1 POW RECEPTOR

<p>GRADIENTWIND ENGINEERS & SCIENTISTS 127 WALGREEN ROAD, OTTAWA, ON 613 836 0934 • GRADIENTWIND.COM</p>	PROJECT	1186-1194 WELLINGTON STREET, OTTAWA ROADWAY TRAFFIC NOISE DETAILED ASSESSMENT		<p>FIGURE 3: RECEPTORS 1 & 6</p>	
	SCALE	1:1000 (APPROX.)	DRAWING NO.		21-113-3
	DATE	JUNE 17, 2021	DRAWN BY		C.A.

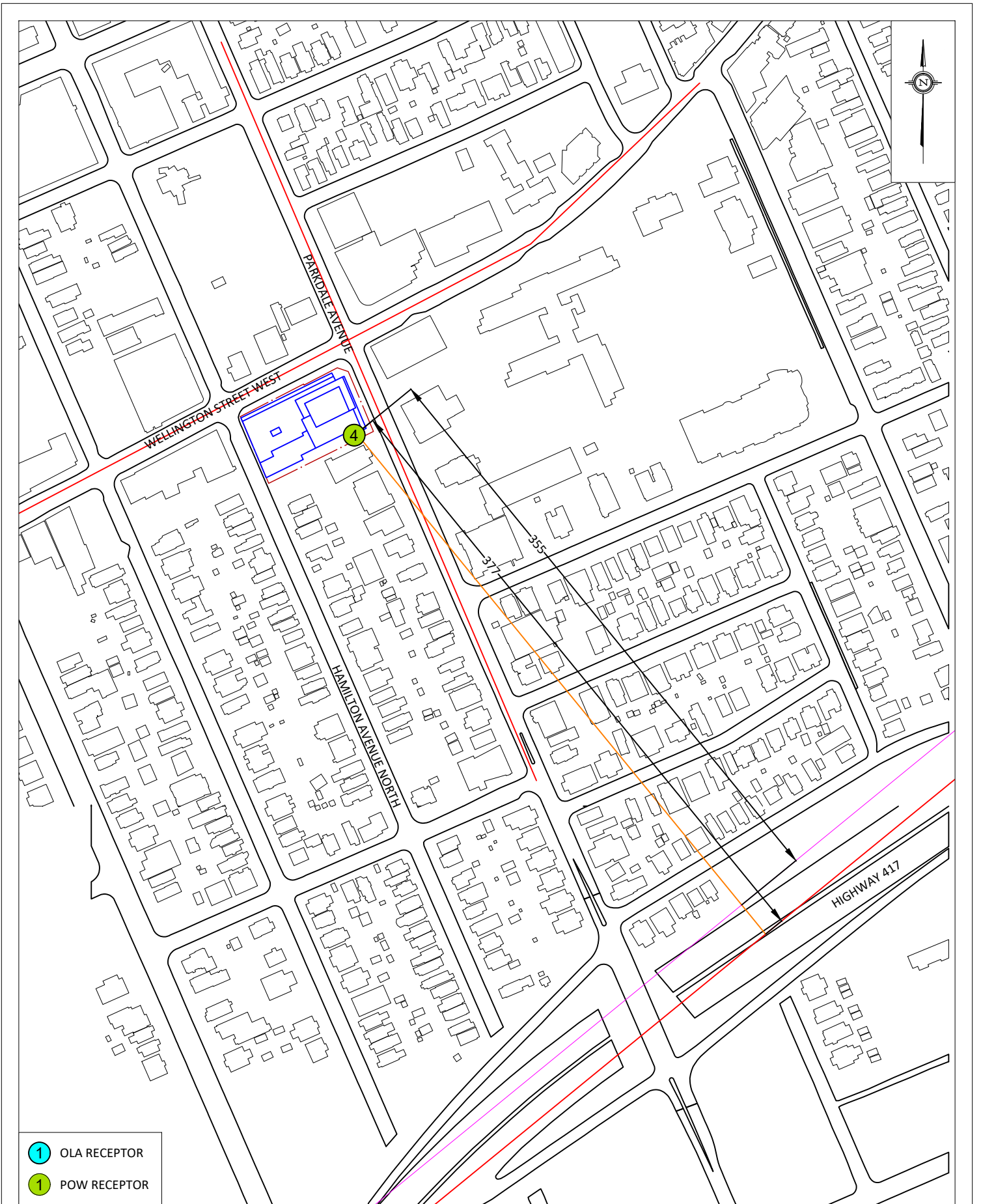


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DATE	JUNE 17, 2021	DRAWN BY C.A.



