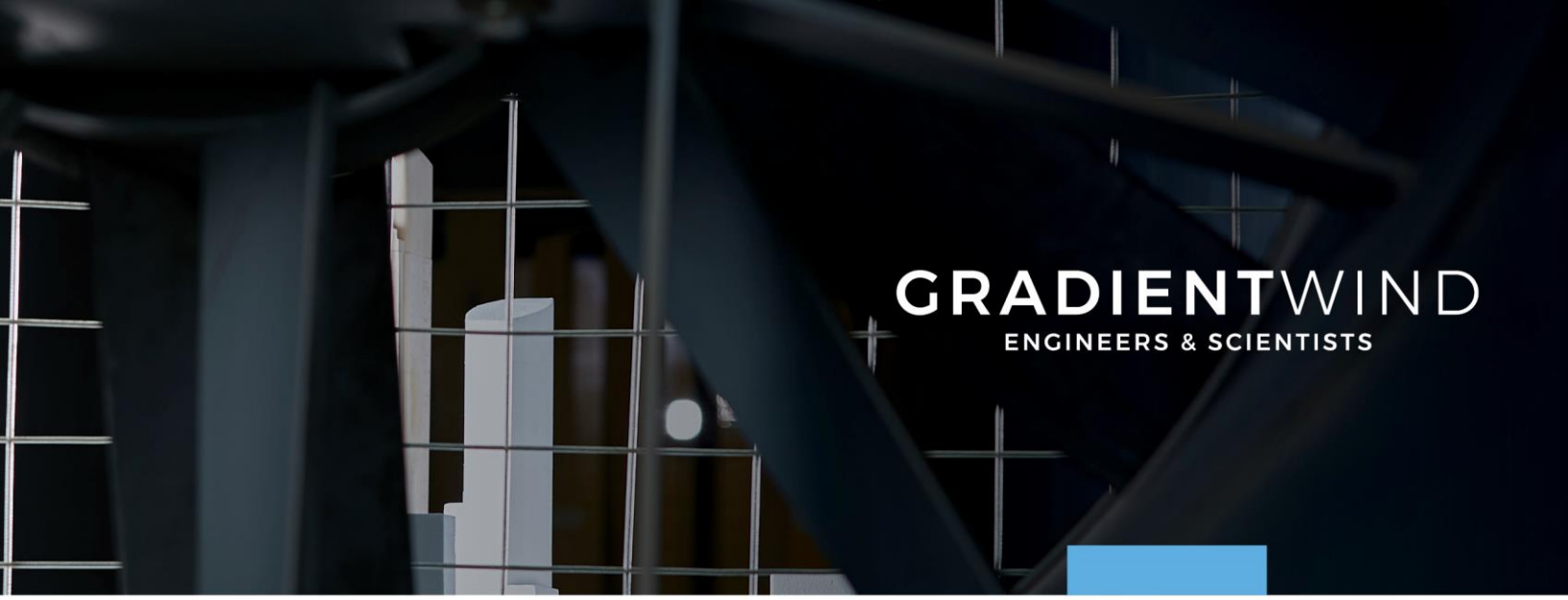
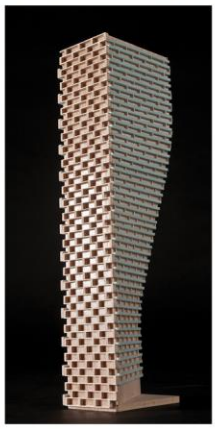


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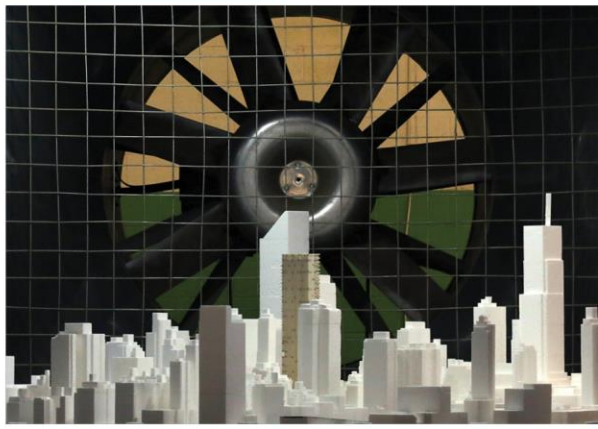
ENVIRONMENTAL NOISE FEASIBILITY STUDY

40-70 Plains Road East
Burlington, Ontario

Report: 19-235-ENVIRONMENTAL NOISE







January 29, 2021

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EXECUTIVE SUMMARY

This report describes an environmental noise assessment performed for the proposed residential development located at 40-70 Plains Road East in Burlington, Ontario. The development comprises a 10-storey, including a mechanical penthouse, residential building with an irregular planform. The long axis of the building is aligned with Plains Road East. The building sets back on the south side with increasing elevation from Level 4 to 10. An outdoor amenity area is provided at Level 10. The major source of roadway traffic noise affecting the development site is Plains Road East. In addition to traffic noise sources, rooftop air handling units and cooling towers on top of the neighbouring buildings and the proposed building were considered as stationary noise sources in this study. Figure 1 illustrates a complete site plan with the surrounding context.

The assessment is based on (i) theoretical noise prediction methods that conform to the Ministry of the Environment, Conservation and Parks (MECP); (ii) noise level criteria as specified by the MECP NPC-300 guidelines; (iii) AADT data provided by the City of Burlington, (iv) future vehicular traffic volumes are based on theoretical capacities and roadway classifications; (v) Guidelines for New Development in Proximity to Railway Operations prepared for the Federation of Canadian Municipalities and the Railway Association of Canada; and (vi) architectural drawings provided by RAW Design.

The predominant source of noise on the development is traffic noise from Plains Road. Given the distance is more than 300 m from the site to the CN railway to the north and also to industrial stationary sources such as St. Marys CBM and King Truck, they are considered to be insignificant sources of noise and vibration

The results of the current analysis indicate that noise levels will range between 40 and 68 dBA at Plane of Window receptors during the daytime period (07:00-23:00) and between 32 and 60 dBA during the nighttime period (23:00-07:00). The highest noise level occurs along the development's north façade which overviews Plains Road East. Those results show that the development will require central air conditioning, or a similar ventilation system, which will allow occupants to keep windows closed and maintain a comfortable living environment. Warning Clauses will also be required in all Lease, Purchase and Sale Agreements as summarized in Section 6.

Well insulated double pane windows, such as 6mm glass, 13 mm air space, and 6 mm glass or equivalent will provide sufficient attenuation provided that the sound transmission class (STC)ratings of the windows meet STC 30.

The noise level at Receptor 7, placed at the west side of the rooftop amenity terrace, is 1 dBA higher than the 55 dBA noise level during the daytime. When noise levels at the outdoor living areas are between 55 dBA and 60 dBA, noise control measures may be applied to reduce the sound level to 55 dBA where feasible. Since the addition of a barrier for 1 dBA reduction in noise level is not considered to be reasonably feasible and the noise level does not exceed 60 dBA, the noise level at Receptor 7 is acceptable when the required warning clause Type A is added to all Lease, Purchase and Sale Agreements (see Section 6).

CN Rail Line is located to the north of the development. For mainline railways, the document titled Guidelines for New Development in Proximity to Railway Operations prepared for the Federation of Canadian Municipalities and the Railway Association of Canada [1] indicates that the noise-sensitive developments within 300 metres of a principle rail line are considered in the influence area of the railway. The same document also indicates that the minimum influence area for ground vibrations created by a railway corridor is 75 metres. The subject site is located more than 500 metres south of the CN Railway, therefore railway noise impact, as well as the ground vibrations and ground-borne noise levels, were not considered in this study. Roadways are not a significant source of perceptible vibrations and there is no heavy industry immediately adjacent to the subject site.

A preliminary stationary noise study was conducted to assess the impact of the surrounding buildings on the subject site and the noise impact of the subject site on the neighbouring noise-sensitive buildings. The result of this study indicated that noise levels at all receptors due to the stationary noise sources fall below the NPC-300 criteria.

[1] Prepared for The Federation of Canadian Municipalities and The Railway Associated of Canada by Dialog and J.E. Coulter Associates Limited, May 2013

NPC-300 indicates that the sound level of emergency equipment should not exceed 55 dBA during non-emergency situations such as testing or maintenance. As per Ontario Regulation 524/98, (O. Reg. 14/17, s. 3), the noise level of a generator located outdoors should not exceed 75 dBA at 7 metres. The closest noise-sensitive building to the subject site's potential generator location is about 50 metres away. In order for the noise levels to be lower than 55 dBA criteria at the location, the total sound level of the generator should not exceed 72 dBA at 7 metres; this can be easily achieved using a Level 2.0 or Level 3.0 sound enclosure for the generator.

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1. INTRODUCTION

Gradient Wind Engineering Inc. (Gradient Wind) was retained by Infinity Development Group to undertake a roadway traffic noise assessment to satisfy the requirements for submission to the city for the proposed residential development located at 40-70 Plains Road East in Burlington, Ontario. This report summarizes the methodology, results, and recommendations related to the assessment of exterior noise levels generated by local roadway traffic.

This assessment is based on theoretical noise calculation methods conforming to the Ministry of the Environment, Conservation and Parks (MECP)[2] guidelines. Noise calculations were based on architectural drawings prepared by RAW Design with future traffic volumes corresponding to roadway classification and theoretical roadway capacities.

2. TERMS OF REFERENCE

The proposed development is located at 40-70 Plains Road East in Burlington, Ontario and comprises a 10 storey residential building, including a mechanical penthouse. The building has a nearly rectangular planform with four (4) rectangular wings, spaced evenly, extending at the south side. The long axis of the building is aligned northeast to southwest direction along Plains Road East. Throughout this report, the Plains Road East elevation is referred to as the north elevation.



Architectural Rendering, West (Compass Direction) Perspective (Courtesy of RAW Design)

A driveway at the northwest corner of the site provides access to surface parking, a ramp to underground parking and a loading area from Plains Road East. The ground floor comprises primarily residential units in addition to an indoor amenity area located at the southwest corner. At grade, an outdoor amenity area is

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

provided along the south perimeter of the site and between the wings of the building. The floors 2-9 are reserved for residential use. 10th floor comprises mechanical rooms and indoor amenity areas as well as an outdoor amenity space at all sides.

The building sets back on the south side with increasing elevation from Level 4 to 10, to accommodate private terraces approximately 3-metres (m) wide. Also, the building sets back on the north and, far most east and west sides creating terraces at Level 7. Additionally, the residential units are provided with balconies. The balconies extending less than 4 m from the building façade are not considered as Outdoor Living Areas (OLA) as per NPC-300 definitions. Therefore, the 10th-floor outdoor amenity terrace, 2nd-floor terrace as well as the grade-level outdoor amenity area were assessed in this study.

The major source of roadway traffic noise is Plains Road East situated along the north perimeter of the site. Figure 1 illustrates the site plan with the surrounding context. Given the distance is more than 300 m from the site to the CN railway to the north and also to industrial stationary sources such as St. Marys CBM and King Truck, they are considered to be insignificant sources of noise.

3. OBJECTIVES

The principal objectives of this study are to (i) calculate the future noise levels on the subject site produced by local roadway traffic and existing stationary noise sources, (ii) calculate the noise impact of the subject site on the surrounding noise-sensitive buildings, and (iii) explore potential noise mitigation, where required.

4. METHODOLOGY

4.1 Background

Noise can be defined as any obtrusive sound. It is created at a source, transmitted through a medium, such as air, and intercepted by a receiver. Noise may be characterized in terms of the power of the source or the sound pressure level 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 sound pressure 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 vehicular traffic, the equivalent sound energy level, L_{eq}, provides a measure of the time-varying noise levels, which is well correlated with the annoyance of sound. It is defined as the continuous sound level, which has the same energy as a time-varying noise level over a period of time. For roadways and LRT, the L_{eq} is commonly calculated on the basis of a 16-hour (L_{eq16}) daytime (07:00-23:00) / 8-hour (L_{eq8}) nighttime (23:00-07:00) split to assess its impact on residential buildings. NPC-300 specifies that the recommended indoor noise limit ranges (that are relevant to this study) are 50, 45 and 40 dBA for retail, living rooms and sleeping quarters, respectively, as listed in Table 1.

TABLE 1: INDOOR SOUND LEVEL CRITERIA (ROAD)

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) determines the action required to achieve the recommended sound levels. NPC-300 dictates if the nighttime sound level outside the bedroom or living/dining room windows exceeds 60 dBA or the daytime sound level outside the bedroom or living/dining area windows exceeds 65 dBA[3]., building components, including windows, walls and doors, should be designed to comply with the sound level limits listed in Table 1.

[3] MECP, Environmental Noise Guidelines, NPC 300 – Part C, Section 7.1.3

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 normally triggers the need for central air conditioning.

The sound level criterion for outdoor living areas (OLA) is 55 dBA, which applies during the daytime (07:00 to 23:00). When noise levels exceed 55 dBA, mitigation should be provided to reduce noise levels where technically and administratively feasible to acceptable levels at or below the criterion. If these measures are not provided, prospective purchasers or tenants should be informed of potential noise problems by a warning clause.

4.2.2 Theoretical Roadway Noise Predictions

Noise predictions were determined by computer modelling using Predictor-LimA (Transportation Noise Model (TNM) calculation). The software was employed to predict the noise levels across the site. The software incorporates the United States Federal Highway Administration's (FHWA) Transportation Noise Model (TNM) 2.5. It is capable of representing three-dimensional surfaces and first reflections of sound waves over a suitable spectrum for human hearing. A receptor grid with 5 × 5 m spacing was placed across the subject site, along with a number of individual receptors at key sensitive areas.

Roadway traffic noise calculations were performed by treating each road segment as a separate line noise source. 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 7% medium trucks and 5% heavy trucks.
- The day/night split was taken to be 92%/8%, respectively, for all roads.
- 12 receptors were strategically placed throughout the study area (see Figure 2).
- POW receptors are placed at the highest level of the façade that they are adjacent to except R5 (taken at Level 7 plane of window); receptor heights are noted in Table 5.

[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

- OLA receptors are placed at 1.5-metre high from the walking surface of the rooftop amenity terrace, Level 2 terrace and grade level outdoor amenity area on the south side of the development.
- The ground surface was defined as reflective (pavement) due to the existence of hard ground between the source and the receptors.
- The study site was treated as having flat or gently sloping topography.

4.2.3 Roadway Traffic Volumes

The City of Burlington shares the Average Annual Daily Traffic (AADT) values for Plains Road East and Waterdown Road on their open data portal (https://navburl-burlington.opendata.arcgis.com/datasets/aadt-counts-2018). The projected 10-year future traffic volumes, which were determined based on a typical growth rate of 2% per year, corresponds to 26,062 for Plains Road East and 20,843 for Waterdown Road (see Appendix C). In our calculations, the Average Annual Daily Traffic (AADT) volumes, which are based on the theoretical traffic capacities of each roadway, were used as a more conservative approach. Table 2 summarizes the AADT values used for each roadway included in this assessment.

TABLE 2: ROADWAY TRAFFIC DATA

Segment	Roadway Type	Speed Limit (km/h)	Traffic Volumes (AADT)
Plains Road East	Multi-Purpose Arterial	60	**30,000**
Waterdown Road	Minor Arterial	50	**30,000**

4.3 Railway Noise and Ground Vibrations

CN Rail Line is located to the north of the development. For mainline railways, the document titled Guidelines for New Development in Proximity to Railway Operations prepared for the Federation of Canadian Municipalities and the Railway Association of Canada [6] indicates that the noise-sensitive developments within 300 metres of a principle rail line are considered in the influence area of the railway noise. The same document also indicates that the minimum influence area for ground vibrations created by a railway corridor is 75 metres.

[6] Prepared for The Federation of Canadian Municipalities and The Railway Associated of Canada by Dialog and J.E. Coulter Associates Limited, May 2013

The subject site is located more than 500 metres south of the CN Railway, therefore railway noise impact, as well as the ground vibrations and ground-borne noise levels, were not considered in this study.

Roadways are not a significant source of perceptible vibrations and there is no heavy industry immediately adjacent to the subject site.

4.4 Stationary Noise

4.4.1 Stationary Noise Criteria

The equivalent sound energy level, Leq, provides a weighted 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 selected period of time. For stationary sources, the Leq is commonly calculated on an hourly interval, while for roadways, the L_{eq} is calculated on the basis of a 16-hour daytime/8-hour nighttime split.

Noise criteria, taken from the NPC-300, apply to points of reception (POR). A POR is defined under the NPC-300 as "any location on a noise-sensitive land use where noise from a stationary source is received"[7]. A POR can be located on an existing or zoned for future use premises of permanent or seasonal residences, hotels/motels, nursing/retirement homes, rental residences, hospitals, campgrounds, and noise-sensitive buildings such as schools and daycares. As the development site is bordered by a multi-purpose arterial road, Plains Road East to the south, the area is considered as a Class 1 area as per the NPC-300. The recommended maximum noise levels for a Class 1 area at a POR are outlined in Table 3 below.

