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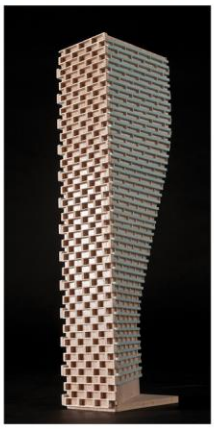
STATIONARY NOISE ASSESSMENT

910 March Road
Ottawa, Ontario

REPORT: 20-021-Stationary Noise



June 10, 2020

PREPARED FOR

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EXECUTIVE SUMMARY

This report describes a stationary noise assessment performed for a proposed commercial development located at 910 March Road in Ottawa, Ontario. The proposed development comprises four commercial buildings including a restaurant, a bank, a gas bar with an adjoining coffee shop, and a department store. Surface parking lots are located throughout the site. Sources of stationary noise include rooftop air handling equipment, an idling refrigerated (reefer) truck, garbage compactor, truck route, idling cars, and speaker boxes associated with drive thrus. Figure 1 illustrates a 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) site plan drawings provided by The Stirling Group in May of 2020, and; (iv) assumed mechanical information based on Gradient Wind's past experience with similar developments.

The results of the current assessment indicate that noise levels at nearby points of reception are expected to fall below the ENCG noise criteria, provided that the assumptions for noise control as outlined in Section 2.1 are followed during the detailed design process. Mechanical information for the development was not yet available at the time of writing. Once the mechanical design progresses and equipment information becomes available, these should be forwarded to Gradient Wind for review. As such, the proposed development is expected to be compatible with the existing and proposed noise sensitive land uses and will satisfy all site plan conditions. A review of the final equipment selections and locations by a qualified acoustical engineer will be required prior to installation of the equipment.

TABLE OF CONTENTS

1. INTRODUCTION

Gradient Wind Engineering Inc. (Gradient Wind) was retained by Wexcom Developments (March Road) Ltd. to undertake a stationary noise assessment for the proposed commercial development located at 910 March Road in Ottawa, Ontario. This report summarizes the methodology, results and recommendations related to a stationary noise assessment.

The present scope of work involves assessing exterior noise levels generated by rooftop air handling equipment, an idling reefer truck, a garbage compactor, a truck route, idling cars, and speaker boxes. The assessment was performed based on theoretical noise calculation methods conforming to the City of Ottawa[1] and Ministry of the Environment, Conservation and Parks (MECP) NPC-300[2] guidelines, site plan drawings provided by The Stirling Group in May of 2020, assumed mechanical information based on Gradient Wind's past experience with similar developments, surrounding street layouts obtained from the City of Ottawa, and recent site imagery.

2. TERMS OF REFERENCE

The focus of this stationary noise assessment is the proposed commercial development located at 910 March Road in Ottawa, Ontario. The development is located on an irregular parcel of land bound by March Road to the west, commercial land to the south, open space/leisure lands to the east and northwest, and residential land to the north.

The proposed development comprises four commercial buildings, including a restaurant, a bank, a gas bar with an adjoining coffee shop, and a department store. Surface parking lots are located throughout the site. Drive thrus are featured at the northwest and southwest sides of the site, serving the coffee shop and the restaurant, respectively. The department store features a loading area at the south side of the building. The gas bar and coffee shop are located at the northwest corner of the site, the department store at the northeast corner, and the bank and restaurant along the south perimeter of the site. The site is accessed via March Road by two vehicular entrances along the west property line. The development

[1] City of Ottawa Environmental Noise Control Guidelines, January 2016
[2] Ministry of the Environment, Conservation and Parks (MECP), Environmental Noise Guideline – Publication NPC-300, August 2013

site is located near existing residential properties to the east and southwest, and proposed residential properties to the north, which are the nearest points of reception. Figure 1 illustrates the site plan and surrounding context.

The facilities are expected to operate 24 hours a day. However, certain sources are likely to have reduced operation during the nighttime period between 23:00 and 07:00. Sources of stationary noise include rooftop air handling equipment, an idling reefer truck at the department store loading bay, garbage compactor associated with the department store, truck route, idling cars, and speaker boxes associated with the two drive thurs. Figure 2 illustrates the location of all noise sources included in this study.