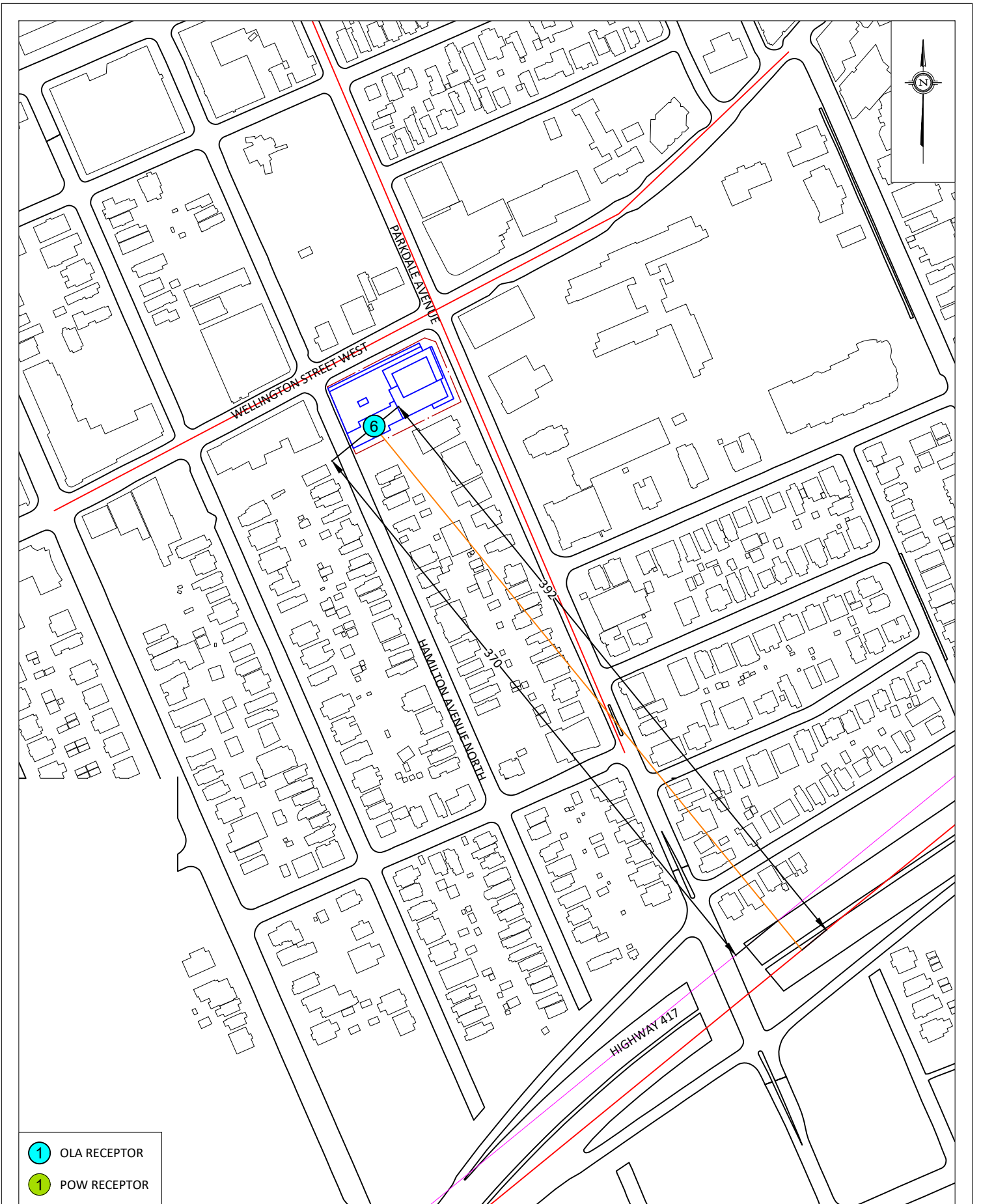
- ❶ OLA RECEPTOR
- ❶ POW RECEPTOR

PROJECT	1186-1194 WELLINGTON STREET, OTTAWA ROADWAY TRAFFIC NOISE DETAILED ASSESSMENT	
SCALE	1:2000 (APPROX.)	DRAWING NO. 21-113-5
DATE	JUNE 18, 2021	DRAWN BY C.A.