TABLE 3: EXCLUSIONARY LIMITS FOR CLASS 1 AREA

Time of Day	Point of Reception (POR)	
	Outdoor Points of Reception (OPOR)	Plane of Window (POW)
07:00 – 19:00	50	50
19:00 – 23:00	50	50
23:00 – 07:00	N/A	45

[7] MECP, Environmental Noise Guidelines, NPC 300, page 14

NPC-300 indicates that the sound level of emergency equipment should not exceed 55 dBA during non-emergency situations such as testing or maintenance. As per Ontario Regulation 524/98, (O. Reg. 14/17, s. 3), the noise level of a generator located outdoors should not exceed 75 dBA at 7 metres. The closest noise-sensitive building to the subject site's potential generator location is about 50 metres away. In order for the noise levels to be lower than 55 dBA criteria at the location, the total sound level of the generator should not exceed 72 dBA at 7 metres; this can be easily achieved using a Level 2.0 or Level 3.0 sound enclosure for the generator.

4.4.2 Stationary Noise Assumptions

The primary stationary noise sources around the proposed development are the rooftop equipment of the existing and future neighbouring buildings. The impact of the neighbouring rooftop equipment on the proposed building as well as the impact of the rooftop equipment of the proposed building on the neighbouring buildings were determined by computer modelling. Stationary noise source modelling is based on the software program Predictor-Lima developed from the International Standards Organization (ISO) standard 9613 Parts 1 and 2. This computer program is capable of representing three-dimensional surfaces and first reflections of sound waves over a suitable spectrum for human hearing. The methodology has been used on numerous assignments and has been accepted by the Ministry of the Environment, Conservation and Parks (MECP) as part of the Environmental Compliance Approvals.

The following assumptions have been made in the analysis:

(i) Each neighbouring building was assumed to have a Rooftop Air Handling Unit (RTU) and a cooling tower.

(ii) The subject site is assumed to have two RTUs and two cooling towers.

(iii) The sound power levels of RTUs and cooling towers were based on the past experience of Gradient Wind with similar projects.

(iv) A noise screen has been considered surrounding the outdoor mechanical area of the study building, blocking the line-of-sight to the neighbouring buildings.

(v) The sound sources were modelled as point sources, RTUs being at 1.5 metres and cooling towers being at 3.5 metres above the walking surface in the analysis.

(vi) RTUs and cooling towers were assumed to be working 100% of the daytime period and 50% of the nighttime period.

(vii) Ground surfaces were taken to be reflective due to the presence of hard ground (pavement, concrete).

(viii) Noise receptors were strategically placed at 22 locations. 12 of these receptors are on the subject site and 10 of them on the neighbouring buildings (see Figure 2).

4.4.3 Determination of Noise Source Power Levels

Table 4 summarizes the sound power of each source used in the analysis. The stationary noise source locations can be seen in Figure 3. The sound power for various pieces of equipment was assumed based on Gradient Wind's experience with similar types of equipment and catalogues of manufactures' data.

TABLE 4: EQUIPMENT SOUND POWER LEVELS (dB)

Source ID	Description	Height Above Walking Surface (m)	Frequency (Hz)								
			63	125	250	500	1000	2000	4000	8000	Total (dB)
S1-7	RTU	1.5	85	87	82	82	83	76	72	67	**91**
S8-12	Cooling Tower	3.5	94	91	86	80	79	80	79	76	**97**

5. RESULTS

5.1 Roadway Traffic Noise Levels

The results of the roadway traffic noise calculations are summarized in Table 5. Predictor input-output data is available upon request.

TABLE 5: EXTERIOR NOISE LEVELS DUE TO ROADWAY TRAFFIC SOURCES

Receptor Number	Receptor Type	Receptor Location	Receptor Height (m)	PREDICTOR-LIMA Noise Level (dBA)	
				Day	Night
1	POW	North Façade – Level 6	17.50	68	60
2	POW	West Façade – Level 6	17.50	63	55
3	POW	North Façade – Level 9	26.50	67	60
4	POW	North Façade – Level 10	29.50	61	53
5	POW	North Façade – Level 7	20.50	58	51
6	POW	East Façade – Level 6	17.50	63	55
7	OLA	West – Amenity Terrace	29.50	56	N/A*
8	OLA	North – Amenity Terrace	29.50	53	N/A*
9	OLA	Grade-Level Outdoor Area	1.50	26	N/A*
10	OLA	South – Level 2 Terrace	6.00	26	N/A*
11	POW	South Façade – Level 9	26.50	40	32
12	POW	South Façade – Level 10	29.50	40	32

*OLA noise levels during the nighttime are not considered as per NPC-300

The results of the current analysis indicate that noise levels will range between 40 and 68 dBA at POW receptors during the daytime period (07:00-23:00) and between 32 and 60 dBA during the nighttime period (23:00-07:00). The highest noise level occurs at the development's north façade which is nearest and most exposed to Plains Road East.

Well insulated double pane windows, such as 6mm glass, 13 mm air space, and 6 mm glass or equivalent will provide sufficient attenuation provided that the sound transmission class (STC) ratings of the window system meet STC 30.

Regarding the OLA receptors, only Receptor 7, placed at the west side of the rooftop amenity terrace, is 1 dBA higher than the criteria of 55 dBA during the daytime period. When noise levels at the outdoor living areas are between 55 dBA and 60 dBA, noise control measures may be applied to reduce the sound level to 55 dBA where feasible. Since the addition of a barrier for 1 dBA reduction in noise level is not considered to be reasonably feasible and the noise level does not exceed 60 dBA, the noise level at Receptor 7 is acceptable when the required warning clause Type A is added to all Lease, Purchase and Sale Agreements (see Section 6).

5.2 Stationary Noise Levels

The receptor numbers, locations, and the receptor heights above grade can be seen in Table 6. The noise impact from the neighbouring mid and high-rise buildings on the subject site is presented in Table 7. Noise levels at all receptors due to the stationary noise sources fall below the NPC-300 criteria. Noise contours can be seen in Figures 7 and 8 for daytime and nighttime conditions, respectively.

Once the mechanical design of the building is completed, equipment sound levels should be reviewed by a qualified acoustic engineer, to ensure compliance with NPC-300 criteria.

TABLE 6: STATIONARY NOISE RECEPTORS

Receptor Number	Receptor Type	Receptor Location	Receptor Height Above Grade (m)
1	POW	North Façade – Level 6	17.50
2	POW	West Façade – Level 6	17.50
3	POW	North Façade – Level 9	26.50
4	POW	North Façade – Level 10	29.50
5	POW	North Façade – Level 7	20.50
6	POW	East Façade – Level 6	17.50
7	OPOR	West – Amenity Terrace	29.50
8	OPOR	North – Amenity Terrace	29.50
9	OPOR	Grade-Level Outdoor Area	1.50
10	OPOR	South – Level 2 Terrace	6.00
11	POW	South Façade – Level 9	26.50
12	POW	South Façade – Level 10	29.50
13	POW	53 Plains Road E – South Facade	37.80
14	POW	53 Plains Road E – South Facade	31.70
15	POW	53 Plains Road E – South Facade	31.70
16	POW	71 Plains Road E – South Facade	31.70
17	POW	71 Plains Road E – South Facade	31.70
18	POW	35 Plains Road E – South Facade	25.60
19	POW	34 Plains Road E – West Facade	19.00
20	POW	41 Fairwood Place E – North Facade	6.50
21	POW	53 Fairwood Place E – North Facade	6.50
22	POW	92 Plains Road E – West Facade	18.80

TABLE 7: EXTERIOR NOISE LEVELS AT THE SUBJECT SITE DUE TO STATIONARY NOISE SOURCES

Receptor Number	34 Plains Road E Noise Level (dBA)		35 Plains Road E Noise Level (dBA)		53 Plains Road E Noise Level (dBA)		71 Plains Road E Noise Level (dBA)		92 Plains Road E Noise Level (dBA)	
	Day*	Night	Day*	Night	Day*	Night	Day*	Night	Day*	Night
1	25	22	42	39	36	33	41	38	12	9
2	48	45	35	32	21	18	32	29	9	6
3	30	26	40	37	31	28	40	37	11	8
4	22	19	42	39	24	21	42	39	12	9
5	32	29	42	39	32	29	48	45	15	12
6	10	7	11	8	18	15	43	40	24	21
7	47	N/A**	42	N/A**	30	N/A**	27	N/A**	10	N/A**
8	18	N/A**	39	N/A**	34	N/A**	45	N/A**	21	N/A**
9	19	N/A**	20	N/A**	13	N/A**	24	N/A**	16	N/A**
10	20	N/A**	17	N/A**	14	N/A**	23	N/A**	16	N/A**
11	35	32	19	16	16	13	19	16	11	8
12	22	19	18	15	16	13	22	19	11	8

* Day values include both day and evening results.

** OPOR noise levels during the nighttime are not considered as per the NPC-300.

TABLE 8: EXTERIOR NOISE LEVELS AT THE NEIGHBOURING BUILDINGS DUE TO STATIONARY NOISE SOURCES AT THE SUBJECT SITE

Receptor Number	Receptor Type	Stationary Sources Noise Level (dBA)	
		Day	Night
1	POW	39	36
2	POW	27	24
3	POW	39	36
4	POW	43	40
5	POW	38	35
6	POW	29	26
7	OPOR	35	N/A**
8	OPOR	43	N/A**
9	OPOR	32	N/A**
10	OPOR	37	N/A**
11	POW	33	30
12	POW	41	38
13	POW	48	45
14	POW	46	43
15	POW	46	43
16	POW	48	45
17	POW	47	44
18	POW	41	38
19	POW	33	30
20	POW	33	30
21	POW	33	30
22	POW	30	27

* Day values include both day and evening results.

** OPOR noise levels during the nighttime are not considered as per the NPC-300.

6. CONCLUSIONS AND RECOMMENDATIONS

The noise levels predicted due to roadway traffic exceed the criteria listed in NPC-300 for building components, therefore STC rated windows and exterior walls will be required, which meet STC 30.

The results of the calculations also indicate that the development will require central air conditioning, or a similar ventilation system, which will allow occupants to keep windows closed and maintain a comfortable living environment. The system will be installed by the developer and will be maintained by the building owner. Warning Clause Type D will also be required in all Lease, Purchase and Sale Agreements:

> *"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."*

Noise levels at the west side of the rooftop amenity terrace were found to be 56 dBA during the daytime. When outdoor living area noise level is between 55 dBA and 60 dBA, noise control measures may be applied to reduce the sound level to 55 dBA where it is feasible. If noise control measures are not provided, prospective purchasers or tenants should be informed of potential noise problems by a Type A warning clause, placed on all Purchase, Sale and Lease Agreements:

> *"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."*

CN Rail Line is located to the north of the development. For mainline railways, the document titled Guidelines for New Development in Proximity to Railway Operations prepared for the Federation of Canadian Municipalities and the Railway Association of Canada [8] indicates that the noise-sensitive developments within 300 metres of a principle rail line are considered in the influence area of the railway. The same document also indicates that the minimum influence area for ground vibrations created by a railway corridor is 75 metres. The subject site is located more than 500 metres south of the CN Railway,

[8] Prepared for The Federation of Canadian Municipalities and The Railway Associated of Canada by Dialog and J.E. Coulter Associates Limited, May 2013

therefore railway noise impact, as well as the ground vibrations and ground-borne noise levels, were not considered in this study. Roadways are not a significant source of perceptible vibrations and there is no heavy industry immediately adjacent to the subject site.

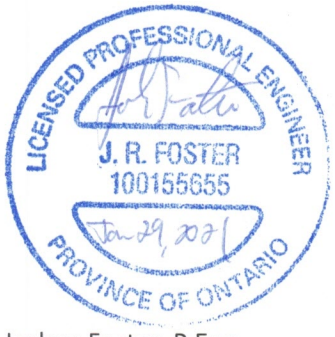
A preliminary stationary noise study was conducted to assess the impact of the surrounding buildings on the subject site and the noise impact of the subject site on the neighbouring noise-sensitive buildings. The result of this study indicated that noise levels at all receptors due to the stationary noise sources fall below the NPC-300 criteria.

NPC-300 indicates that the sound level of emergency equipment should not exceed 55 dBA during non-emergency situations such as testing or maintenance. As per Ontario Regulation 524/98, (O. Reg. 14/17, s. 3), the noise level of a generator located outdoors should not exceed 75 dBA at 7 metres. The closest noise-sensitive building to the subject site's potential generator location is about 50 metres away. In order for the noise levels to be lower than 55 dBA criteria at the location, the total sound level of the generator should not exceed 72 dBA at 7 metres; this can be easily achieved using a Level 2.0 or Level 3.0 enclosure for the generator.

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,

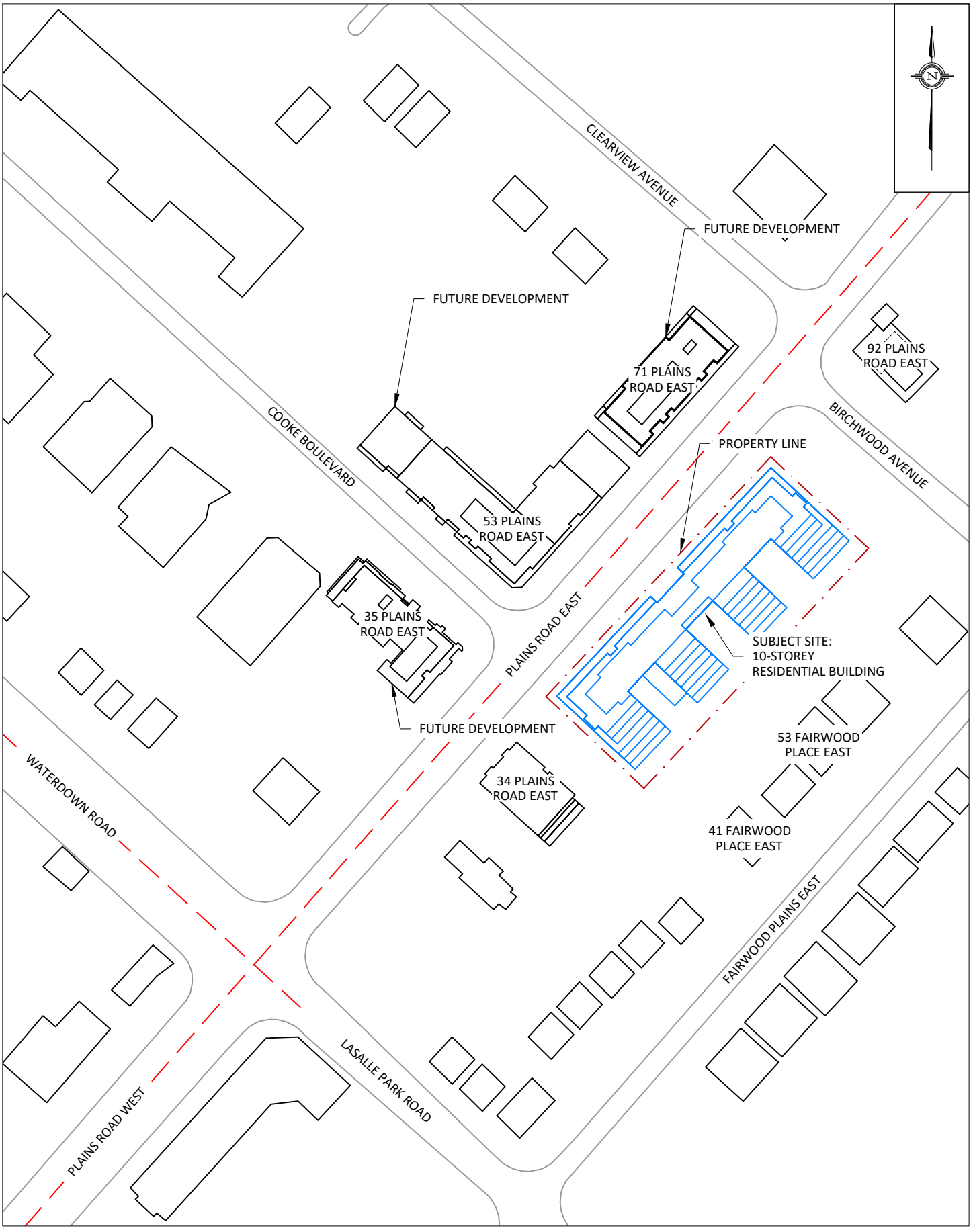
Gradient Wind Engineering Inc.