According to NPC-300 Section A5.5[3], sources that are not considered as stationary sources include "*occasional movement of vehicles on the property such as delivery of goods to and the removal of goods/refuse from convenience stores, fast food restaurants and similar commercial facilities, etc.*". Based on Gradient Wind's past experience with similar developments, it is expected that delivery/removal of goods for the gas station, coffee shop and restaurant will occur occasionally on site (less than 2 occurrences per week). As such, noise generated in relation to these deliveries are expected to be minimal and was omitted from the analysis. However, delivery/removal of goods for the department store are expected to occur 2 or more times per week and was therefore included in the assessment.

2.1 Assumptions

At the time of writing, mechanical information for the development was not yet available. As a result, Gradient Wind assumed the preliminary mechanical information for the development based on experience with similar developments. Once the mechanical design progresses and equipment information becomes available, these should be forwarded to Gradient Wind for review. A review of the final equipment selections and locations by a qualified acoustical engineer will be required prior to installation of the equipment. The following assumptions have been made in the analysis:

(i) A reefer truck idles at the loading dock for thirty minutes per hour during the daytime period (07:00 – 23:00). No idling trucks are expected at the loading dock during the nighttime period

[3] NPC – 300, page 20

(23:00 – 07:00). The City of Ottawa Noise By-law No.2017-255 prohibits deliveries during the nighttime period.

(ii) One truck movement occurs per hour for the department store during the daytime period (07:00 – 23:00).

(iii) The garbage compactor operates for six minutes per hour during the daytime period (07:00 – 23:00). No garbage compactor operation occurs during the nighttime period (23:00 – 07:00).

(iv) Idling cars are assumed to operate continuously over a 1-hour period during the daytime and nighttime period.

(v) The locations, quantity and tonnage of rooftop units have been assumed based on Gradient Wind's experience with similar developments.

(vi) Sound data for all noise sources for the development have been assumed based on Gradient Wind's experience with similar developments.

(vii) The rooftop mechanical units and speaker boxes were assumed to operate continuously over a 1-hour period during the daytime and at 50% operation during the nighttime period.

(viii) Screening effects of the parapets have been conservatively excluded in the modelling.

(ix) A 3-metre-tall noise barrier was assumed along the department store loading bay.

(x) The ground region was modelled as reflective due to the presence of hard ground (pavement). For rear yards within the residential area, as well as open spaces, the ground region was modelled as absorptive due to the presence of soft ground (grass).

3. OBJECTIVES

The main goals of this work are to (i) calculate the future noise levels on the surrounding dwellings produced by stationary sources and (ii) ensure that exterior noise levels do not exceed the allowable limits specified by the ENCG, as outlined in Section 4 of this report.

4. METHODOLOGY

The impact of the external stationary noise sources on the nearby residential areas was 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 simulates three-dimensional surfaces and first reflections of sound waves over a

suitable spectrum for human hearing. This methodology has been used on numerous assignments and has been accepted by the MECP as part of Environmental Compliance Approvals applications. Seven receptor locations were selected for the study site, as illustrated in Figure 3.

4.1 Perception of Noise

Noise can be defined as any obtrusive sound. It is created at a source, transmitted through a medium, such as air, and intercepted by a receiver. Noise may be characterized in terms of the power of the source or the sound pressure at a specific distance. While the power of a source is characteristic of that source, the sound pressure depends on the location of the receiver and the path that the noise takes to reach the receiver. Its measurement 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 represents the noise perceived by the human ear. With this scale, a doubling of sound power at the source results in a 3 dBA increase in measured noise levels at the receiver and is just perceptible to most people. An increase of 10 dBA is often perceived to be twice as loud.

Stationary sources are defined in NPC-300 as "a source of sound or combination of sources of sound that are included and normally operated within the property lines of a facility and includes the premises of a person as one stationary source, unless the dominant source of sound on those premises is construction"[4].