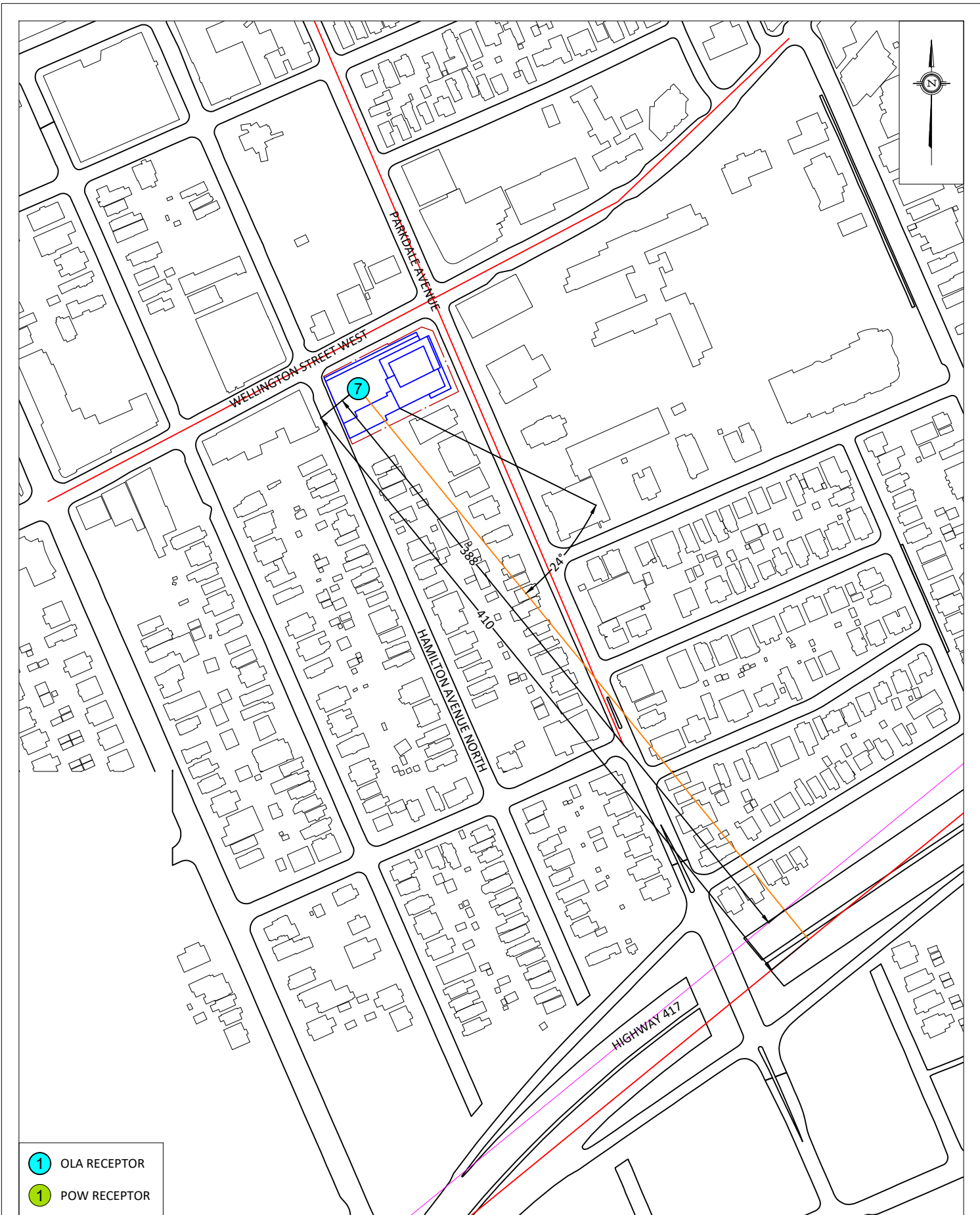
- 1 OLA RECEPTOR
- 1 POW RECEPTOR

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	SCALE	1:2000 (APPROX.)	DRAWING NO.	21-113-6
	DATE	JUNE 18, 2021	DRAWN BY	C.A.
				FIGURE 6: RECEPTOR 4: HIGHWAY 417



1 OLA RECEPTOR

1 POW RECEPTOR





- 7 OLA RECEPTOR
- 1 POW RECEPTOR

GRADIENTWIND ENGINEERS & SCIENTISTS 127 WALGREEN ROAD, OTTAWA, ON 613 836 0934 • GRADIENTWIND.COM	PROJECT	1186-1194 WELLINGTON STREET, OTTAWA ROADWAY TRAFFIC NOISE DETAILED ASSESSMENT		DESCRIPTION
	SCALE	1:2000 (APPROX.)	DRAWING NO.	FIGURE 8: RECEPTOR 7: HIGHWAY 417
	DATE	JUNE 18, 2021	DRAWN BY	



WELLINGTON STREET WEST

HAMILTON AVENUE NO.

-  BEDROOM/LIVING ROOM WINDOWS: STC 32/29
-  BEDROOM/LIVING ROOM WINDOWS: STC 27/27

GRADIENTWIND ENGINEERS & SCIENTISTS 127 WALGREEN ROAD, OTTAWA, ON 613 836 0934 • GRADIENTWIND.COM	PROJECT	1186-1194 WELLINGTON STREET, OTTAWA ROADWAY TRAFFIC NOISE DETAILED ASSESSMENT		DESCRIPTION FIGURE 9: WINDOW STC REQUIREMENTS	
	SCALE	1:500 (APPROX.)	DRAWING NO.		GW21-113-9
	DATE	JUNE 7, 2022	DRAWN BY		M.L.