Efser Kara, MSc, LEED GA
Acoustic Scientist

Joshua Foster, P.Eng.
Principal

Gradient Wind File #19-235-Environmental Noise



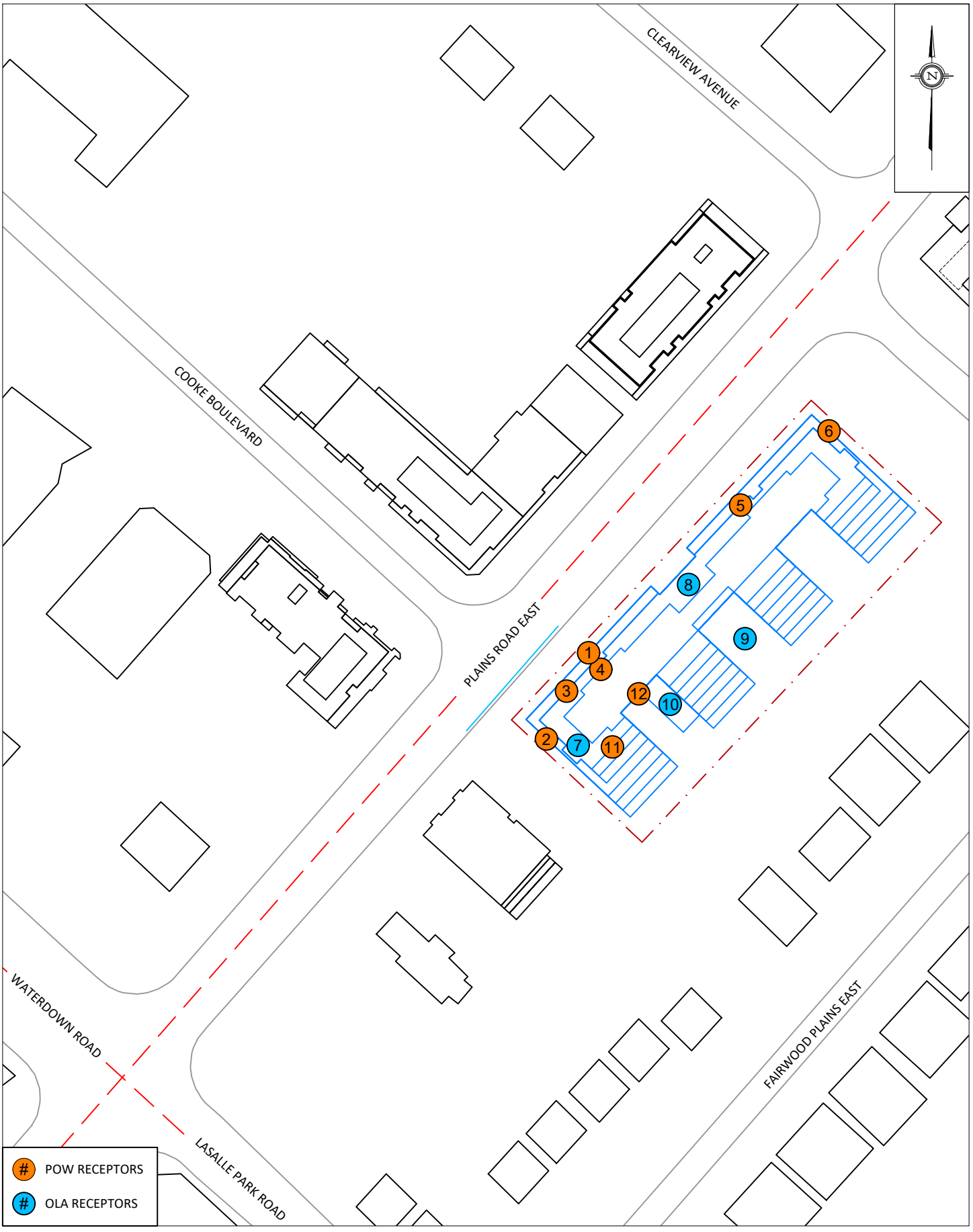
GRADIENTWIND
ENGINEERS & SCIENTISTS

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

PROJECT	40-70 PLAINS ROAD ENVIRONMENTAL NOISE FEASIBILITY STUDY
SCALE	1:2000 (APPROX.)
DRAWING NO.	GW19-235-1
DATE	JANUARY 20, 2021
DRAWN BY	E.K.

DESCRIPTION

FIGURE 1:
SITE PLAN AND SURROUNDING CONTEXT



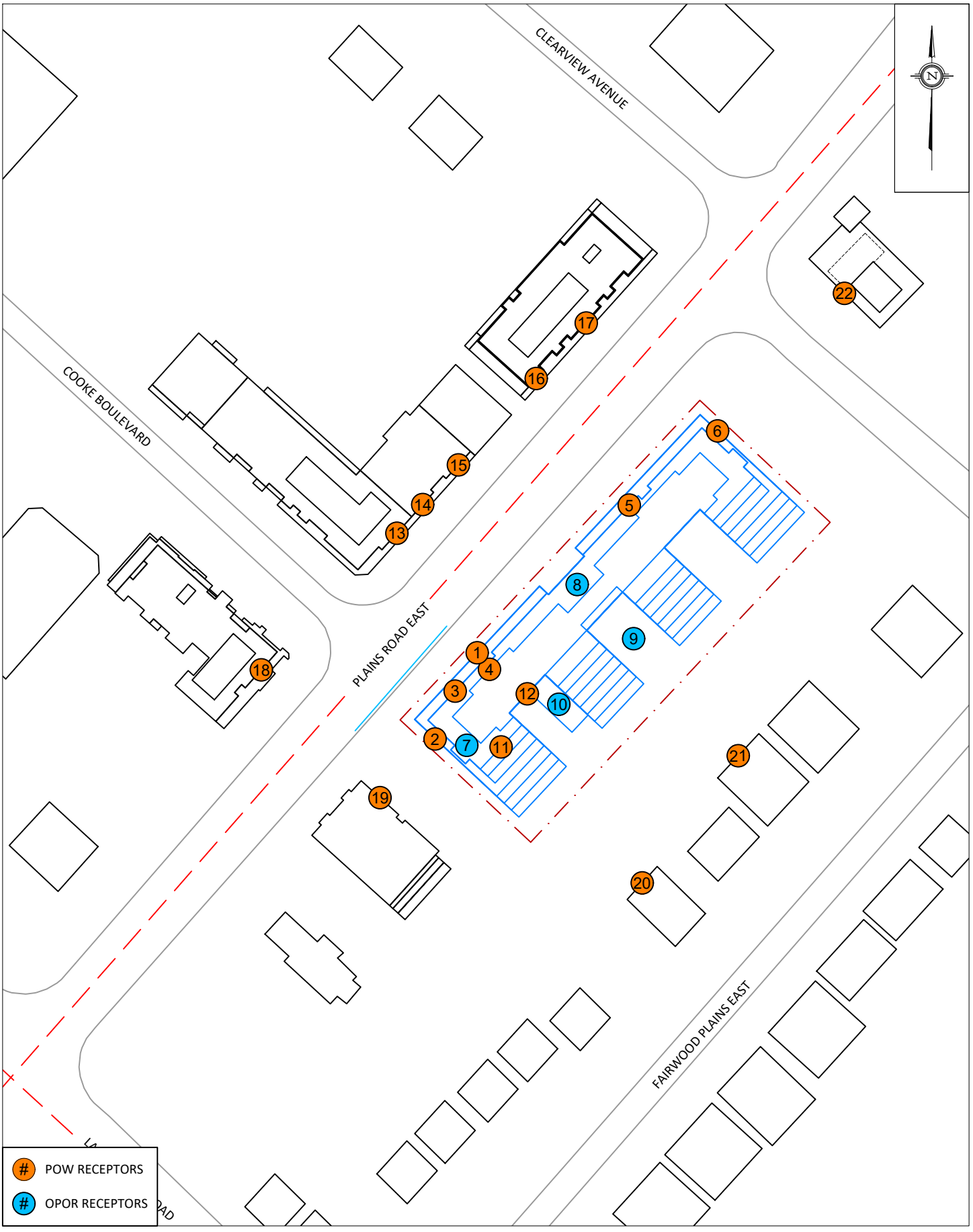
GRADIENTWIND
ENGINEERS & SCIENTISTS

127 WALGREEN ROAD , OTTAWA, ON
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PROJECT	40-70 PLAINS ROAD ENVIRONMENTAL NOISE FEASIBILITY STUDY		
SCALE	1:1500 (APPROX.)	DRAWING NO.	GW19-235-2
DATE	JANUARY 20, 2021	DRAWN BY	E.K.

DESCRIPTION

FIGURE 2:
TRAFFIC NOISE RECEPTOR LOCATIONS

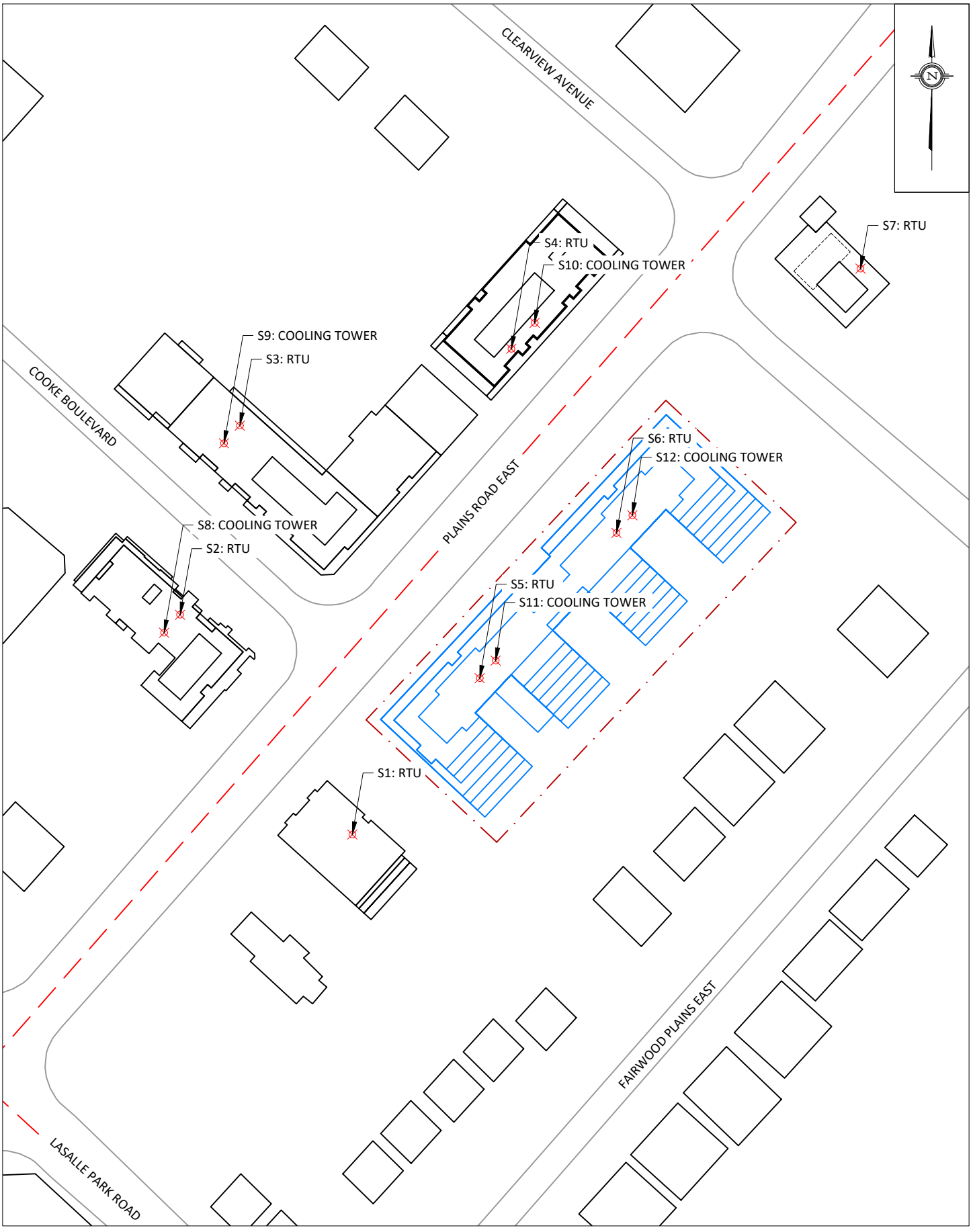


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ENGINEERS & SCIENTISTS

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

PROJECT	40-70 PLAINS ROAD ENVIRONMENTAL NOISE FEASIBILITY STUDY		DESCRIPTION
SCALE	1:1500 (APPROX.)	DRAWING NO.	GW19-235-3
DATE	JANUARY 20, 2021	DRAWN BY	E.K.

FIGURE 3:
STATIONARY NOISE RECEPTOR LOCATIONS



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PROJECT	40-70 PLAINS ROAD ENVIRONMENTAL NOISE FEASIBILITY STUDY		DESCRIPTION
SCALE	1:1500 (APPROX.)	DRAWING NO.	GW19-235-4
DATE	JANUARY 20, 2021	DRAWN BY	E.K.