4.2 Stationary Noise Criteria

The equivalent sound energy level, L_{eq}, 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 L_{eq} 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 ENCG and NPC-300 apply to outdoor points of reception (POR). A POR is defined under NPC-300 as "any location on a noise sensitive land use where noise from a stationary source is received"[5]. A POR can be located on an existing or zoned for future use premises of permanent or

[4] NPC – 300, page 16
[5] NPC – 300, page 14

seasonal residences, hotels/motels, nursing/retirement homes, rental residences, hospitals, camp grounds, and noise sensitive buildings such as schools and places of worship. The recommended maximum noise levels for a Class 1 area in a suburban environment adjacent to arterial roadways at a POR are outlined in Table 1 below. The study site is considered to be Class 1 as it is located within the "Urban Area" boundary as defined in Schedule A and B of the City of Ottawa Official Plan[6]. Furthermore, March Road is classified as an arterial roadway and is the main contributor to ambient noise in the area. These conditions indicate that the sound field is dominated by manmade sources.

TABLE 1: EXCLUSIONARY LIMITS FOR CLASS 1 AREA

Time of Day	Outdoor Points of Reception	Plane of Window
07:00 – 19:00	50	50
19:00 – 23:00	50	50
23:00 – 07:00	N/A	45

4.3 Determination of Noise Source Power Levels

Mechanical information for the development was not yet available at the time of writing. As a result, Gradient Wind assumed the preliminary mechanical information for the development based on experience with similar developments. Once the mechanical design progresses and equipment information becomes available, these should be forwarded to Gradient Wind for review. Table 2 summarizes the sound power of each source used in the analysis.

[6] City of Ottawa Official Plan Vol 1: Section 6

TABLE 2: EQUIPMENT SOUND POWER LEVELS (dBA)

Source	Description	Height Above Grade/Roof (m)	Frequency (Hz)								
			63	125	250	500	1000	2000	4000	8000	Total
S1-S5, S12	Rooftop Unit	1.2	62	76	79	84	83	79	73	66	**88**
S8-S11, S14-S16	Rooftop Unit	1.2	59	73	76	81	80	76	70	63	**85**
S6	Garbage Compactor	0.5	-	-	-	-	75	-	-	-	**75**
S7	Refrigerated Truck	2.7	-	-	-	-	98	-	-	-	**98**
S13, S17	Speaker Box	1	69	68	66	72	79	76	67	58	**82**
S18-S34	Idle Cars	0.75	55	65	57	65	66	63	62	54	**72**
S35	Truck Route	1.5	65	72	76	85	90	89	83	74	**94**

4.4 Stationary Source Noise Predictions

The impact of stationary noise sources on nearby residential areas was determined by computer modelling using the software program Predictor-Lima. This program was developed from the International Standards Organization (ISO) standard 9613 Parts 1 and 2 and 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 Environmental Compliance Approval applications.

A total of seven receptor locations were chosen around the site to measure the noise impact at points of reception (POR) during the daytime/evening period (07:00 – 23:00), as well as during the nighttime period (23:00 – 07:00). POR locations include outdoor points of reception (OPOR) and the plane of windows (POW) of the adjacent residential properties. Sensor locations are described in Table 3 and illustrated in Figure 3. All units were represented as point sources in the Predictor model, with the exception of S13 and S17 which were modelled as emitting facades. Table 4 below contains Predictor-Lima calculation settings. These are typical settings that have been based on ISO 9613 standards and guidance from the MECP.

Ground absorption over the study area was determined based on topographical features (such as water, concrete, grassland, etc.). An absorption value of 0 is representative of hard ground, while a value of 1 represents grass and similar soft surface conditions. Existing and proposed buildings were added to the model to account for screening and reflection effects from building façades. A Predictor-Lima modelling data is available upon request.