GRADIENTWIND

ENGINEERS & SCIENTISTS



APPENDIX A

STAMSON 5.04 – INPUT AND OUTPUT DATA

STAMSON 5.0 NORMAL REPORT Date: 17-06-2021 15:58:54
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

Road data, segment # 1: Wellington (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: Wellington (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 : 19.50 / 19.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: Parkdale 1 (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 : 40 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 # 2: Parkdale 1 (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 : 71.00 / 71.00 m
 Receiver height : 19.50 / 19.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

Results segment # 1: Wellington (day)

 Source height = 1.50 m

ROAD (0.00 + 68.48 + 0.00) = 68.48 dBA

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

 -90 90 0.00 68.48 0.00 0.00 0.00 0.00 0.00 0.00 68.48 -----

 Segment Leq : 68.48 dBA

Results segment # 2: Parkdale 1 (day)

 Source height = 1.50 m

ROAD (0.00 + 56.92 + 0.00) = 56.92 dBA

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

 -90 0 0.00 66.69 0.00 -6.75 -3.01 0.00 0.00 0.00 56.92 -----

 Segment Leq : 56.92 dBA



Total Leq All Segments: 68.77 dBA

Results segment # 1: Wellington (night)

Source height = 1.50 m

ROAD (0.00 + 60.88 + 0.00) = 60.88 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	90	0.00	60.88	0.00	0.00	0.00	0.00	0.00	0.00	60.88

 -90 90 0.00 60.88 0.00 0.00 0.00 0.00 0.00 0.00 60.88 -----
 ----- Segment Leq : 60.88 dBA

Results segment # 2: Parkdale 1 (night)

Source height = 1.50 m

ROAD (0.00 + 49.33 + 0.00) = 49.33 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	0	0.00	59.09	0.00	-6.75	-3.01	0.00	0.00	0.00	49.33

 -90 0 0.00 59.09 0.00 -6.75 -3.01 0.00 0.00 0.00 49.33 -----

 Segment Leq : 49.33 dBA

Total Leq All Segments: 61.17 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 68.77
 (NIGHT): 61.17



STAMSON 5.0 NORMAL REPORT Date: 17-06-2021 15:59:06
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

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

Angle1 Angle2 : -90.00 deg 76.00 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 : 55.50 / 55.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

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

Angle1 Angle2 : 76.00 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 : 55.50 / 55.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 76.00 deg Angle2 : 90.00 deg
Barrier height : 30.00 m
Barrier receiver distance : 8.00 / 8.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

Road data, segment # 3: Parkdale (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 : 40 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

Segment # 3: Parkdale (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 : 19.00 / 19.00 m
 Receiver height : 55.50 / 55.50 m
 Topography : 1 (Flat/gentle slope; no barrier)
 Reference angle : 0.00

Results segment # 1: Wellington (day)

Source height = 1.50 m

ROAD (0.00 + 67.58 + 0.00) = 67.58 dBA

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

 -90 76 0.00 68.48 0.00 -0.54 -0.35 0.00 0.00 0.00 67.58 -----

Segment Leq : 67.58 dBA

Results segment # 2: Wellington 2 (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 ! 55.50 ! 30.09 ! 30.09

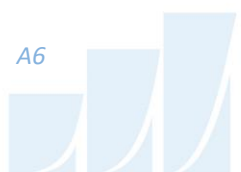
ROAD (0.00 + 56.85 + 0.00) = 56.85 dBA

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

 76 90 0.00 68.48 0.00 -0.54 -11.09 0.00 0.00 -5.00 51.85*
 76 90 0.00 68.48 0.00 -0.54 -11.09 0.00 0.00 0.00 56.85 -----

* Bright Zone !

Segment Leq : 56.85 dBA



Results segment # 3: Parkdale (day)

Source height = 1.50 m

ROAD (0.00 + 62.65 + 0.00) = 62.65 dBA

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

-90 0 0.00 66.69 0.00 -1.03 -3.01 0.00 0.00 0.00 62.65 -----

Segment Leq : 62.65 dBA

Total Leq All Segments: 69.06 dBA

Results segment # 1: Wellington (night)

Source height = 1.50 m

ROAD (0.00 + 59.99 + 0.00) = 59.99 dBA

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

-90 76 0.00 60.88 0.00 -0.54 -0.35 0.00 0.00 0.00 59.99 -----

Segment Leq : 59.99 dBA

Results segment # 2: Wellington 2 (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 ! 55.50 ! 30.09 ! 30.09

ROAD (0.00 + 49.25 + 0.00) = 49.25 dBA

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

76 90 0.00 60.88 0.00 -0.54 -11.09 0.00 0.00 -5.00 44.25*



76 90 0.00 60.88 0.00 -0.54 -11.09 0.00 0.00 0.00 49.25 -----

* Bright Zone !