FIGURE 4:
STATIONARY NOISE SOURCES



FIGURE 5: ROADWAY TRAFFIC NOISE LEVEL CONTOURS, DAYTIME PERIOD



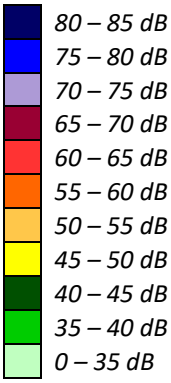
FIGURE 6: ROADWAY TRAFFIC NOISE LEVEL CONTOURS, NIGHTTIME PERIOD



FIGURE 7: STATIONARY NOISE CONTOURS
IMPACT OF THE SUBJECT SITE, DAYTIME PERIOD



FIGURE 8: STATIONARY NOISE CONTOURS
IMPACT OF THE SUBJECT SITE, NIGHTTIME PERIOD



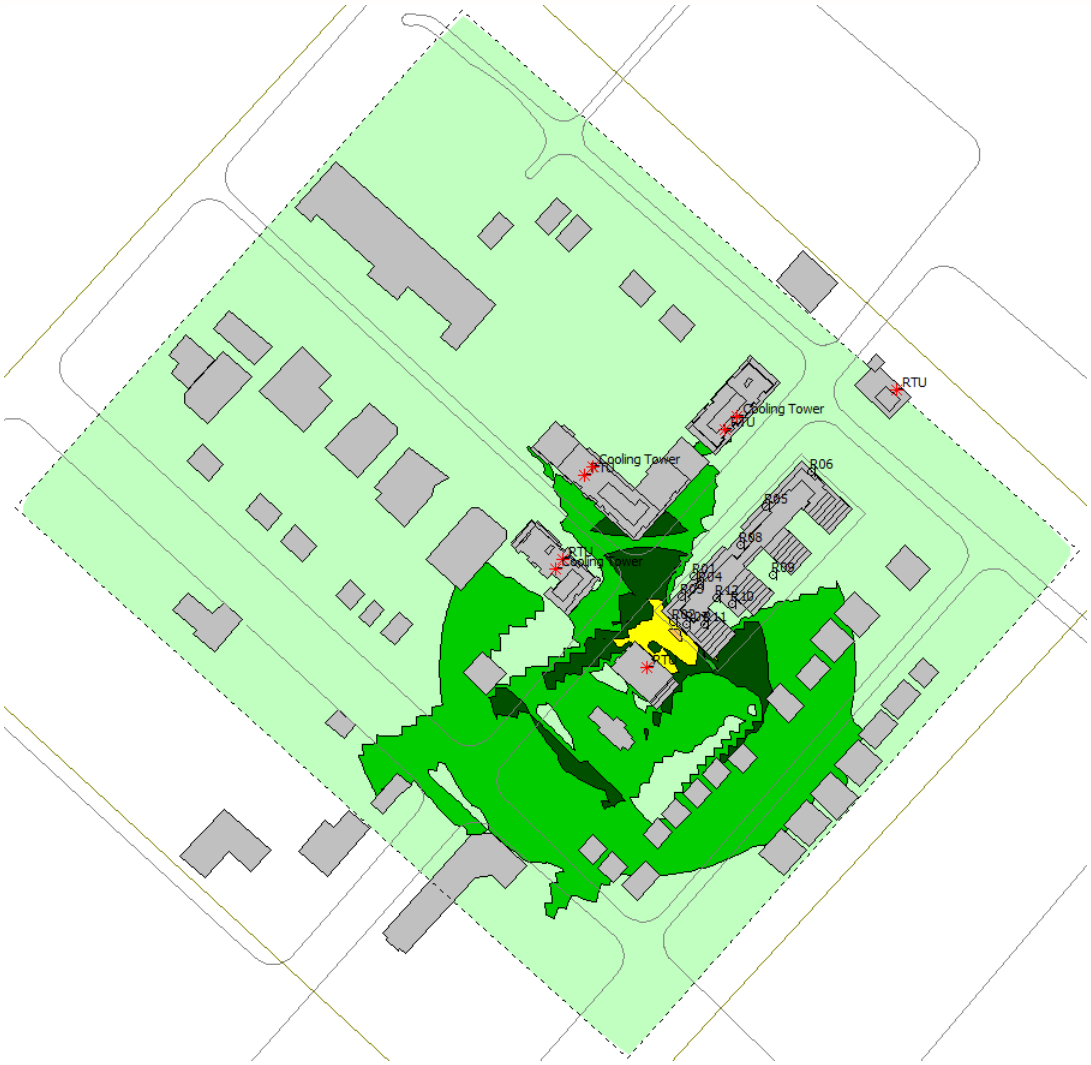


FIGURE 9: STATIONARY NOISE CONTOURS
IMPACT OF 34 PLAINS ROAD, DAYTIME PERIOD

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



FIGURE 10: STATIONARY NOISE CONTOURS
IMPACT OF 34 PLAINS ROAD, NIGHTTIME PERIOD



FIGURE 11: STATIONARY NOISE CONTOURS
IMPACT OF 35 PLAINS ROAD, DAYTIME PERIOD

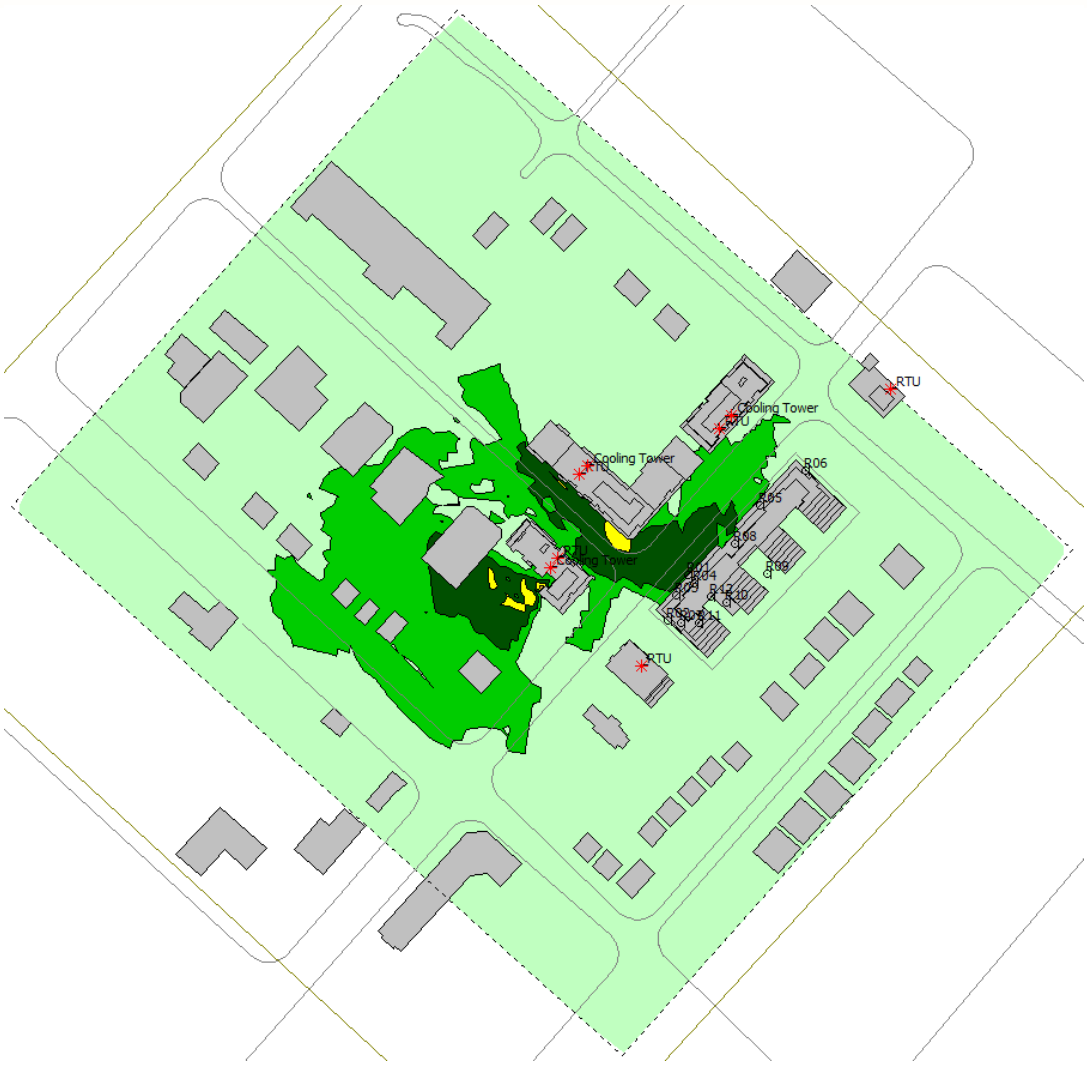


FIGURE 12: STATIONARY NOISE CONTOURS
IMPACT OF 35 PLAINS ROAD, NIGHTTIME PERIOD

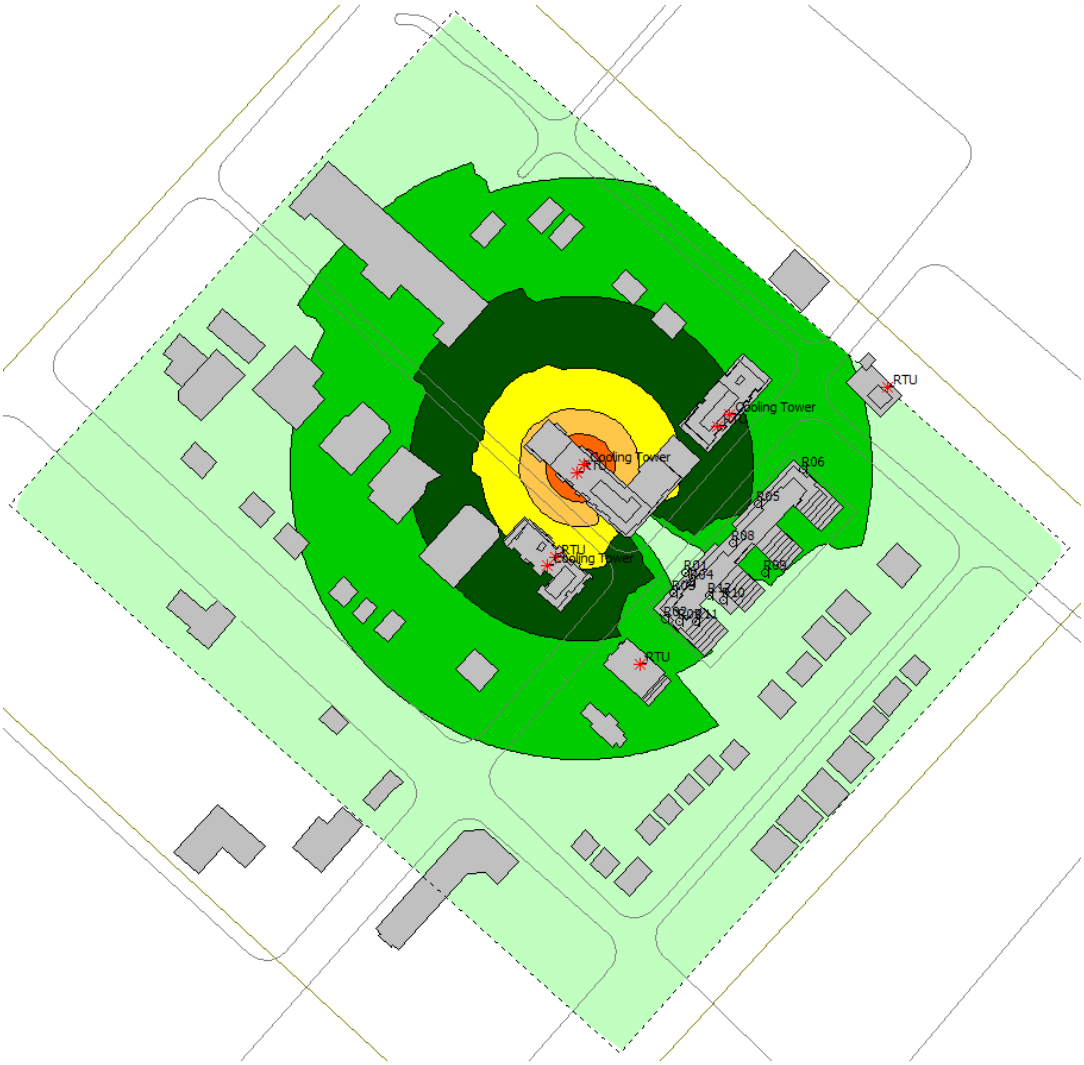


FIGURE 13: STATIONARY NOISE CONTOURS
IMPACT OF 53 PLAINS ROAD, DAYTIME PERIOD

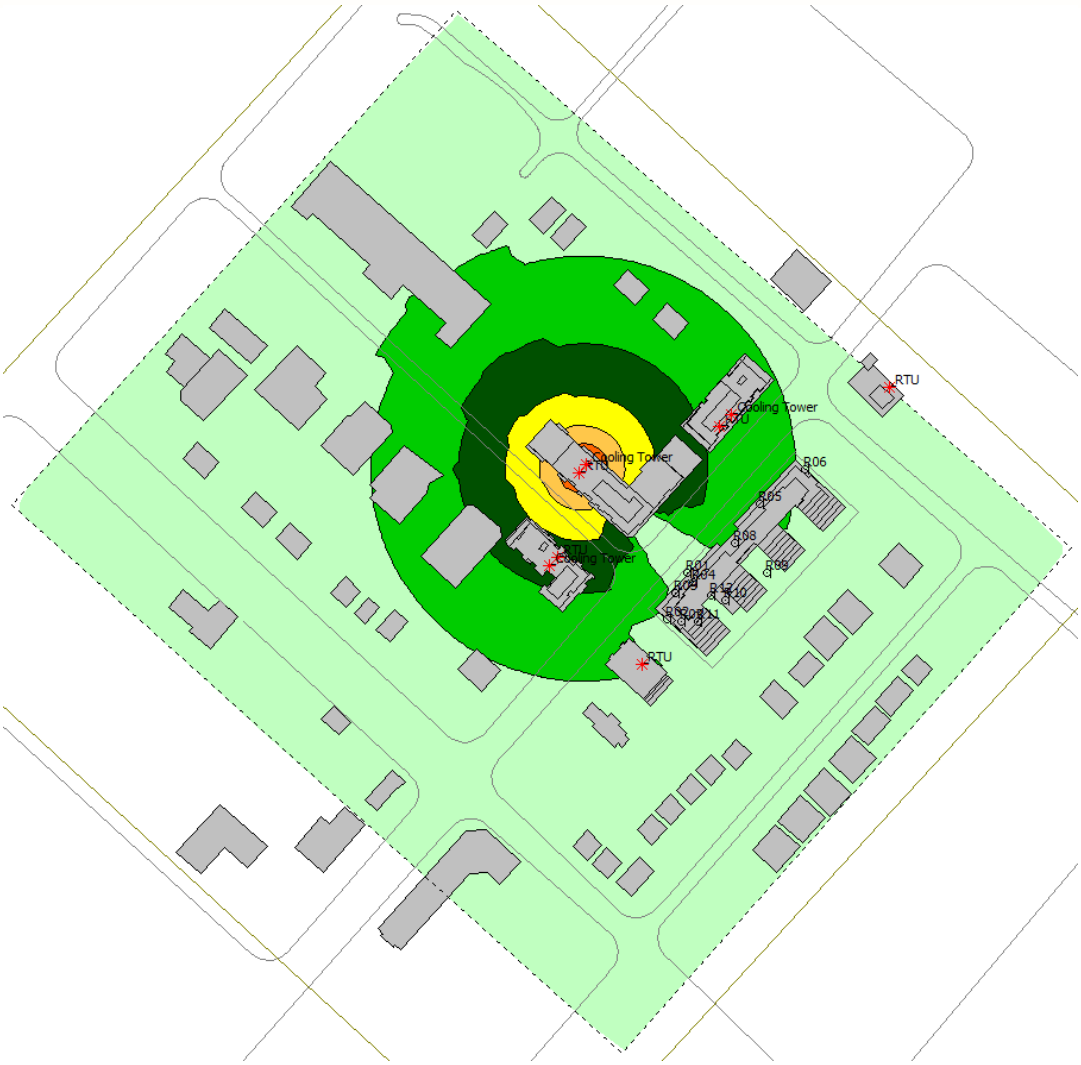
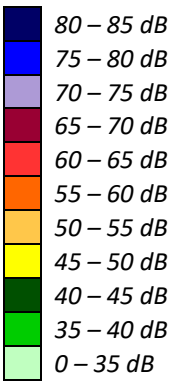