TABLE 3: RECEPTOR LOCATIONS

Receptor Number	Receptor Location	Height Above Grade (m)
R1	POW – 176 Windance Crescent	4.5
R2	OPOR – 176 Windance Crescent	1.5
R3	POW – 172 Windance Crescent	4.5
R4	OPOR – 172 Windance Crescent	1.5
R5	POW – Future Proposed Residential Development	4.5
R6	OPOR – Future Proposed Residential Development	1.5
R7	POW – 905 March Road	1.5

TABLE 4: CALCULATION SETTINGS

Parameter	Setting
Meteorological correction method	Single value for C0
Value C0	2.0
Ground attenuation factor for lawn areas	1
Ground attenuation factor for roadways and paved areas	0
Temperature (K)	283.15
Pressure (kPa)	101.33
Air humidity (%)	70

5. RESULTS AND DISCUSSION

Noise levels at nearby sensitive receptors fall below ENCG criteria for stationary noise, as summarized in Table 5 below. The sound levels listed in Table 5 are based on the assumptions outlined in Section 2.1.

TABLE 5: NOISE LEVELS FROM STATIONARY SOURCES

Receptor Number	Plane of Window Receptor Location	Noise Level (dBA)		Sound Level Limits		Meets ENCG Class 1 Criteria	
		Day	Night	Day	Night	Day	Night
R1	POW – 176 Windance Crescent	43	40	50	45	Yes	Yes
R2	OPOR – 176 Windance Crescent	42	N/A	50	N/A	Yes	N/A
R3	POW – 172 Windance Crescent	44	41	50	45	Yes	Yes
R4	OPOR – 172 Windance Crescent	44	N/A	50	N/A	Yes	N/A
R5	POW – Future Proposed Residential Development	45	42	50	45	Yes	Yes
R6	OPOR – Future Proposed Residential Development	42	N/A	50	N/A	Yes	N/A
R7	POW – 905 March Road	47	44	50	45	Yes	Yes

As Table 5 summarizes, noise levels fall below ENCG criteria at all receptors. Noise contours at 1.5 m above grade can be seen in Figures 4 and 5 for daytime and nighttime conditions, respectively. The main contributors of noise are expected to be the rooftop units associated with the restaurant. As a general recommendation, rooftop equipment should be located toward the centre of the rooftop, avoiding direct line of sight with sensitive areas if possible.

6. CONCLUSIONS AND RECOMMENDATIONS

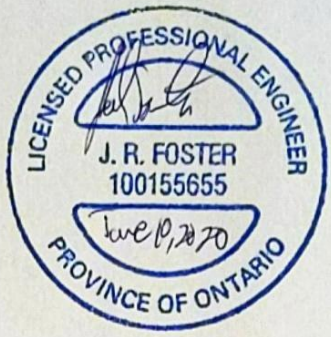
The results of the current study indicate that noise levels at nearby points of reception are expected to fall below the ENCG noise criteria, provided that the assumptions for noise control as outlined in Section 2.1 are followed during the detailed design process. As previously mentioned, mechanical information for the development was not yet available at the time of writing. As a result, Gradient Wind assumed the preliminary mechanical information for the development based on experience with similar developments. Once the mechanical design progresses and equipment information becomes available, these should be forwarded to Gradient Wind for review.

As such, the proposed development is expected to be compatible with the existing and proposed noise sensitive land uses and will satisfy all site plan conditions. A review of the final equipment selections and locations by a qualified acoustical engineer will be required prior to installation of the equipment.

This concludes our 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.