Segment Leq : 49.25 dBA

Results segment # 3: Parkdale (night)

Source height = 1.50 m

ROAD (0.00 + 55.05 + 0.00) = 55.05 dBA

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

-90 0 0.00 59.09 0.00 -1.03 -3.01 0.00 0.00 0.00 55.05 -----

Segment Leq : 55.05 dBA

Total Leq All Segments: 61.47 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 69.06
(NIGHT): 61.47

STAMSON 5.0 NORMAL REPORT Date: 18-06-2021 18:45:25
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

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

Angle1 Angle2 : 5.00 deg 55.00 deg Wood depth : 0
(No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 25.00 / 25.00 m
Receiver height : 55.50 / 55.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

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

Angle1 Angle2 : 55.00 deg 90.00 deg Wood depth : 0
(No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 25.00 / 25.00 m
Receiver height : 55.50 / 55.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 55.00 deg Angle2 : 90.00 deg
Barrier height : 30.00 m
Barrier receiver distance : 16.00 / 16.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

Road data, segment # 3: Parkdale (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 : 40 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 # 3: Parkdale (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 / 19.00 m
Receiver height : 55.50 / 55.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 4: HWY417 (day/night)

Car traffic volume : 116582/10138 veh/TimePeriod *
Medium truck volume : 9274/806 veh/TimePeriod *
Heavy truck volume : 6624/576 veh/TimePeriod *
Posted speed limit : 100 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): 144000
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 # 4: HWY417 (day/night)

Angle1 Angle2 : -90.00 deg 16.00 deg Wood depth : 0
(No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 400.00 / 400.00 m
Receiver height : 55.50 / 55.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : 16.00 deg
Barrier height : 5.00 m
Barrier receiver distance : 378.00 / 378.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00

Results segment # 1: Wellington (day)



Source height = 1.50 m

ROAD (0.00 + 60.70 + 0.00) = 60.70 dBA

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

5	55	0.00	68.48	0.00	-2.22	-5.56	0.00	0.00	0.00	60.70	-----
---	----	------	-------	------	-------	-------	------	------	------	-------	-------

Segment Leq : 60.70 dBA

Results segment # 2: Wellington 2 (day)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	! Receiver ! Height (m)	! Barrier ! Height (m)	! Elevation of ! Barrier Top (m)
1.50 !	55.50 !	20.94 !	20.94

ROAD (0.00 + 50.12 + 0.00) = 50.12 dBA

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

55	90	0.00	68.48	0.00	-2.22	-7.11	0.00	0.00	-9.03	50.12	-----
----	----	------	-------	------	-------	-------	------	------	-------	-------	-------

Segment Leq : 50.12 dBA

Results segment # 3: Parkdale (day)

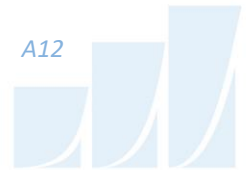
Source height = 1.50 m

ROAD (0.00 + 66.69 + 0.00) = 66.69 dBA

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

-90	90	0.00	66.69	0.00	0.00	0.00	0.00	0.00	0.00	66.69	-----
-----	----	------	-------	------	------	------	------	------	------	-------	-------

Segment Leq : 66.69 dBA



Results segment # 4: HWY417 (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 ! 55.50 ! 4.47 ! 4.47

ROAD (0.00 + 62.53 + 0.00) = 62.53 dBA

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

-90 16 0.00 84.33 0.00 -14.26 -2.30 0.00 0.00 -5.24 62.53 -----

Segment Leq : 62.53 dBA

Total Leq All Segments: 68.88 dBA

Results segment # 1: Wellington (night)

Source height = 1.50 m

ROAD (0.00 + 53.10 + 0.00) = 53.10 dBA

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

5 55 0.00 60.88 0.00 -2.22 -5.56 0.00 0.00 0.00 53.10 -----

Segment Leq : 53.10 dBA

Results segment # 2: Wellington 2 (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 ! 55.50 ! 20.94 ! 20.94



ROAD (0.00 + 42.52 + 0.00) = 42.52 dBA

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

 55 90 0.00 60.88 0.00 -2.22 -7.11 0.00 0.00 -9.03 42.52 -----

Segment Leq : 42.52 dBA

Results segment # 3: Parkdale (night)

Source height = 1.50 m

ROAD (0.00 + 58.06 + 0.00) = 58.06 dBA

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

 -90 90 0.00 59.09 0.00 -1.03 0.00 0.00 0.00 0.00 58.06 -----

Segment Leq : 58.06 dBA

Results segment # 4: HWY417 (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 ! 55.50 ! 4.47 ! 4.47

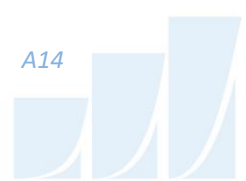
ROAD (0.00 + 54.93 + 0.00) = 54.93 dBA

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

 -90 16 0.00 76.73 0.00 -14.26 -2.30 0.00 0.00 -5.24 54.93 -----

Segment Leq : 54.93 dBA

Total Leq All Segments: 60.69 dBA



TOTAL Leq FROM ALL SOURCES (DAY): 68.88
(NIGHT): 60.69

STAMSON 5.0 NORMAL REPORT Date: 18-06-2021 18:45:37
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

Road data, segment # 1: Parkdale (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 : 40 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: Parkdale (day/night)