FIGURE 14: STATIONARY NOISE CONTOURS
IMPACT OF 53 PLAINS ROAD, NIGHTTIME PERIOD



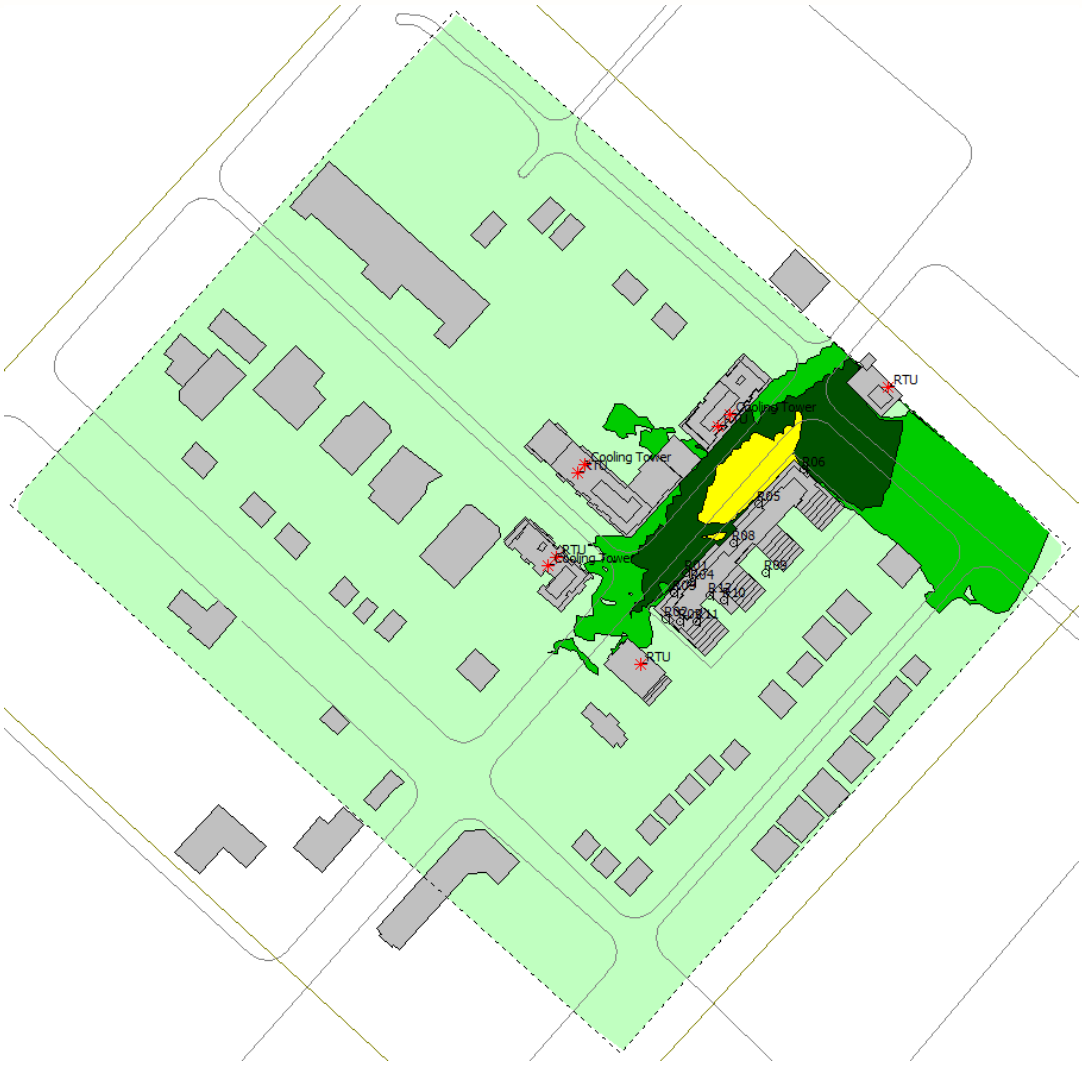


FIGURE 15: STATIONARY NOISE CONTOURS
IMPACT OF 71 PLAINS ROAD, DAYTIME PERIOD

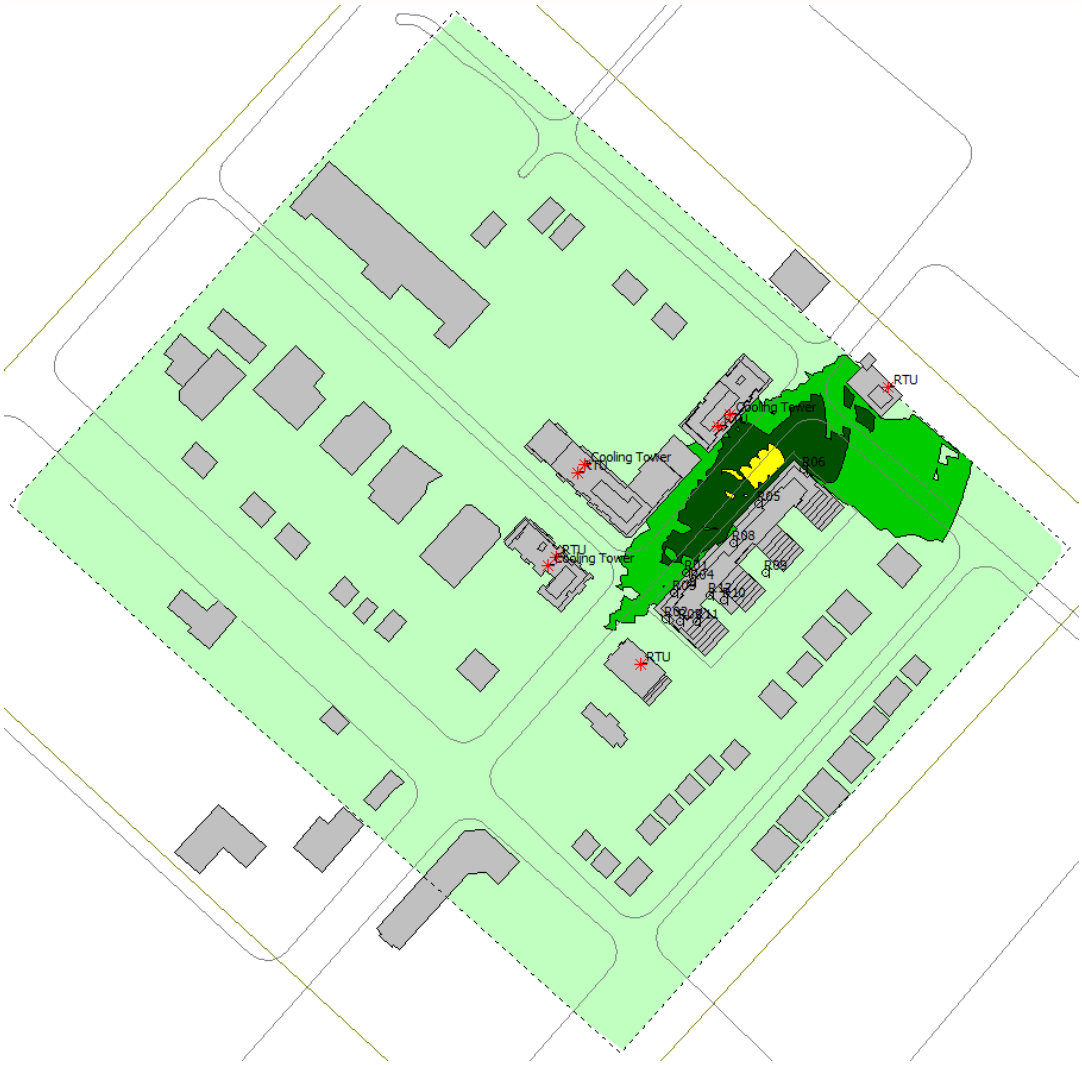


FIGURE 16: STATIONARY NOISE CONTOURS
IMPACT OF 71 PLAINS ROAD, NIGHTTIME PERIOD

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



FIGURE 17: STATIONARY NOISE CONTOURS
IMPACT OF 92 PLAINS ROAD, DAYTIME PERIOD

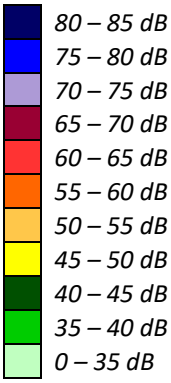
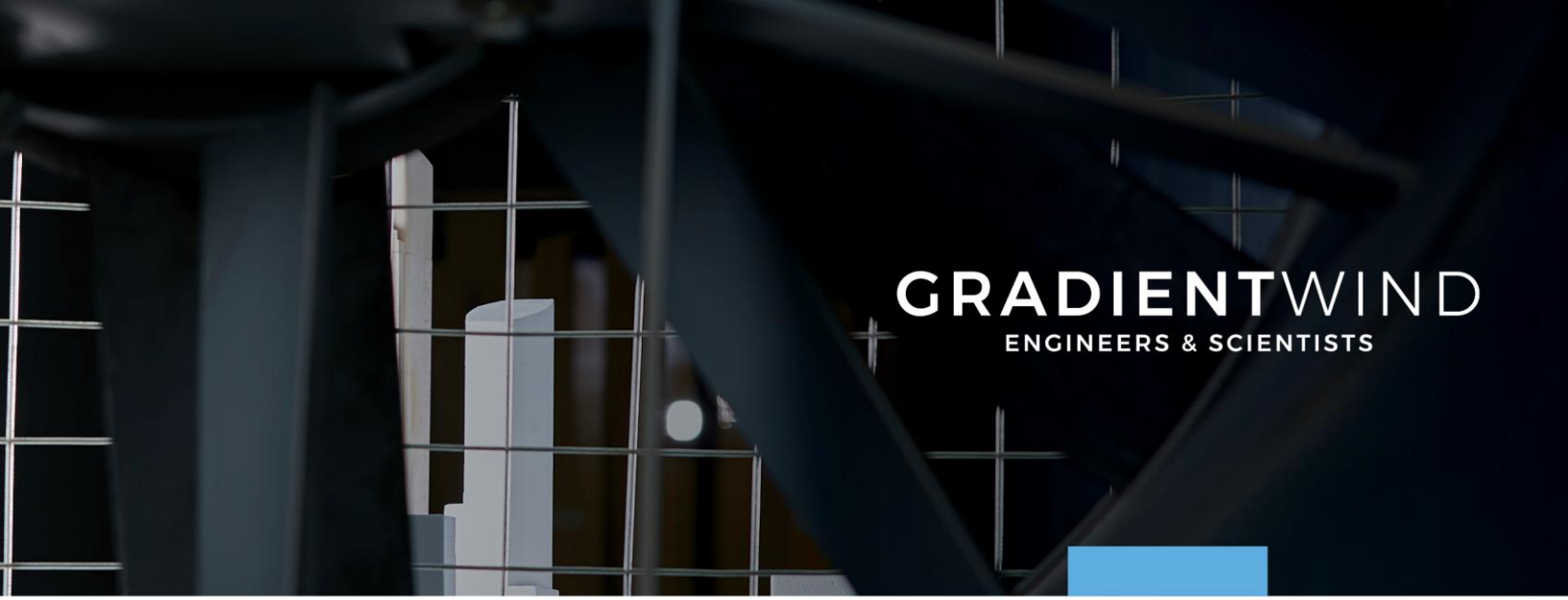
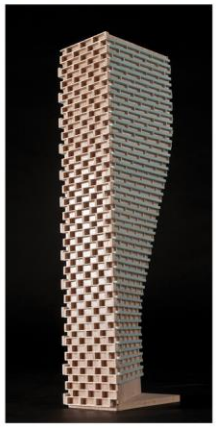




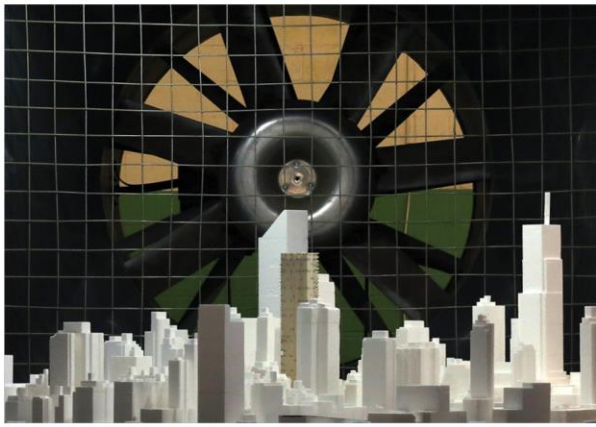
FIGURE 18: STATIONARY NOISE CONTOURS
IMPACT OF 92 PLAINS ROAD, NIGHTTIME PERIOD











APPENDIX A

PREDICTOR INPUT-OUTPUT DATA FOR TRAFFIC NOISE

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

RECEPTOR 1 (SAMPLE)
Current road id : 4262
Source part calculation order

PartID	P1.x	P1.y	P2.x	P2.y
1	-59762.68	5526.15	-59554.19	5763.58
2	-59554.19	5763.58	-59491.99	5841.01
0	-59867.70	5407.39	-59762.68	5526.15

Start calculation source part : 1
Start calculation on triangle : 1
Segment length : 118.76
Angle : 10.00

	x	y
Point A	-59762.68	5526.15
Point B	-59684.31	5615.40
Origin	-59626.32	5652.93

Start calculation on triangle : 2
Segment length : 27.56
Angle : 10.00

	x	y
Point A	-59684.31	5615.40
Point B	-59666.13	5636.10
Origin	-59626.32	5652.93

Start calculation on triangle : 3
Segment length : 12.83
Angle : 10.00

	x	y
Point A	-59666.13	5636.10
Point B	-59657.67	5645.74
Origin	-59626.32	5652.93

Start calculation on triangle : 4
Segment length : 7.79
Angle : 10.00

	x	y
Point A	-59657.67	5645.74
Point B	-59652.52	5651.60
Origin	-59626.32	5652.93

Start calculation on triangle : 5
Segment length : 5.51
Angle : 10.00

	x	y
Point A	-59652.52	5651.60
Point B	-59648.89	5655.74
Origin	-59626.32	5652.93

Start calculation on triangle : 6
Segment length : 4.33
Angle : 10.00

	x	y
Point A	-59648.89	5655.74

```
      Point B     -59646.03       5658.99
       Origin     -59626.32       5652.93
Start calculation on triangle : 7
        Segment length :      3.68
               Angle :      10.00
                   x           y
      Point A     -59646.03       5658.99
      Point B     -59643.60       5661.76
       Origin     -59626.32       5652.93
Start calculation on triangle : 8
        Segment length :      3.38
               Angle :      10.00
                   x           y
      Point A     -59643.60       5661.76
      Point B     -59641.37       5664.30
       Origin     -59626.32       5652.93
Start calculation on triangle : 9
        Segment length :      3.30
               Angle :      10.00
                   x           y
      Point A     -59641.37       5664.30
      Point B     -59639.19       5666.78
       Origin     -59626.32       5652.93
Start calculation on triangle : 10
        Segment length :      3.41
               Angle :      10.00
                   x           y
      Point A     -59639.19       5666.78
      Point B     -59636.94       5669.34
       Origin     -59626.32       5652.93
Start calculation on triangle : 11
        Segment length :      3.76
               Angle :      10.00
                   x           y
      Point A     -59636.94       5669.34
      Point B     -59634.46       5672.17
       Origin     -59626.32       5652.93
Start calculation on triangle : 12
        Segment length :      4.47
               Angle :      10.00
                   x           y
      Point A     -59634.46       5672.17
      Point B     -59631.51       5675.53
       Origin     -59626.32       5652.93
Start calculation on triangle : 13
        Segment length :      5.78
               Angle :      10.00
                   x           y
```

```
      Point A     -59631.51       5675.53
      Point B     -59627.69       5679.88
       Origin     -59626.32       5652.93
Start calculation on triangle : 14
         Segment length :      8.33
                Angle :      10.00
                    x           y
      Point A     -59627.69       5679.88
      Point B     -59622.20       5686.13
       Origin     -59626.32       5652.93
Start calculation on triangle : 15
         Segment length :     14.18
                Angle :      10.00
                    x           y
      Point A     -59622.20       5686.13
      Point B     -59612.84       5696.79
       Origin     -59626.32       5652.93
Start calculation on triangle : 16
         Segment length :     32.47
                Angle :      10.00
                    x           y
      Point A     -59612.84       5696.79
      Point B     -59591.43       5721.18
       Origin     -59626.32       5652.93
Start calculation on triangle : 17
         Segment length :     56.42
                Angle :       6.02
                    x           y
      Point A     -59591.43       5721.18
      Point B     -59554.19       5763.58
       Origin     -59626.32       5652.93
Contribution per period (Db) for triangle : 1
   55.93     0.00    48.34     0.00
Contribution per period (Db) for triangle : 2
   56.24     0.00    48.65     0.00
Contribution per period (Db) for triangle : 3
   55.99     0.00    48.40     0.00
Contribution per period (Db) for triangle : 4
   55.73     0.00    48.13     0.00
Contribution per period (Db) for triangle : 5
   55.47     0.00    47.88     0.00
Contribution per period (Db) for triangle : 6
   54.98     0.00    47.39     0.00
Contribution per period (Db) for triangle : 7
   55.04     0.00    47.45     0.00
Contribution per period (Db) for triangle : 8
   55.33     0.00    47.73     0.00
Contribution per period (Db) for triangle : 9
```

Model: Initial Condition
Group: (main group)
Listing of: Roads, for method Road traffic noise - LimA - TNM

Name	Desc.	HDef.	Terrain L	V(Auto)	V(Medium Truck)	V(Heavy Truck)	%Auto(D)	%Medium Truck(D)	%Heavy Truck(D)	Auto(D)	Auto(N)
Plains RdE	Plains Rd East	Relative	0.00	60.00	60.00	60.00	88.00	7.00	5.00	1518.00	264.00
Waterdown	Waterdown Rd	Relative	0.00	50.00	50.00	50.00	88.00	7.00	5.00	1518.00	264.00

Model: Initial Condition
Group: (main group)
Listing of: Roads, for method Road traffic noise - LimA - TNM

Name	Medium Truck(D)	Medium Truck(N)	Heavy Truck(D)	Heavy Truck(N)
Plains RdE	121.00	21.00	86.00	15.00
Waterdown	121.00	21.00	86.00	15.00

Report: Table of Results
Model: Initial Condition
LAeq: total results for receivers
Group: (main group)
Group Reduction: No

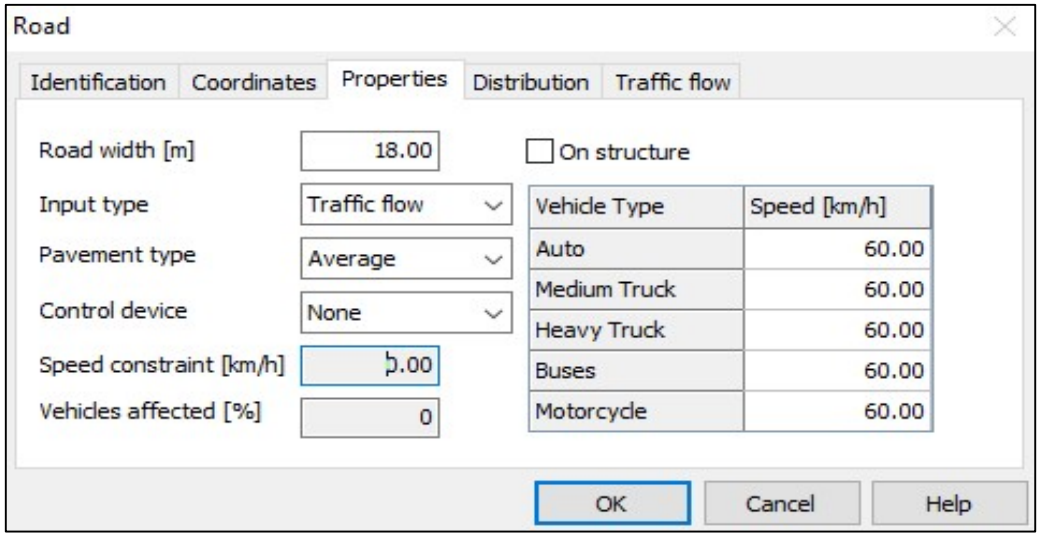
Name Receiver	X	Y	Height	Day	Night
R01_A	-59626.32	5652.93	17.50	68	60
R02_A	-59638.61	5624.99	17.50	63	55
R03_A	-59633.59	5640.72	26.50	67	60
R04_A	-59622.98	5647.43	29.50	61	53
R05_A	-59583.00	5694.71	20.50	58	51
R06_A	-59555.13	5715.94	17.50	63	55
R07_A	-59630.51	5623.75	29.50	56	48
R08_A	-59598.15	5671.28	29.50	53	45
R09_A	-59578.66	5653.26	1.50	26	18
R10_A	-59603.39	5636.32	6.00	26	19
R11_A	-59620.06	5623.80	26.50	40	32
R12_A	-59612.38	5639.47	29.50	40	32