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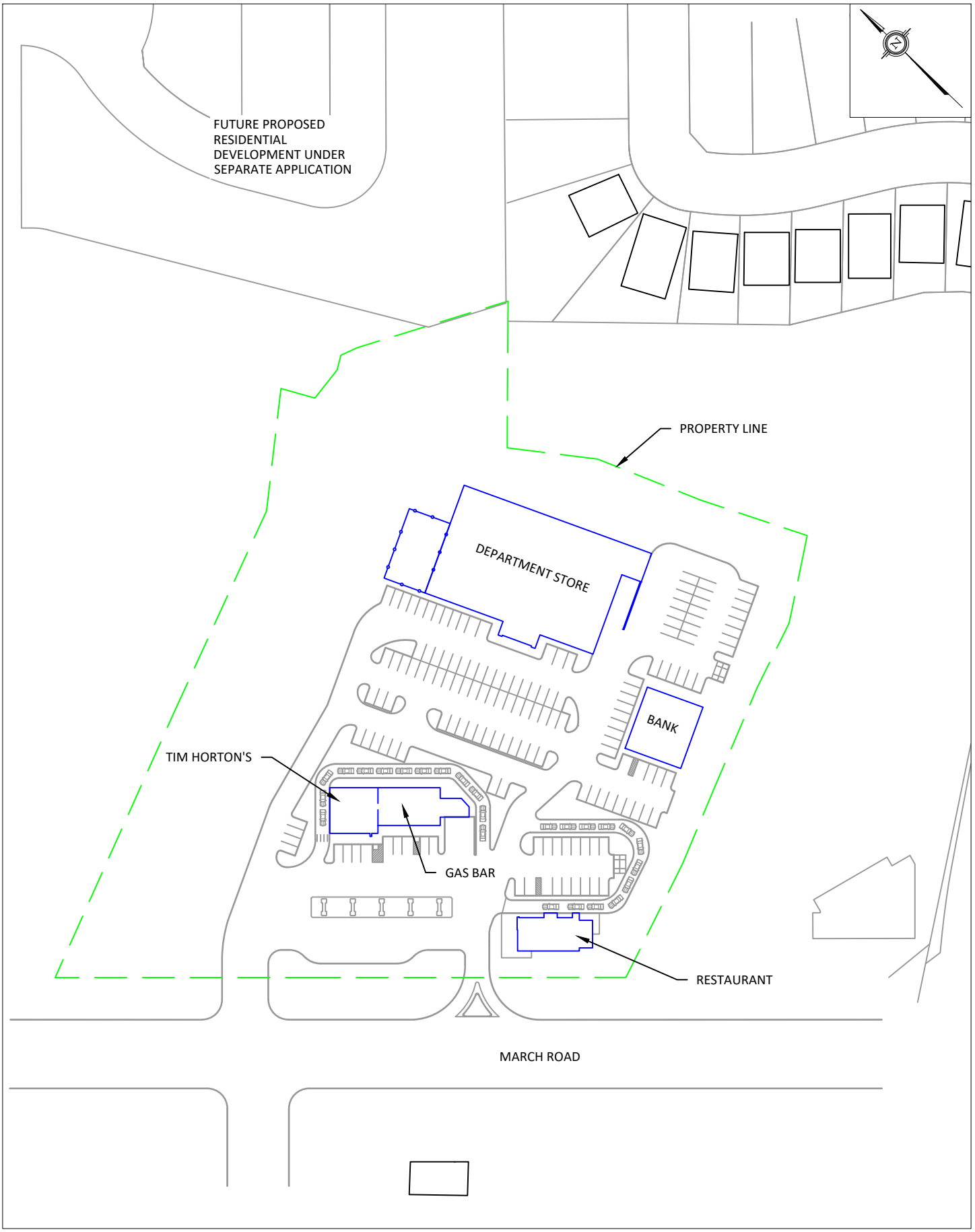
Gradient Wind File #20-021 – Stationary Noise



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PROJECT	910 MARCH ROAD, OTTAWA STATIONARY NOISE ASSESSMENT		DESCRIPTION
SCALE	1:1500 (APPROX.)	DRAWING NO. GWE20-021-1	FIGURE 1: SITE PLAN AND SURROUNDING CONTEXT
DATE	JUNE 5, 2020	DRAWN BY G.G.	