Angle1 Angle2 : -3.00 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 : 19.50 / 19.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: HWY417 1 (day/night)

Car traffic volume : 116582/10138 veh/TimePeriod *
Medium truck volume : 9274/806 veh/TimePeriod *
Heavy truck volume : 6624/576 veh/TimePeriod *



Posted speed limit : 100 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): 144000
 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: HWY417 1 (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 : 377.00 / 377.00 m
 Receiver height : 19.50 / 19.50 m
 Topography : 2 (Flat/gentle slope; with barrier)
 Barrier angle1 : -90.00 deg Angle2 : 90.00 deg
 Barrier height : 5.00 m
 Barrier receiver distance : 355.00 / 10.00 m
 Source elevation : 0.00 m
 Receiver elevation : 0.00 m
 Barrier elevation : 0.00 m
 Reference angle : 0.00

Results segment # 1: Parkdale (day)

 Source height = 1.50 m

ROAD (0.00 + 63.27 + 0.00) = 63.27 dBA

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

 -3 90 0.00 66.69 0.00 -0.54 -2.87 0.00 0.00 0.00 63.27 -----

 Segment Leq : 63.27 dBA

Results segment # 2: HWY417 1 (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 !   19.50 !    2.55 !    2.55
    
```

ROAD (0.00 + 62.19 + 0.00) = 62.19 dBA

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

```

-----
-90  90  0.00 84.33  0.00 -14.00  0.00  0.00  0.00  0.00 -8.14 62.19 -----
-----
    
```

Segment Leq : 62.19 dBA

Total Leq All Segments: 65.77 dBA

Results segment # 1: Parkdale (night)

Source height = 1.50 m

ROAD (0.00 + 55.68 + 0.00) = 55.68 dBA

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

```

-----
-3   90  0.00 59.09  0.00 -0.54 -2.87  0.00  0.00  0.00  0.00 55.68 -----
-----
    