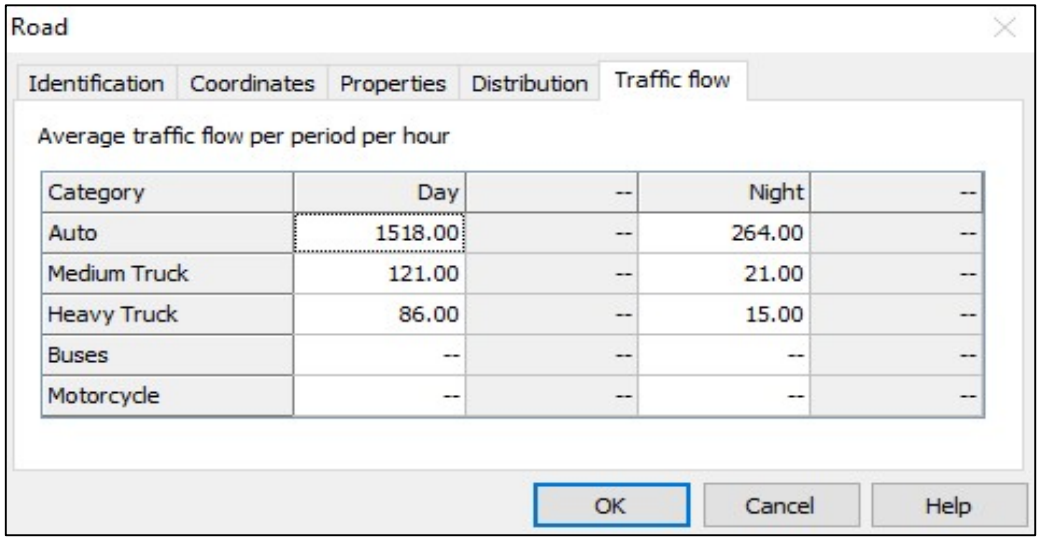
All shown dB values are A-weighted

40-70 PLAINS ROAD EAST - TRAFFIC FLOW CALCULATION

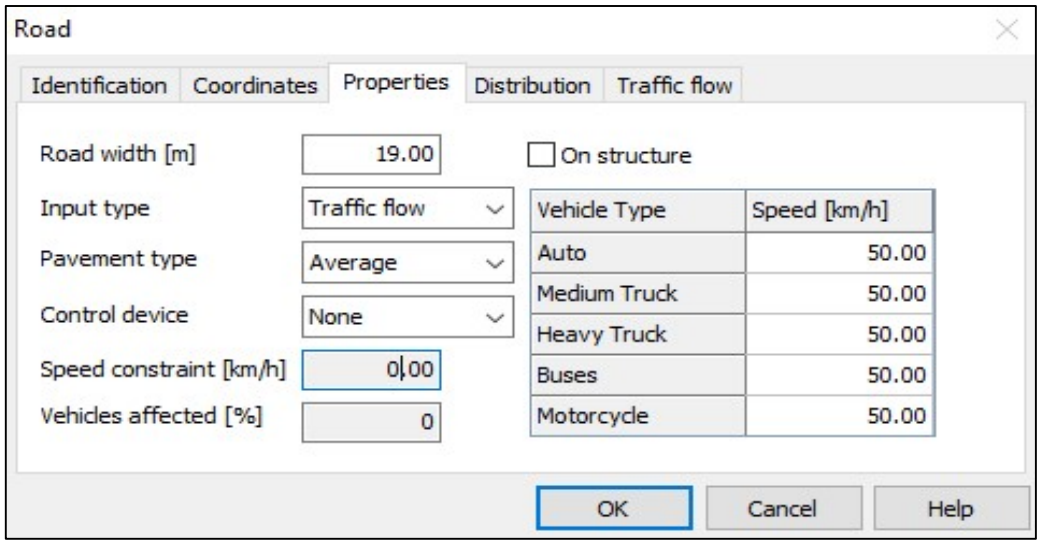
			Average traffic flow per period per hour (PREDICTOR)					
			Day			Night		
#	Road	AADT	Auto (88% - 16 hr)	Med Truck (7% - 16 hr)	Hvy Truck (5% - 16 hr)	Auto (88% - 8 hr)	Med Truck (7% - 8 hr)	Hvy Truck (5% - 16 hr)
1	Waterdown Road	30,000	1518	121	86	264	21	15
2	Plains Rd East	30,000	1518	121	86	264	21	15

PLAINS ROAD EAST - PREDICTOR INPUT SCREENSHOT





WATERDOWN ROAD - PREDICTOR INPUT SCREENSHOT



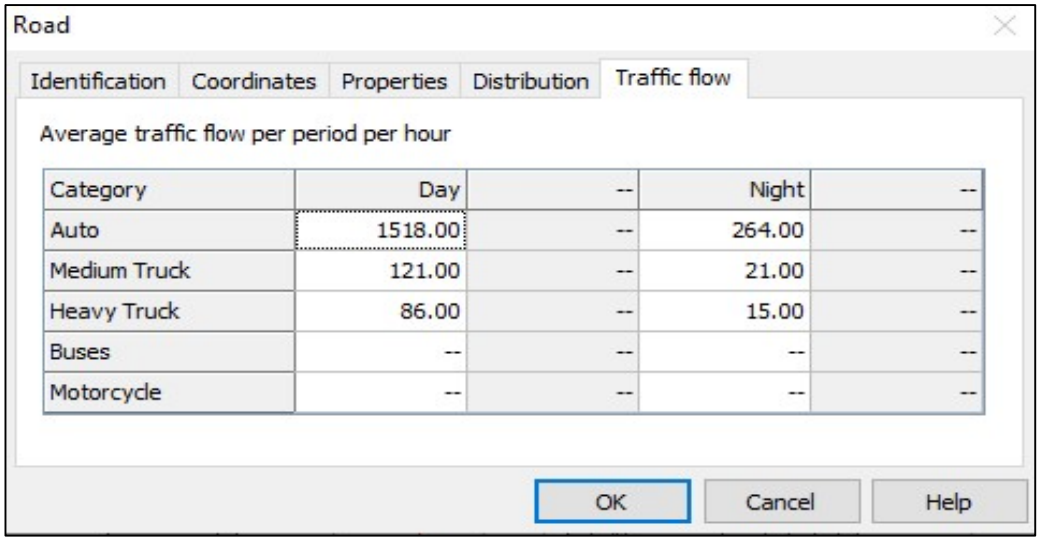


Table of Results

All Receivers | Details

Contents | Receivers

LAeq

Use groups

Include group reductions

Number of rows: 0

Number of decimals: 0

Columns

- Name
- Description
- X
- Y
- Height
- Day
- Night

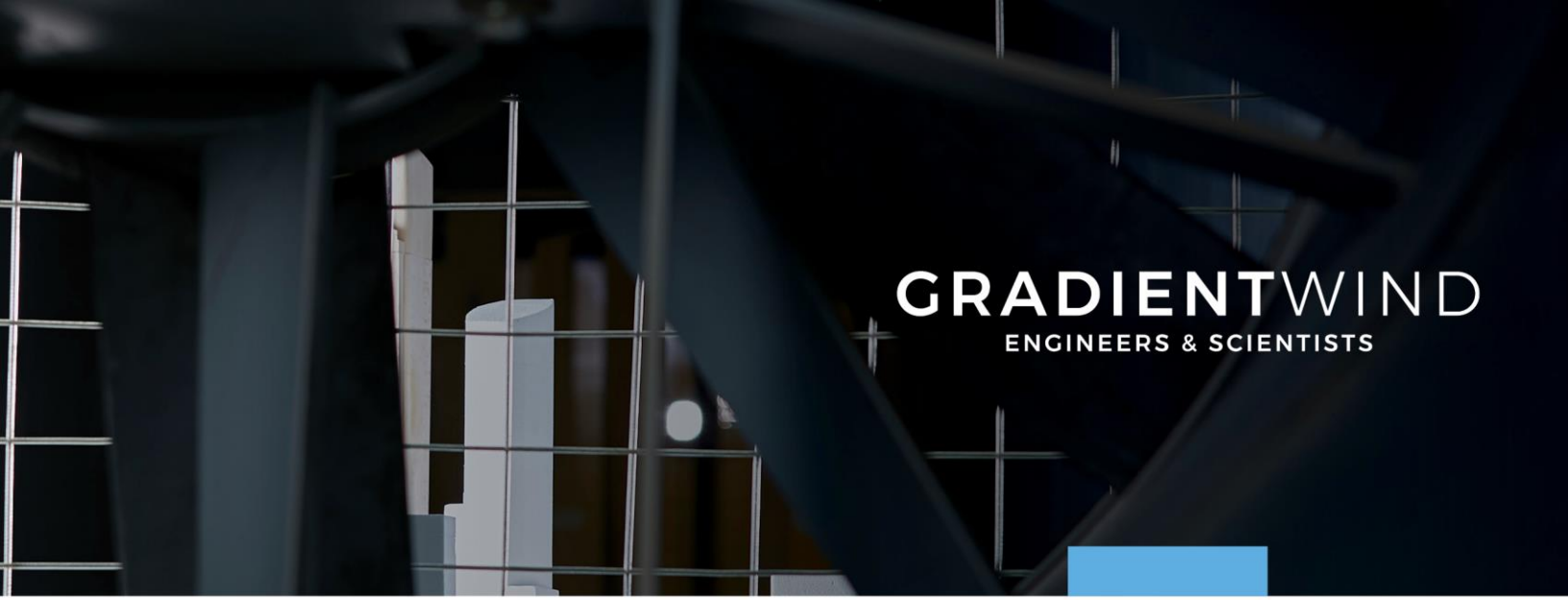
Groups

(main group)

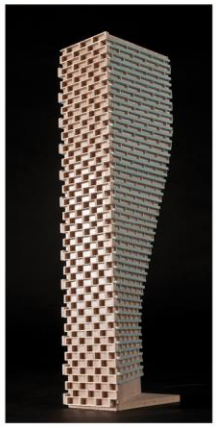
20201002 Massing for Predictor R1.(

Name	X	Y	Height	Day	Night
R01_A	-59626.32	5652.93	17.50	68	60
R02_A	-59638.61	5624.99	17.50	63	55
R03_A	-59633.59	5640.72	26.50	67	60
R04_A	-59622.98	5647.43	29.50	61	53
R05_A	-59583.00	5694.71	20.50	58	51
R06_A	-59555.13	5715.94	17.50	63	55
R07_A	-59630.51	5623.75	29.50	56	48
R08_A	-59598.15	5671.28	29.50	53	45
R09_A	-59578.66	5653.26	1.50	26	18
R10_A	-59603.39	5636.32	6.00	26	19
R11_A	-59620.06	5623.80	26.50	40	32
R12_A	-59612.38	5639.47	29.50	40	32

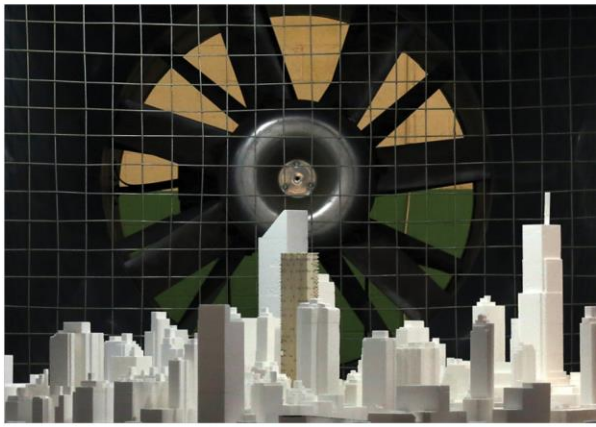
Print | Calculation settings | Calculate selection | Close | Help











APPENDIX B

PREDICTOR INPUT-OUTPUT DATA FOR STATIONARY NOISE

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

RECEPTOR 1 (SAMPLE)

==========

Testfile openend: 2021-01-20 5:16:24 PM

==========

==========

Height	Per	LAeq	32	63	125	250	500	1000	2000	4000	8000
17.50	1	39.72	--	22.35	29.46	30.39	29.92	33.77	34.24	30.58	17.95
17.50	2	39.72	--	22.35	29.46	30.39	29.92	33.77	34.24	30.58	17.95
17.50	3	36.71	--	19.34	26.45	27.38	26.91	30.76	31.23	27.57	14.94
17.50	4	--	--	--	--	--	--	--	--	--	--

```
    0.0000;       58;   0.0000002; "TTimerSet - overhead"
    0.0000;        1;   0.0000200; "TMeshLineList.AddLines"
    0.0007;       28;   0.0000255; "WriteTestString"
    0.0025;       33;   0.0000751; "TPolyClipper.Clip"
```

==========

Testfile closed: 2021-01-20 5:16:24 PM

==========

RECEPTOR 2 (SAMPLE)

==========

Testfile openend: 2021-01-20 5:17:55 PM

==========

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Height	Per	LAeq	32	63	125	250	500	1000	2000	4000	8000
17.50	1	27.72	--	14.95	19.64	18.85	19.72	22.23	19.47	15.81	6.40
17.50	2	27.72	--	14.95	19.64	18.85	19.72	22.23	19.47	15.81	6.40
17.50	3	24.71	--	11.94	16.63	15.84	16.71	19.22	16.46	12.80	3.39
17.50	4	--	--	--	--	--	--	--	--	--	--

```
    0.0000;       50;   0.0000002; "TTimerSet - overhead"
    0.0000;        1;   0.0000174; "TMeshLineList.AddLines"
    0.0006;       24;   0.0000253; "WriteTestString"
    0.0017;       32;   0.0000542; "TPolyClipper.Clip"
```

==========

Testfile closed: 2021-01-20 5:17:55 PM

==========

RECEPTOR 3 (SAMPLE)

==========

Testfile openend: 2021-01-20 5:18:14 PM

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Height	Per	LAeq	32	63	125	250	500	1000	2000	4000	8000
26.50	1	41.44	--	26.35	31.97	32.94	33.55	35.62	34.62	30.40	17.30
26.50	2	41.44	--	26.35	31.97	32.94	33.55	35.62	34.62	30.40	17.30
26.50	3	38.43	--	23.34	28.96	29.93	30.54	32.61	31.61	27.39	14.29
26.50	4	--	--	--	--	--	--	--	--	--	--

```
    0.0000;       56;   0.0000002; "TTimerSet - overhead"
    0.0000;        1;   0.0000179; "TMeshLineList.AddLines"
    0.0007;       27;   0.0000249; "WriteTestString"
    0.0007;       10;   0.0000721; "TPolyClipper.Clip"
```

==========

Testfile closed: 2021-01-20 5:18:14 PM

==========

Neighbouring Buildings Noise Sources

Model: Initial Conditions - Impact of Neighburing Buildings
Group: (main group)
Listing of: Point sources, for method Industrial noise - ISO 9613.1/2

Name	Desc.	Height	Terrain L	Type	Lw 125	Lw 250	Lw 500	Lw 1k	Lw 2k	Lw 4k	Lw 8k	Lw 63
35 RTU	_RTU	28.55	0.00	Normal point source	71.10	73.20	78.50	82.60	77.40	72.60	65.80	58.40
35 CT	_Cooling Tower	30.55	0.00	Normal point source	74.90	77.40	76.80	79.00	81.20	80.00	74.90	67.80
53 RTU	_RTU	40.84	0.00	Normal point source	71.10	73.20	78.50	82.60	77.40	72.60	65.80	58.40
53 CT	_Cooling Tower	42.84	0.00	Normal point source	74.90	77.40	76.80	79.00	81.20	80.00	74.90	67.80
71 RTU	_RTU	34.80	0.00	Normal point source	71.10	73.20	78.50	82.60	77.40	72.60	65.80	58.40
71 CT	_Cooling Tower	36.80	0.00	Normal point source	74.90	77.40	76.80	79.00	81.20	80.00	74.90	67.80
34 RTU	_RTU	22.00	0.00	Normal point source	71.10	73.20	78.50	82.60	77.40	72.60	65.80	58.40
92 RTU	_RTU	21.80	0.00	Normal point source	71.10	73.20	78.50	82.60	77.40	72.60	65.80	58.40

Model: Initial Conditions - Impact on Neighbouring Buildings
Group: (main group)
Listing of: Point sources, for method Industrial noise - ISO 9613.1/2

Name	Desc.	Height	Terrain L	Type	Lw 125	Lw 250	Lw 500	Lw 1k	Lw 2k	Lw 4k	Lw 8k	Lw 63	Lw Tot
POINT	_RTU	32.50	0.00	Normal point source	87.20	81.80	81.70	82.60	76.20	71.60	66.90	84.60	91.32
POINT	_RTU	32.50	0.00	Normal point source	87.20	81.80	81.70	82.60	76.20	71.60	66.90	84.60	91.32
POINT	_Cooling Tower	34.50	0.00	Normal point source	91.00	86.00	80.00	79.00	80.00	79.00	76.00	94.00	96.60
POINT	_Cooling Tower	34.50	0.00	Normal point source	91.00	86.00	80.00	79.00	80.00	79.00	76.00	94.00	96.60