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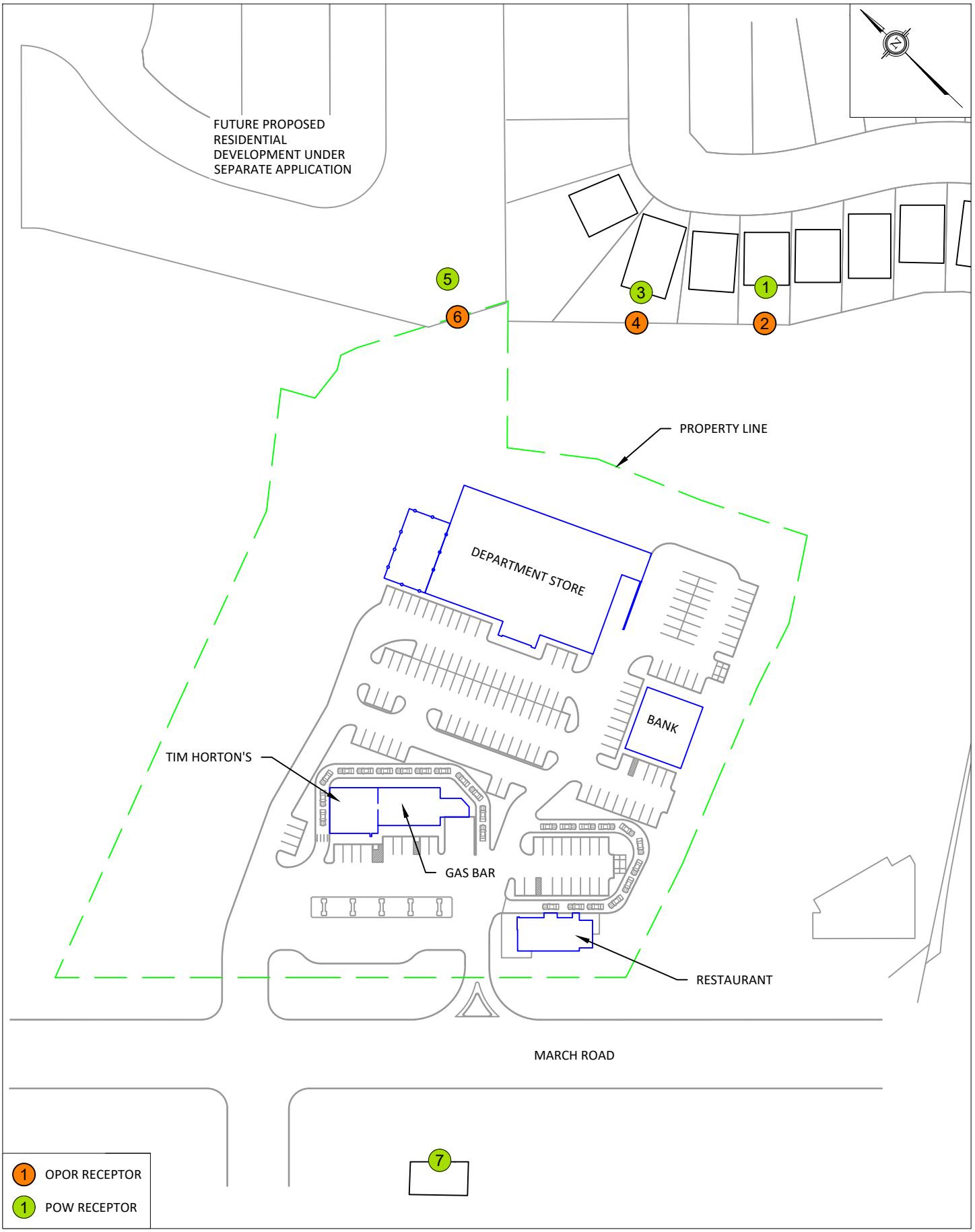
PROJECT	910 MARCH ROAD, OTTAWA STATIONARY NOISE ASSESSMENT		DESCRIPTION
SCALE	1:1000 (APPROX.)	DRAWING NO.	GWE20-021-2
DATE	JUNE 5, 2020	DRAWN BY	G.G.

FIGURE 2:
NOISE SOURCE LOCATIONS



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PROJECT	910 MARCH ROAD, OTTAWA STATIONARY NOISE ASSESSMENT		DESCRIPTION
SCALE	1:1500 (APPROX.)	DRAWING NO.	GWE20-021-3
DATE	JUNE 5, 2020	DRAWN BY	G.G.