```

Segment Leq : 55.68 dBA

Results segment # 2: HWY417 1 (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 ! 19.50 ! 19.02 ! 19.02

ROAD (0.00 + 60.71 + 0.00) = 60.71 dBA

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

-90 90 0.00 76.73 0.00 -14.00 0.00 0.00 0.00 -0.01 62.72*
-90 90 0.12 76.73 0.00 -15.68 -0.34 0.00 0.00 0.00 60.71 -----

* Bright Zone !

Segment Leq : 60.71 dBA

Total Leq All Segments: 61.90 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 65.77
(NIGHT): 61.90

STAMSON 5.0 NORMAL REPORT Date: 18-06-2021 18:45:52
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

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

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

Angle1 Angle2 : -90.00 deg 5.00 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 : 19.50 / 19.50 m
Topography : 1 (Flat/gentle slope; no barrier)
Reference angle : 0.00

Road data, segment # 2: HWY417 1 (day/night)

Car traffic volume : 116582/10138 veh/TimePeriod *
Medium truck volume : 9274/806 veh/TimePeriod *
Heavy truck volume : 6624/576 veh/TimePeriod *
Posted speed limit : 100 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): 144000
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: HWY417 1 (day/night)

Angle1 Angle2 : 16.00 deg 90.00 deg Wood depth : 0
(No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 416.00 / 416.00 m
Receiver height : 19.50 / 19.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 16.00 deg Angle2 : 90.00 deg
Barrier height : 5.00 m
Barrier receiver distance : 394.00 / 394.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m



Reference angle : 0.00

Results segment # 1: Wellington (day)

Source height = 1.50 m

ROAD (0.00 + 64.04 + 0.00) = 64.04 dBA

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

-90 5 0.00 68.48 0.00 -1.66 -2.78 0.00 0.00 0.00 64.04 -----

Segment Leq : 64.04 dBA

Results segment # 2: HWY417 1 (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 ! 19.50 ! 2.45 ! 2.45

ROAD (0.00 + 58.05 + 0.00) = 58.05 dBA

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

16 90 0.00 84.33 0.00 -14.43 -3.86 0.00 0.00 -7.99 58.05 -----

Segment Leq : 58.05 dBA

Total Leq All Segments: 65.02 dBA

Results segment # 1: Wellington (night)

Source height = 1.50 m

ROAD (0.00 + 56.44 + 0.00) = 56.44 dBA

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



-90 5 0.00 60.88 0.00 -1.66 -2.78 0.00 0.00 0.00 56.44 -----

Segment Leq : 56.44 dBA

Results segment # 2: HWY417 1 (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 ! 19.50 ! 2.45 ! 2.45

ROAD (0.00 + 50.45 + 0.00) = 50.45 dBA

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

16 90 0.00 76.73 0.00 -14.43 -3.86 0.00 0.00 -7.99 50.45 -----

Segment Leq : 50.45 dBA

Total Leq All Segments: 57.42 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 65.02
(NIGHT): 57.42

GRADIENTWIND

ENGINEERS & SCIENTISTS

STAMSON 5.0 NORMAL REPORT Date: 07-06-2022 11:58:03
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: r7wel.te Time Period: Day/Night 16/8 hours
Description:

Road data, segment # 1: 417-1 (day/night)

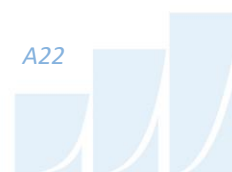
Car traffic volume : 116582/10138 veh/TimePeriod *
Medium truck volume : 9274/806 veh/TimePeriod *
Heavy truck volume : 6624/576 veh/TimePeriod *
Posted speed limit : 100 km/h
Road gradient : 0 %
Road pavement : 1 (Typical asphalt or concrete)

* Refers to calculated road volumes based on the following input:

24 hr Traffic Volume (AADT or SADT): 144000
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: 417-1 (day/night)

Angle1 Angle2 : -24.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 410.00 / 410.00 m
Receiver height : 22.50 / 22.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -24.00 deg Angle2 : 0.00 deg
Barrier height : 5.00 m
Barrier receiver distance : 388.00 / 388.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00



GRADIENTWIND

ENGINEERS & SCIENTISTS

Road data, segment # 2: 417-2 (day/night)

Car traffic volume : 116582/10138 veh/TimePeriod *
Medium truck volume : 9274/806 veh/TimePeriod *
Heavy truck volume : 6624/576 veh/TimePeriod *
Posted speed limit : 100 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): 144000
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: 417-2 (day/night)

Angle1 Angle2 : 0.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 410.00 / 410.00 m
Receiver height : 22.50 / 22.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 0.00 deg Angle2 : 90.00 deg
Barrier height : 5.00 m
Barrier receiver distance : 388.00 / 388.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00



GRADIENTWIND

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Road data, segment # 3: Park1 (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 : 40 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 # 3: Park1 (day/night)

Angle1 Angle2 : -90.00 deg 29.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 60.00 / 60.00 m
Receiver height : 22.50 / 22.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : 29.00 deg
Barrier height : 21.00 m
Barrier receiver distance : 18.00 / 18.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00



GRADIENTWIND

ENGINEERS & SCIENTISTS

Road data, segment # 4: Park2 (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 : 40 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 # 4: Park2 (day/night)

Angle1 Angle2 : 49.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 2 (Reflective ground surface)
Receiver source distance : 60.00 / 60.00 m
Receiver height : 22.50 / 22.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 49.00 deg Angle2 : 90.00 deg
Barrier height : 21.00 m
Barrier receiver distance : 18.00 / 18.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00



GRADIENTWIND

ENGINEERS & SCIENTISTS

Results segment # 1: 417-1 (day)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	22.50	2.62	2.62

ROAD (0.00 + 51.64 + 0.00) = 51.64 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
-24	0	0.00	84.33	0.00	-14.37	-8.75	0.00	0.00	-9.57

SubLeq
51.64

Segment Leq : 51.64 dBA



GRADIENTWIND

ENGINEERS & SCIENTISTS

Results segment # 2: 417-2 (day)

 Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	! Receiver ! Height (m)	! Barrier ! Height (m)	! Elevation of ! Barrier Top (m)