Report: Table of Results
Model: Initial Conditions - Impact of Neighburing Buildings
LAeq: total results for receivers
Group: (main group)
Group Reduction: No

Name Receiver	X	Y	Height	Day	Evening	Night
R01_A	-59626.32	5652.93	17.50	25	25	22
R02_A	-59638.61	5624.99	17.50	48	48	45
R03_A	-59633.59	5640.72	26.50	30	30	26
R04_A	-59622.98	5647.43	29.50	22	22	19
R05_A	-59583.00	5694.71	20.50	32	32	29
R06_A	-59555.13	5715.94	17.50	11	11	8
R07_A	-59630.51	5623.75	29.50	47	47	44
R08_A	-59598.15	5671.28	29.50	18	18	15
R09_A	-59578.66	5653.26	1.50	19	19	16
R10_A	-59603.39	5636.32	6.00	20	20	17
R11_A	-59620.06	5623.80	26.50	35	35	32
R12_A	-59612.38	5639.47	29.50	22	22	19

All shown dB values are A-weighted

Report: Table of Results
Model: Initial Conditions - Impact of Neighburing Buildings
LAeq: total results for receivers
Group: (main group)
Group Reduction: No

Name Receiver	X	Y	Height	Day	Evening	Night
R01_A	-59626.32	5652.93	17.50	42	42	39
R02_A	-59638.61	5624.99	17.50	35	35	32
R03_A	-59633.59	5640.72	26.50	40	40	37
R04_A	-59622.98	5647.43	29.50	42	42	39
R05_A	-59583.00	5694.71	20.50	42	42	39
R06_A	-59555.13	5715.94	17.50	13	13	10
R07_A	-59630.51	5623.75	29.50	42	42	39
R08_A	-59598.15	5671.28	29.50	39	39	36
R09_A	-59578.66	5653.26	1.50	20	20	17
R10_A	-59603.39	5636.32	6.00	17	17	14
R11_A	-59620.06	5623.80	26.50	19	19	16
R12_A	-59612.38	5639.47	29.50	18	18	15

All shown dB values are A-weighted

Report: Table of Results
Model: Initial Conditions - Impact of Neighburing Buildings
LAeq: total results for receivers
Group: (main group)
Group Reduction: No

Name Receiver	X	Y	Height	Day	Evening	Night
R01_A	-59626.32	5652.93	17.50	36	36	33
R02_A	-59638.61	5624.99	17.50	21	21	18
R03_A	-59633.59	5640.72	26.50	31	31	28
R04_A	-59622.98	5647.43	29.50	24	24	21
R05_A	-59583.00	5694.71	20.50	32	32	29
R06_A	-59555.13	5715.94	17.50	18	18	15
R07_A	-59630.51	5623.75	29.50	30	30	27
R08_A	-59598.15	5671.28	29.50	34	34	31
R09_A	-59578.66	5653.26	1.50	13	13	10
R10_A	-59603.39	5636.32	6.00	14	14	11
R11_A	-59620.06	5623.80	26.50	16	16	13
R12_A	-59612.38	5639.47	29.50	16	16	13

All shown dB values are A-weighted

Report: Table of Results
Model: Initial Conditions - Impact of Neighburing Buildings
LAeq: total results for receivers
Group: (main group)
Group Reduction: No

Name Receiver	X	Y	Height	Day	Evening	Night
R01_A	-59626.32	5652.93	17.50	41	41	38
R02_A	-59638.61	5624.99	17.50	32	32	29
R03_A	-59633.59	5640.72	26.50	40	40	37
R04_A	-59622.98	5647.43	29.50	42	42	39
R05_A	-59583.00	5694.71	20.50	48	48	45
R06_A	-59555.13	5715.94	17.50	43	43	40
R07_A	-59630.51	5623.75	29.50	27	27	24
R08_A	-59598.15	5671.28	29.50	45	45	42
R09_A	-59578.66	5653.26	1.50	24	24	21
R10_A	-59603.39	5636.32	6.00	23	23	20
R11_A	-59620.06	5623.80	26.50	19	19	16
R12_A	-59612.38	5639.47	29.50	22	22	19

All shown dB values are A-weighted

Report: Table of Results
Model: Initial Conditions - Impact of Neighburing Buildings
LAeq: total results for receivers
Group: (main group)
Group Reduction: No

Name Receiver	X	Y	Height	Day	Evening	Night
R01_A	-59626.32	5652.93	17.50	12	12	9
R02_A	-59638.61	5624.99	17.50	9	9	6
R03_A	-59633.59	5640.72	26.50	11	11	8
R04_A	-59622.98	5647.43	29.50	12	12	9
R05_A	-59583.00	5694.71	20.50	15	15	12
R06_A	-59555.13	5715.94	17.50	24	24	21
R07_A	-59630.51	5623.75	29.50	10	10	7
R08_A	-59598.15	5671.28	29.50	21	21	18
R09_A	-59578.66	5653.26	1.50	16	16	13
R10_A	-59603.39	5636.32	6.00	16	16	13
R11_A	-59620.06	5623.80	26.50	11	11	8
R12_A	-59612.38	5639.47	29.50	11	11	8

All shown dB values are A-weighted

Report: Table of Results
Model: Initial Conditions - Impact on Neighbouring Buildings
LAeq: total results for receivers
Group: (main group)
Group Reduction: No

Name Receiver	X	Y	Height	Day	Evening	Night
R01_A	-59626.32	5652.93	17.50	39	39	36
R02_A	-59638.61	5624.99	17.50	27	27	24
R03_A	-59633.59	5640.72	26.50	39	39	36
R04_A	-59622.98	5647.43	29.50	43	43	40
R05_A	-59583.00	5694.71	20.50	38	38	35
R06_A	-59555.13	5715.94	17.50	29	29	26
R07_A	-59630.51	5623.75	29.50	35	35	32
R08_A	-59598.15	5671.28	29.50	43	43	40
R09_A	-59578.66	5653.26	1.50	32	32	29
R10_A	-59603.39	5636.32	6.00	37	37	34
R11_A	-59620.06	5623.80	26.50	33	33	30
R12_A	-59612.38	5639.47	29.50	41	41	38
R13_A	-59650.90	5686.90	37.84	48	48	45
R14_A	-59643.01	5695.55	31.74	46	46	43
R15_A	-59632.61	5707.07	31.74	46	46	43
R16_A	-59609.75	5732.64	31.74	48	48	45
R17_A	-59595.42	5748.55	31.74	47	47	44
R18_A	-59690.92	5646.59	25.55	41	41	38
R19_A	-59655.77	5608.56	19.01	33	33	30
R20_A	-59578.68	5583.53	6.50	33	33	30
R21_A	-59550.10	5621.27	6.50	33	33	30
R22_A	-59518.86	5757.55	18.80	30	30	27

All shown dB values are A-weighted

Table of Results

All Receivers | Details

Contents | Receivers

- (•) LAeq
- ( ) LAeq per octave
- ( ) LA;max

[x] Use groups

[ ] Include group reductions

Number of rows: 0

Number of decimals: 0

Columns

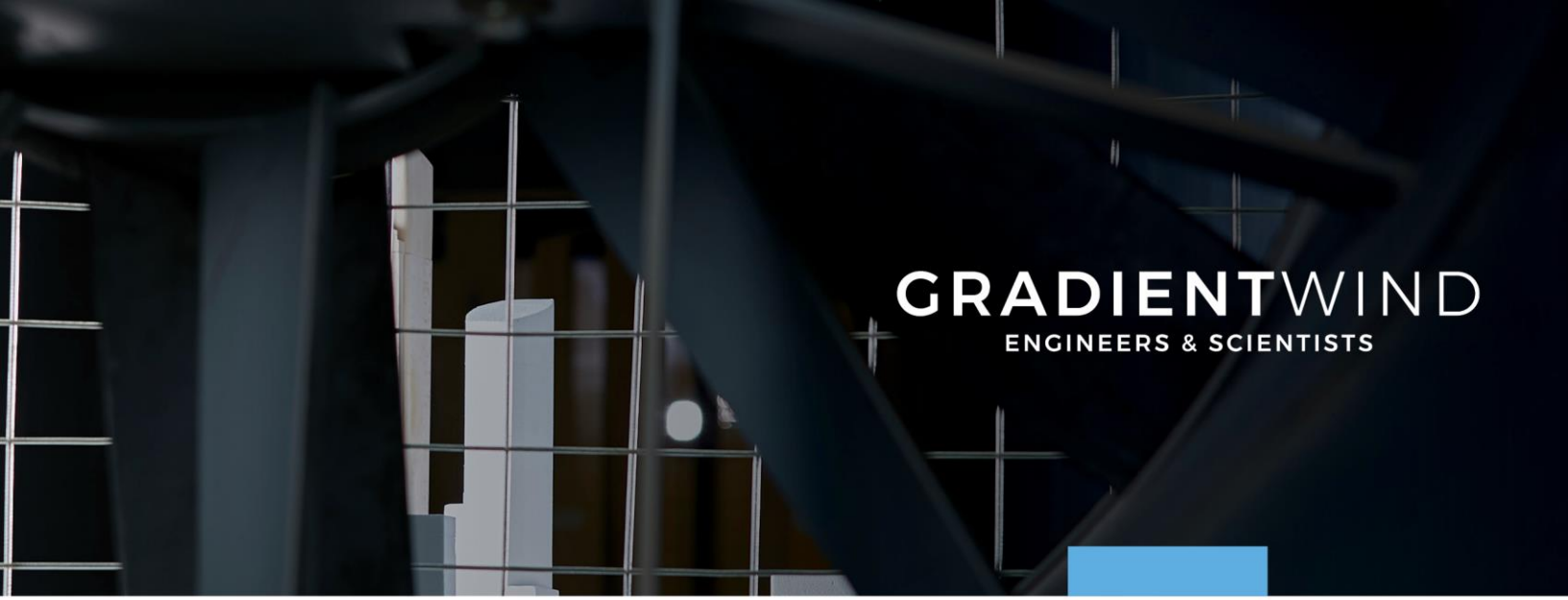
- [x] Name
- [ ] Description
- [x] X
- [x] Y
- [x] Height
- [x] Day
- [x] Evening
- [x] Night
- [ ] Li

Groups

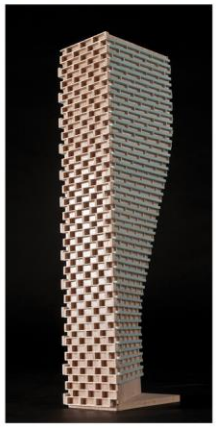
- (main group)
  - GWE19-235 40-70 Plains Road T Noi
  - GWE19-235 40-70 Plains Road T Noi
  - GWE19-235 40-70 Plains Road T Noi

Name	X	Y	Height	Day	Evening	Night
R01_A	-59626.32	5652.93	17.50	39	39	36
R02_A	-59638.61	5624.99	17.50	27	27	24
R03_A	-59633.59	5640.72	26.50	39	39	36
R04_A	-59622.98	5647.43	29.50	43	43	40
R05_A	-59583.00	5694.71	20.50	38	38	35
R06_A	-59555.13	5715.94	17.50	29	29	26
R07_A	-59630.51	5623.75	29.50	35	35	32
R08_A	-59598.15	5671.28	29.50	43	43	40
R09_A	-59578.66	5653.26	1.50	32	32	29
R10_A	-59603.39	5636.32	6.00	37	37	34
R11_A	-59620.06	5623.80	26.50	33	33	30
R12_A	-59612.38	5639.47	29.50	41	41	38
R13_A	-59650.90	5686.90	37.84	48	48	45
R14_A	-59643.01	5695.55	31.74	46	46	43
R15_A	-59632.61	5707.07	31.74	46	46	43
R16_A	-59609.75	5732.64	31.74	48	48	45
R17_A	-59595.42	5748.55	31.74	47	47	44
R18_A	-59690.92	5646.59	25.55	41	41	38
R19_A	-59655.77	5608.56	19.01	33	33	30
R20_A	-59578.68	5583.53	6.50	33	33	30
R21_A	-59550.10	5621.27	6.50	33	33	30
R22_A	-59518.86	5757.55	18.80	30	30	27

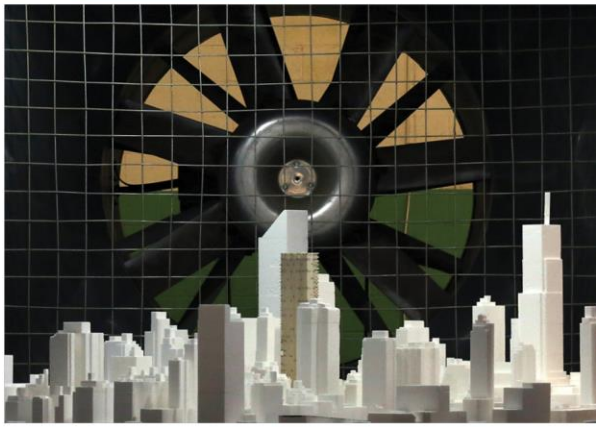
Print | Calculation settings | Calculate selection | Close | Help











APPENDIX C

CORRESPONDENCE WITH THE CITY OF BURLINGTON & TRAFFIC DATA

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

Efser Kara

From: Efser Kara
Sent: January 18, 2021 9:22 AM
To: Patrau, Florin
Subject: RE: RE: AADT Counts CRM:0070000000093

Thank you for the information.

Regards,

EFSER KARA, MSc, LEED GA
ACOUSTIC SCIENTIST
efser.kara@gradientwind.com
T 613 836 0934 | M 613 981 8807
127 Walgreen Road, Ottawa, ON, Canada K0A 1L0
GRADIENTWIND.COM

GRADIENTWIND
ENGINEERS & SCIENTISTS

From: Patrau, Florin <Florin.Patrau@burlington.ca>
Sent: January 15, 2021 10:22 AM
To: Efser Kara <efser.kara@gradientwind.com>
Subject: FW: RE: AADT Counts CRM:0070000000093

Fyi, for any questions please contact me directly.

Sincerely,

Florin Patrau
Traffic Technologist
Transportation Services
(905) 335-7671 ext 7838

From: CRM, Service Burlington
Sent: Friday, January 15, 2021 10:08 AM
To: Patrau, Florin <Florin.Patrau@burlington.ca>
Subject: FW: RE: AADT Counts CRM:0070000000093

Hi Florin,

Would you be able to direct your answer/email to the customer, some emails come through Eforms, such as this customer did

at the bottom of page you will see email: efser.kara@gradientwind.com

Thank you,

Service Burlington

---------- Original Message ----------
From: Traffic Operations
Received: Fri Jan 15 2021 09:35:29 GMT-0500 (Eastern Standard Time)
To: Eforms - noreply@burlington.ca - Need to search contact from PDF; Traffic Operations (Parent); Web No Reply
Subject: RE: AADT Counts CRM:0070000000093

Hello, please visit the below link to access our open data portal https://navburl-burlington.opendata.arcgis.com/datasets/aadt-counts-2018

For any other questions please contact mem directly at florin.patrau@burlington.ca

Regards,

Florin Patrau

Traffic Technologist

---------- Original Message ----------
From: Eforms - noreply@burlington.ca - Need to search contact from PDF
Received: Thu Jan 14 2021 10:16:00 GMT-0500 (Eastern Standard Time)
To: Traffic Operations (Parent)
Subject: AADT Counts

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hello,

We are an engineering company located in Ottawa. For a project we are working on, we require the current and projected AADT data for Plains Road East and Waterdown Road. I would be grateful if you can provide this data?

Kind regards,
Efser Kara

Origin: https://can01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.burlington.ca%2Fen%2Fservices-for-you%2Ftransportation.asp&data=04%7C01%7Ctraffic%40burlington.ca%7C971befd4ac664278b9ef08d8b89f4c01%7Cfe0e43b9f5444aa69c13b3500fedb2ee%7C0%7C0%7C637462341596357086%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C1000&sdata=p5SYOAzUZhJC3fpwx81jHRCKqsUEKzd8%2F5kNkU2snt8%3D&reserved=0

This email was sent to you by Efser Kara<efser.kara@gradientwind.com> through https://can01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.burlington.ca%2F&data=04%7C01%7Ctraffic%40burlington.ca%7C971befd4ac664278b9ef08d8b89f4c01%7Cfe0e43b9f5444aa69c13b3500fedb2ee%7C0%7C0%7C637462341596357086%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C1000&sdata=OA5I8bo9NwfXv1A8GKDTTCmM7zcKH7iPQAl%2FYtnn0D8%3D&reserved=0.
This message, including any attachments, is privileged and intended only for the addressee(s) named above. If you are not the intended recipient, you must not read, use or disseminate the information contained in this email/fax. If you have received this email/fax transmission in error, please notify the sender immediately by telephone, fax or email and permanently delete this email from your computer/shred this fax, including any attachments, without making a copy. Access to this email/fax by anyone else is unauthorized. Thank you.