FIGURE 3:
RECEPTOR LOCATIONS

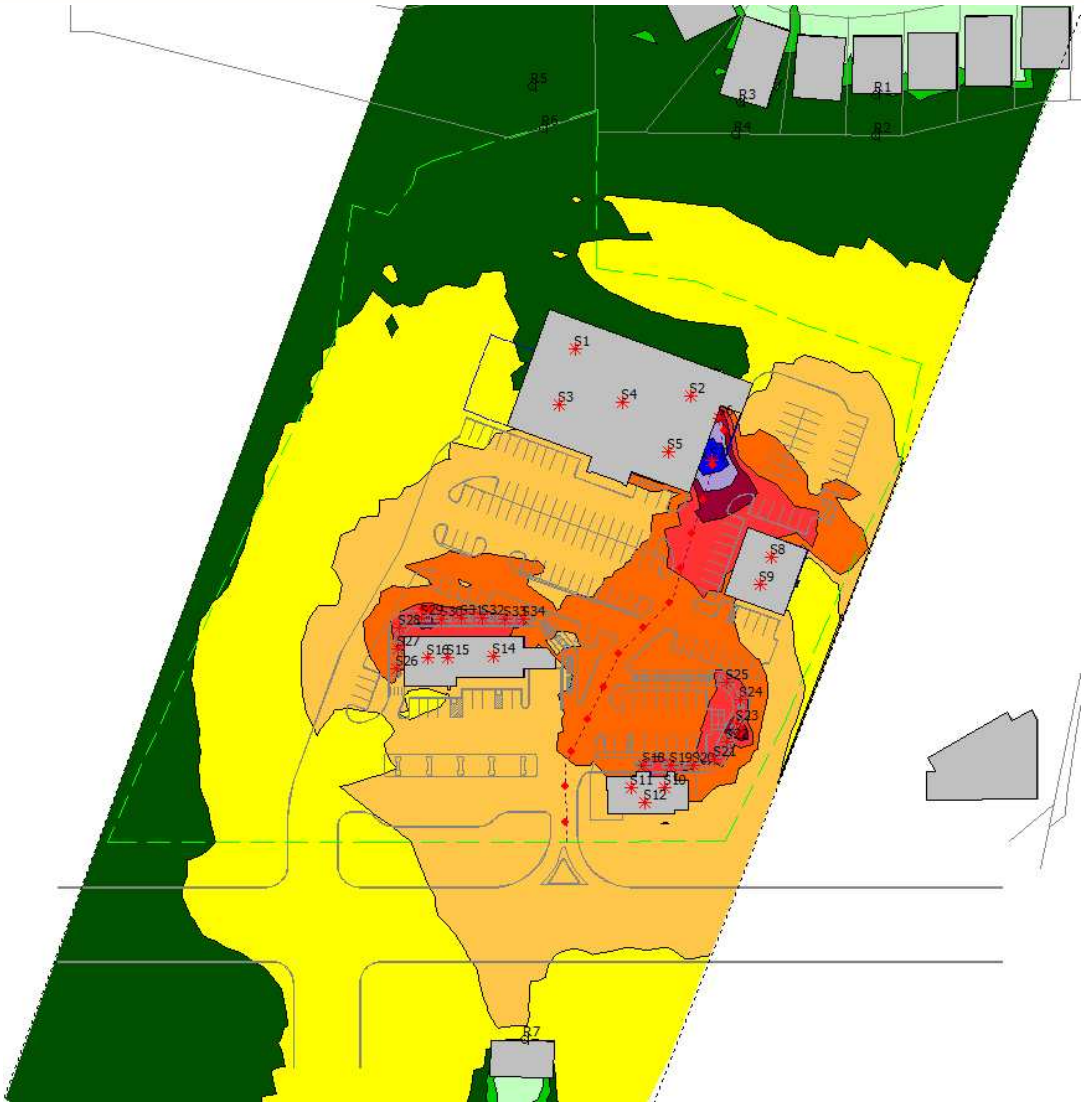

FIGURE 4: DAYTIME STATIONARY NOISE CONTOURS (1.5 METERS ABOVE GRADE)