1.50	22.50	2.62	2.62

ROAD (0.00 + 58.96 + 0.00) = 58.96 dBA

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

0	90	0.00	84.33	0.00	-14.37	-3.01	0.00	0.00	-7.99
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 Segment Leq : 58.96 dBA



GRADIENTWIND

ENGINEERS & SCIENTISTS

Results segment # 3: Park1 (day)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	22.50	16.20	16.20

ROAD (0.00 + 45.38 + 0.00) = 45.38 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
-90	29	0.00	66.69	0.00	-6.02	-1.80	0.00	0.00	-13.48

SubLeq

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45.38

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Segment Leq : 45.38 dBA



GRADIENTWIND

ENGINEERS & SCIENTISTS

Results segment # 4: Park2 (day)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	22.50	16.20	16.20

ROAD (0.00 + 43.52 + 0.00) = 43.52 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
49	90	0.00	66.69	0.00	-6.02	-6.42	0.00	0.00	-10.72

SubLeq

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43.52

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Segment Leq : 43.52 dBA

Total Leq All Segments: 59.96 dBA



GRADIENTWIND

ENGINEERS & SCIENTISTS

Results segment # 1: 417-1 (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	22.50	2.62	2.62

ROAD (0.00 + 44.05 + 0.00) = 44.05 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
-24	0	0.00	76.73	0.00	-14.37	-8.75	0.00	0.00	-9.57

SubLeq
44.05

Segment Leq : 44.05 dBA



GRADIENTWIND

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Results segment # 2: 417-2 (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	22.50	2.62	2.62

ROAD (0.00 + 51.36 + 0.00) = 51.36 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
0	90	0.00	76.73	0.00	-14.37	-3.01	0.00	0.00	-7.99

SubLeq

51.36

Segment Leq : 51.36 dBA



GRADIENTWIND

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Results segment # 3: Park1 (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	22.50	16.20	16.20

ROAD (0.00 + 37.79 + 0.00) = 37.79 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj	SubLeq
-90	29	0.00	59.09	0.00	-6.02	-1.80	0.00	0.00	-13.48	37.79

Segment Leq : 37.79 dBA



GRADIENTWIND

ENGINEERS & SCIENTISTS

Results segment # 4: Park2 (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	22.50	16.20	16.20

ROAD (0.00 + 35.92 + 0.00) = 35.92 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
49	90	0.00	59.09	0.00	-6.02	-6.42	0.00	0.00	-10.72

SubLeq

Segment Leq : 35.92 dBA

Total Leq All Segments: 52.36 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 59.96
(NIGHT): 52.36



GRADIENTWIND

ENGINEERS & SCIENTISTS

STAMSON 5.0 NORMAL REPORT Date: 07-06-2022 10:54:41
MINISTRY OF ENVIRONMENT AND ENERGY / NOISE ASSESSMENT

Filename: R6Wel.te Time Period: Day/Night 16/8 hours
Description:

Road data, segment # 1: 417-1 (day/night)

Car traffic volume : 116582/10138 veh/TimePeriod *
Medium truck volume : 9274/806 veh/TimePeriod *
Heavy truck volume : 6624/576 veh/TimePeriod *
Posted speed limit : 100 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): 144000
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: 417-1 (day/night)

Angle1 Angle2 : -90.00 deg 0.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 392.00 / 392.00 m
Receiver height : 7.50 / 7.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : -90.00 deg Angle2 : 0.00 deg
Barrier height : 5.00 m
Barrier receiver distance : 370.00 / 370.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00



GRADIENTWIND

ENGINEERS & SCIENTISTS

Road data, segment # 2: 417-2 (day/night)

Car traffic volume : 116582/10138 veh/TimePeriod *
Medium truck volume : 9274/806 veh/TimePeriod *
Heavy truck volume : 6624/576 veh/TimePeriod *
Posted speed limit : 100 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): 144000
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: 417-2 (day/night)

Angle1 Angle2 : 0.00 deg 90.00 deg
Wood depth : 0 (No woods.)
No of house rows : 0 / 0
Surface : 1 (Absorptive ground surface)
Receiver source distance : 392.00 / 392.00 m
Receiver height : 7.50 / 7.50 m
Topography : 2 (Flat/gentle slope; with barrier)
Barrier angle1 : 0.00 deg Angle2 : 90.00 deg
Barrier height : 5.00 m
Barrier receiver distance : 370.00 / 370.00 m
Source elevation : 0.00 m
Receiver elevation : 0.00 m
Barrier elevation : 0.00 m
Reference angle : 0.00



GRADIENTWIND

ENGINEERS & SCIENTISTS

Results segment # 1: 417-1 (day)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	7.50	1.83	1.83

ROAD (0.00 + 54.77 + 0.00) = 54.77 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
-90	0	0.18	84.33	0.00	-16.72	-3.50	0.00	0.00	-9.34

SubLeq

54.77

Segment Leq : 54.77 dBA



GRADIENTWIND

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Results segment # 2: 417-2 (day)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	7.50	1.83	1.83

ROAD (0.00 + 54.77 + 0.00) = 54.77 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
0	90	0.18	84.33	0.00	-16.72	-3.50	0.00	0.00	-9.34

SubLeq

Segment Leq : 54.77 dBA

Total Leq All Segments: 57.78 dBA



GRADIENTWIND

ENGINEERS & SCIENTISTS

Results segment # 1: 417-1 (night)

 Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	! Receiver ! Height (m)	! Barrier ! Height (m)	! Elevation of ! Barrier Top (m)
1.50	!	7.50	!
		1.83	!
			1.83

ROAD (0.00 + 47.17 + 0.00) = 47.17 dBA

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

-90	0	0.18	76.73	0.00	-16.72	-3.50	0.00	0.00	-9.34
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 Segment Leq : 47.17 dBA



GRADIENTWIND

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Results segment # 2: 417-2 (night)

Source height = 1.50 m

Barrier height for grazing incidence

Source Height (m)	Receiver Height (m)	Barrier Height (m)	Elevation of Barrier Top (m)
1.50	7.50	1.83	1.83

ROAD (0.00 + 47.17 + 0.00) = 47.17 dBA

Angle1	Angle2	Alpha	RefLeq	P.Adj	D.Adj	F.Adj	W.Adj	H.Adj	B.Adj
0	90	0.18	76.73	0.00	-16.72	-3.50	0.00	0.00	-9.34

SubLeq

--

0 90 0.18 76.73 0.00 -16.72 -3.50 0.00 0.00 -9.34

47.17

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Segment Leq : 47.17 dBA

Total Leq All Segments: 50.18 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 57.78
(NIGHT): 50.18