OBJECTID	TES_ID	Street_Name	AADT_Year	Source	Volume	Shape__Length		
20	215720	MEADOWBROOK RD.	2018	Count	831	158.6832401		
21	215760	MEADOWBROOK RD.	2018	Count	750	39.38591119		
255	215700	MEADOWBROOK RD.	2018	Single intersection	1889	79.95842369		
297	215710	MEADOWBROOK RD.	2018	Count	1967	354.934931		
54	215910	MELISSA CRES.	2018	Count	1276	254.2214723		
87	215980	MELORES DR.	2018	Count	440	94.74228448		
22	216690	MOUNT FOREST DR.	2018	Count	2397	90.23958115		
88	216650	MOUNT FOREST DR.	2018	Count	2995	114.7923387		
132	216630	MOUNT FOREST DR.	2018	Single intersection	7526	180.5202551		
133	216660	MOUNT FOREST DR.	2018	Count	2869	298.3270633		
134	216670	MOUNT FOREST DR.	2018	Count	2399	150.2139205		
89	216360	MOUNTAIN GROVE AVE.	2018	Count	677	426.8335132		
23	216520	MOUNTAINSIDE DR.	2018	Count	2913	166.0528125		
135	216490	MOUNTAINSIDE DR.	2018	Count	1489	260.0904563		
136	217110	NEW ST.	2018	Count	17684	169.2668251		
223	217130	NEW ST.	2018	Count	16792	280.0111287		
298	217150	NEW ST.	2018	Count	16707	257.049322		
179	218070	NO. 4 SIDE RD.	2018	Count	167	2530.899985		
24	217570	NORTH SERVICE RD.	2018	Single intersection	8576	949.3470974		
25	227430	NORTH SERVICE RD.	2018	Single intersection	13692	728.2809914		
180	217580	NORTH SERVICE RD.	2018	Single intersection	6563	229.6314266		
181	231240	NORTH SERVICE RD.	2018	Single intersection	16370	622.0322516		
224	239330	NORTH SERVICE RD.	2018	Single intersection	21106	196.6365921		
256	232830	NORTH SERVICE RD.	2018	Single intersection	9775	681.169635		
299	217490	NORTH SERVICE RD.	2018	Single intersection	9127	1453.18089		
90	239320	NORTH SHORE BLVD. E	2018	Single intersection	26497	272.7018748		
182	217950	NOTTINGHAM AVE.	2018	Count	882	97.65855347		
225	217940	NOTTINGHAM AVE.	2018	Count	438	145.513292		
91	218180	OAKWOOD DR.	2018	Count	259	133.7476903		
226	218170	OAKWOOD DR.	2018	Count	235	89.76880766		
26	245090	OLD YORK RD.	2018	Count	1392	144.2340425		
137	238540	OLD YORK RD.	2018	Count	1247	1315.897717		
138	218350	ONTARIO ST.	2018	Single intersection	4975	187.6926094		
257	218360	ONTARIO ST.	2018	Single intersection	5229	111.698534		
27	232870	ORCHARD RD.	2018	Count	1769	512.5525463		
55	232900	ORCHARD RD.	2018	Count	1654	62.2434927		
258	232940	ORCHARD RD.	2018	Count	375	137.4651387		
300	232930	ORCHARD RD.	2018	Count	1201	223.5154147		
227	218520	PAISLEY AVE.	2018	Count	209	351.9165427		
139	218570	PALMER DR.	2018	Count	1692	154.6289022		
140	218580	PALMER DR.	2018	Count	1851	273.4941107		
141	218670	PALMER DR.	2018	Count	2596	251.9605539		
183	218660	PALMER DR.	2018	Count	2525	90.67762601		
228	218640	PALMER DR.	2018	Count	2696	198.7663794		
301	218680	PALMER DR.	2018	Count	3223	301.5086888		
92	218910	PARKWAY DR.	2018	Count	1079	331.9453761		
302	218890	PARKWAY DR.	2018	Count	1044	93.51876873		
56	228390	PINEMEADOW DR.	2018	Single intersection	1987	81.22656061		
28	228410	PLAINS RD. E	2018	Single intersection	20147	157.6129542	**Projected 2031**	26,062
93	219760	PLAINS RD. E	2018	Intersection average	13247	792.6120492		
229	219750	PLAINS RD. E	2018	Single intersection	21210	377.5569493		
259	220410	PLAINS RD. E	2018	Single intersection	9751	198.6353824		
184	232790	PLAINS RD. W	2018	Single intersection	22224	196.0624152		
57	220210	PROSPECT ST.	2018	Single intersection	5836	94.21634714		
58	220240	PROSPECT ST.	2018	Count	5037	89.33539332		
59	220320	PROSPECT ST.	2018	Single intersection	6366	441.4752259		
142	220290	PROSPECT ST.	2018	Count	5840	195.8753111		
185	220200	PROSPECT ST.	2018	Count	4046	330.9037792		
186	220220	PROSPECT ST.	2018	Single intersection	5699	89.97555292		

OBJECTID	TES_ID	Street_Name	AADT_Year	Source	Volume	Shape__Length		
102	225460	WATERDOWN RD.	2018	Intersection average	16112	346.3378621	**Projected 2031**	20,843
103	225490	WATERDOWN RD.	2018	Count	11964	544.5482617		
268	225500	WATERDOWN RD.	2018	Count	11605	1473.530257		
269	225550	WATERLOO ST.	2018	Count	293	182.2248178		
235	225720	WESTBURY AVE.	2018	Count	346	277.8818575		
236	229760	WILLIAM O'CONNELL BLVD.	2018	Count	1461	125.2996107		
270	227510	WILLIAM O'CONNELL BLVD.	2018	Count	2218	166.8443582		
104	225980	WILLOWBROOK RD.	2018	Count	338	198.7883891		
271	225970	WILLOWBROOK RD.	2018	Single intersection	827	200.1473431		
237	226000	WILSON AVE.	2018	Count	399	313.0719765		
153	226310	WOODLAND AVE.	2018	Count	647	199.5661566		
272	226390	WOODVIEW RD.	2018	Count	2139	193.9473189		
105	226500	WOODWARD AVE.	2018	Count	3175	382.8627728		
195	233600	WOODWARD AVE.	2018	Count	3041	105.1392678		
273	238070	YORKSHIRE CRES.	2018	Count	105	154.9693288		

201468-Plains Rd W @ Waterdown Rd

Total Count Diagram

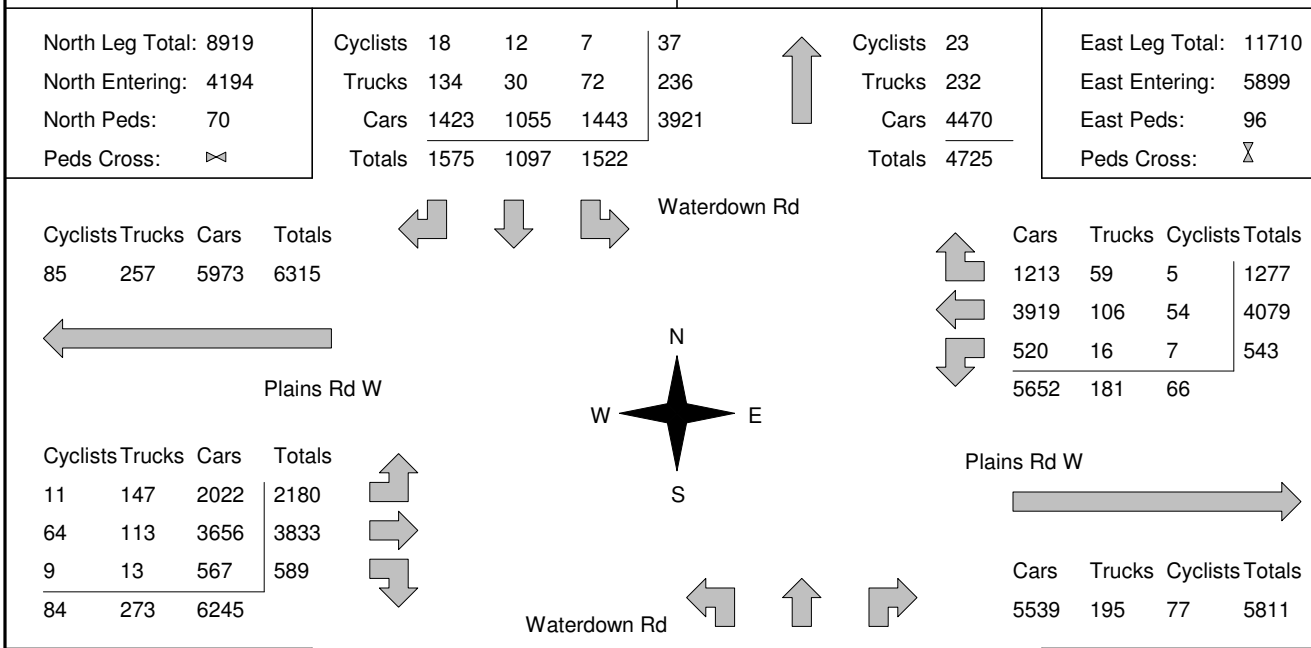
Municipality: Burlington
Site #: 0000201468
Intersection: Plains Rd W & Waterdown Rd
TFR File #: 1
Count date: 18-Sep-2018

Weather conditions:
Sunny

Person(s) who counted:
Nik

**** Signalized Intersection ****

Major Road: Plains Rd W runs W/E



Comments

201468-Plains Rd W @ Waterdown Rd
Traffic Count Summary

Intersection: Plains Rd W & Waterdown Rd | **Count Date:** 18-Sep-2018 | **Municipality:** Burlington

North Approach Totals

Hour Ending	Includes Cars, Trucks, & Cyclists: Left	Thru	Right	Grand Total	Total Peds	North/South Total Approaches
7:00:00	0	0	0	0	1	0
8:00:00	112	111	108	331	7	606
9:00:00	177	116	169	462	6	815
11:00:00	0	0	0	0	4	0
12:00:00	213	117	171	501	10	751
13:00:00	200	143	212	555	9	790
14:00:00	179	91	169	439	4	705
15:00:00	0	0	0	0	2	0
16:00:00	203	154	216	573	13	874
17:00:00	218	187	260	665	9	1034
18:00:00	220	178	270	668	5	1004
Totals:	1522	1097	1575	4194	70	6579

South Approach Totals

Hour Ending	Includes Cars, Trucks, & Cyclists: Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0
8:00:00	47	184	44	275	9
9:00:00	88	218	47	353	8
11:00:00	0	0	0	0	0
12:00:00	70	131	49	250	13
13:00:00	46	119	70	235	7
14:00:00	56	137	73	266	5
15:00:00	0	0	0	0	0
16:00:00	99	138	64	301	20
17:00:00	127	177	65	369	7
18:00:00	128	164	44	336	8
Totals:	661	1268	456	2385	77

East Approach Totals

Hour Ending	Includes Cars, Trucks, & Cyclists: Left	Thru	Right	Grand Total	Total Peds	East/West Total Approaches
7:00:00	0	0	0	0	0	0
8:00:00	56	211	154	421	8	1735
9:00:00	55	300	142	497	3	1709
11:00:00	0	0	0	0	0	0
12:00:00	55	353	144	552	32	1238
13:00:00	80	453	148	681	12	1351
14:00:00	67	396	154	617	25	1287
15:00:00	0	0	0	0	0	0
16:00:00	88	623	193	904	12	1620
17:00:00	77	799	191	1067	3	1760
18:00:00	65	944	151	1160	1	1801
Totals:	543	4079	1277	5899	96	12501

West Approach Totals

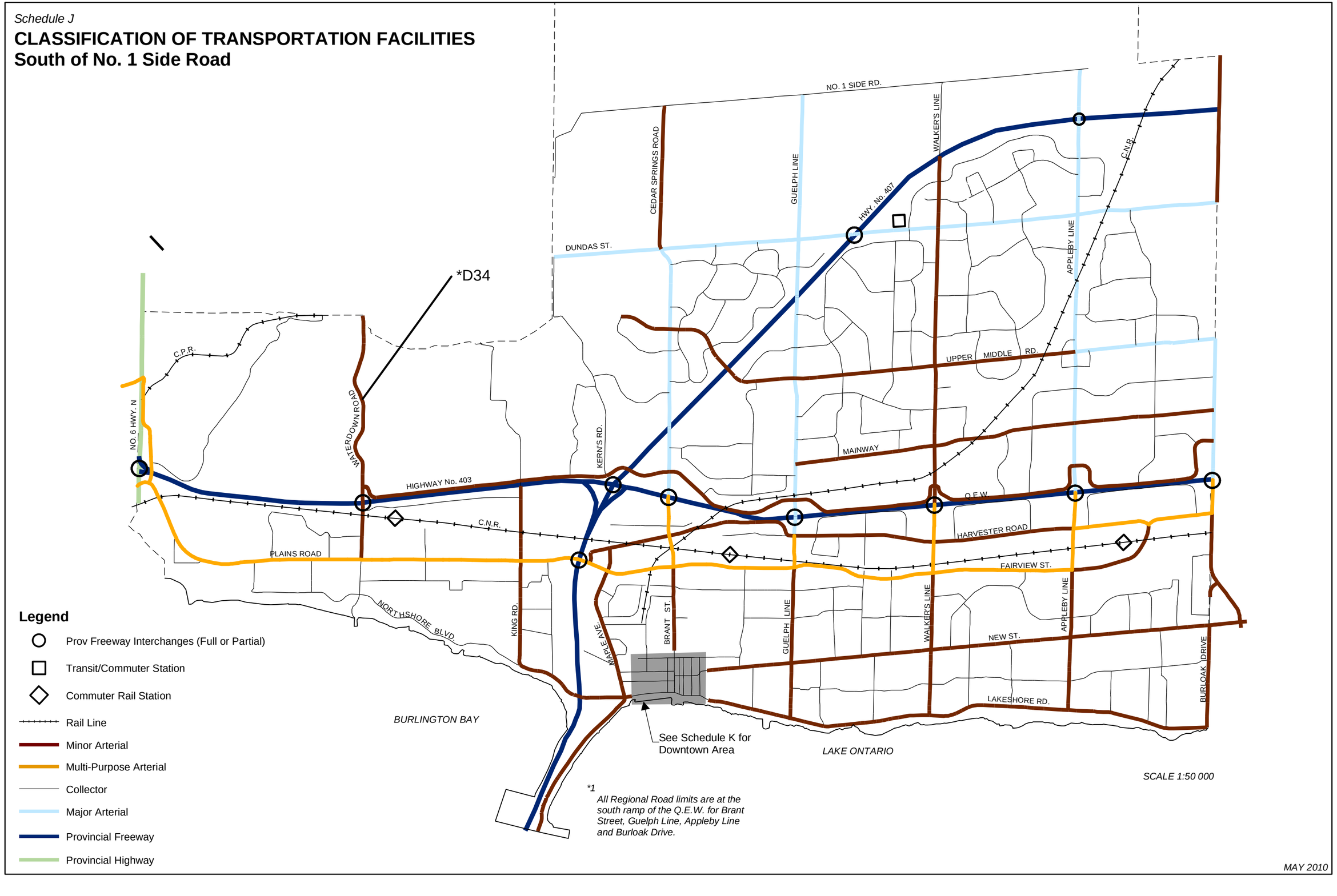
Hour Ending	Includes Cars, Trucks, & Cyclists: Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0
8:00:00	490	701	123	1314	5
9:00:00	457	650	105	1212	4
11:00:00	0	0	0	0	0
12:00:00	198	415	73	686	13
13:00:00	188	427	55	670	16
14:00:00	217	399	54	670	3
15:00:00	0	0	0	0	0
16:00:00	247	395	74	716	7
17:00:00	196	439	58	693	3
18:00:00	187	407	47	641	0
Totals:	2180	3833	589	6602	51

Calculated Values for Traffic Crossing Major Street

Hours Ending:	8:00	9:00	12:00	13:00	14:00	16:00	17:00	18:00
Crossing Values:	356	490	459	417	400	475	538	527

Schedule J

CLASSIFICATION OF TRANSPORTATION FACILITIES
South of No. 1 Side Road



Legend

- Prov Freeway Interchanges (Full or Partial)
- Transit/Commuter Station
- Commuter Rail Station
- Rail Line
- Minor Arterial
- Multi-Purpose Arterial
- Collector
- Major Arterial
- Provincial Freeway
- Provincial Highway

*1 *All Regional Road limits are at the south ramp of the Q.E.W. for Brant Street, Guelph Line, Appleby Line and Burloak Drive.*

MAY 2010