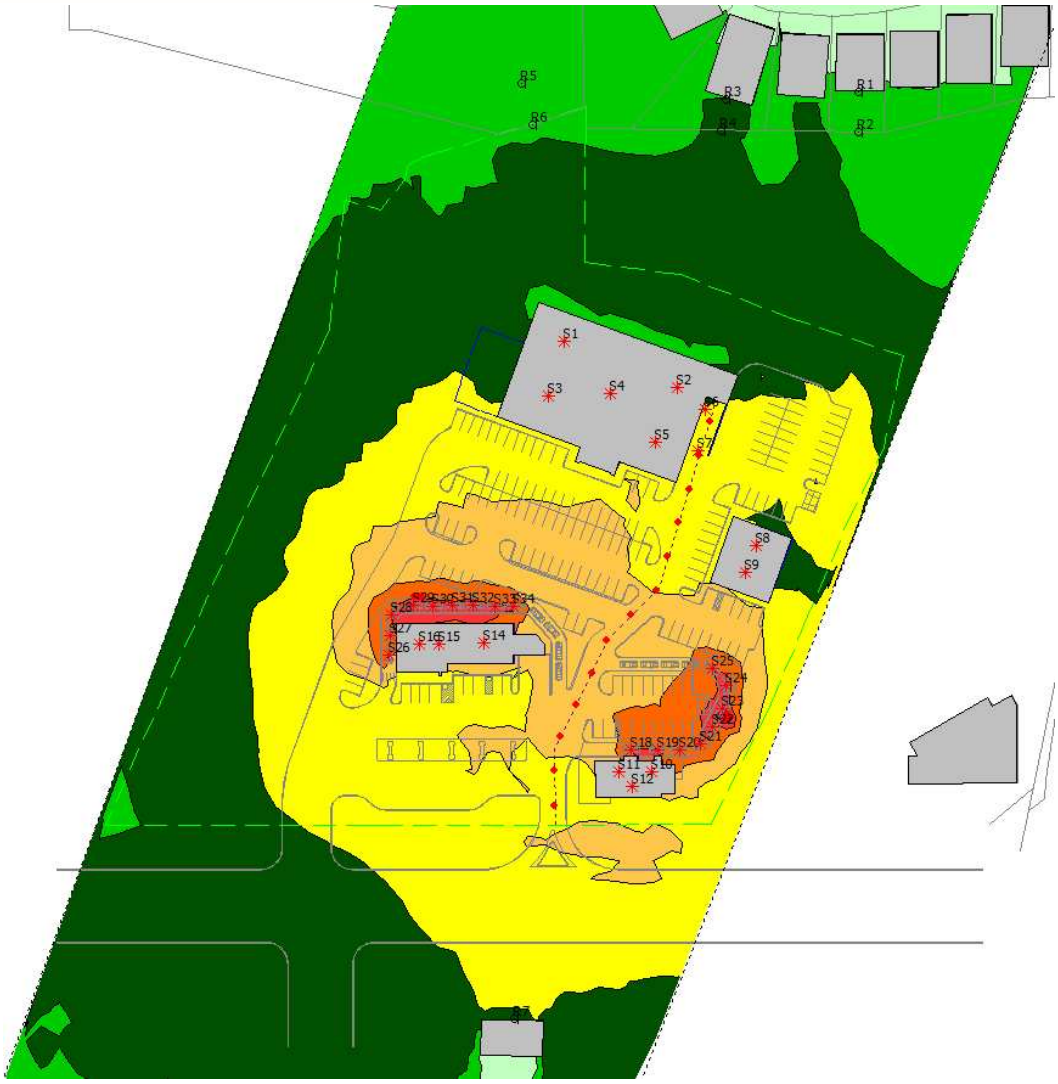

FIGURE 5: NIGHTTIME STATIONARY NOISE CONTOURS (1.5 METERS ABOVE GRADE)