GRADIENTWIND
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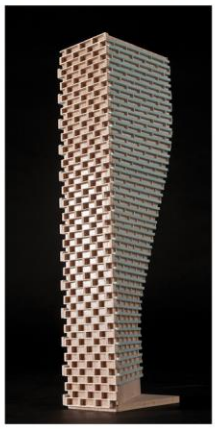
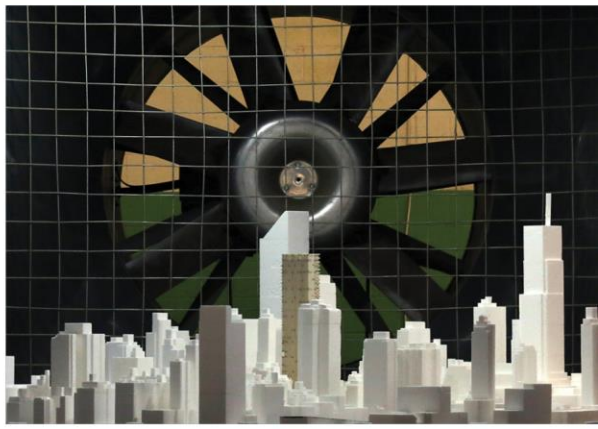
STATIOANRY NOISE ASSESSMENT

2610 Rideau Road
Ottawa, Ontario

GRADIENT WIND REPORT: GWE19-092 – Stationary Noise





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EXECUTIVE SUMMARY

This report describes a stationary noise assessment performed for a proposed expansion to the LTR Industries woodworking facility at 2610 Rideau Road in Ottawa, Ontario. The proposed addition is a 1-storey, rectangular planform warehouse with an area of 4662 m^2, connected to the existing building on the south side. The addition comprises two phases, Phase 1 and 2, each with an equal area of 2331 m^2, situated at the west and east side, respectively. Sources of stationary noise include and existing rooftop paint booth exhaust atop the existing building, and a relocated dust collector located to the south of the proposed addition. 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), and; (iii) architectural drawings prepared by Vandenberg & Wildeboer Architects.

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 Figure 4 for daytime conditions. The main contributor of noise at these locations is the paint booth exhaust. The new dust collector location is positioned favorably behind the addition. With consideration of Gradient Wind's recommendations, the proposed development is expected to be compatible with the existing land uses. 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 LTR Industries to undertake a stationary noise assessment for a proposed expansion to their woodworking facility at 2610 Rideau 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 associated mechanical equipment. 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, architectural drawings prepared by Vandenberg & Wildeboer Architects, mechanical information assumed by Gradient Wind based on experience with similar projects, surrounding street layouts obtained from the City of Ottawa, and recent site imagery.

2. TERMS OF REFERENCE

The proposed addition is a 1-storey, rectangular planform warehouse with an area of 4662 m^2, connected to the existing building on the south side. The addition comprises two phases, Phase 1 and 2, each with an equal area of 2331 m^2, situated at the west and east side, respectively. Surface parking is provided at the centre of the site and a loading area is proposed at the south side of the addition, accessed by laneways along the east and west perimeters of the site from Rideau Road. Residential homes are situated to the east and west of the development site. Figure 1 illustrates the site plan and surrounding context.

The facility is considered to operate during the daytime period, from 07:00-19:00. Sources of stationary noise include and existing rooftop paint booth exhaust atop the existing building, and a relocated dust collector located to the south of the proposed addition. Figure 2 illustrates the location of all noise sources included in this study.

[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

2.1 Assumptions

Gradient Wind has assumed the preliminary mechanical information of the development based on experience with similar developments. 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) The location of mechanical equipment has been assumed based on satellite images and drawings provided by the architect.

(ii) Sound data for the mechanical equipment is based on experience with similar developments, including noise measurements conducted by Gradient Wind.

(iii) Mechanical equipment is assumed to operate continuously over a 1-hour period during the daytime and nighttime period.

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

(v) On-site and off-site building massing has been included in the model to account for potential blockage.

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. Nine 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"[3].

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"[4]. 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, camp grounds, and noise sensitive buildings such as schools and places of worship. The recommended maximum noise levels for a Class 3 area in a rural environment at a POR are outlined in Table 1 below. The study site is considered to be in a Class 3 area because it is located in a rural area.

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

TABLE 1: EXCLUSIONARY LIMITS FOR CLASS 3 AREA

Time of Day	Outdoor Points of Reception	Plane of Window
07:00 – 19:00	45	45
19:00 – 23:00	40	40
23:00 – 07:00	N/A	40

4.3 Determination of Noise Source Power Levels

Preliminary mechanical information for the development has been based on Gradient Wind's experience with similar developments. Table 2 summarizes the sound power of each source used in the analysis.

TABLE 2: EQUIPMENT SOUND POWER LEVELS (dBA)

Source ID	Description	Height Above Grade (m)	Frequency (Hz)								
			63	125	250	500	1000	2000	4000	8000	Total
S1	Paint Booth Exhaust	1.5	34	63	76	81	84	85	80	71	91
S2	Dust Collector	1.5	79	79	83	85	86	85	86	69	93

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 9 receptor locations were chosen around the site to measure the noise impact at points of reception (POR) during the daytime (07:00 – 19:00) period. 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. 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. Modelling data is available upon request.

TABLE 3: RECEPTOR LOCATIONS

Receptor Number	Receptor Location	Height Above Grade (m)
R1	POW – 2594 Rideau Road	1.5
R2	POW – 2594 Rideau Road	1.5
R3	OPOR – 2594 Rideau Road	1.5
R4	POW – 2600 Rideau Road	1.5
R5	POW – 2600 Rideau Road	1.5
R6	OPOR – 2600 Rideau Road	1.5
R7	POW – 2628 Rideau Road	1.5
R8	POW – 2628 Rideau Road	1.5
R9	OPOR – 2628 Rideau Road	1.5

TABLE 4: CALCULATION SETTINGS

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

5. STATIONARY NOISE RESULTS

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 4 Criteria
		Day	Day	Day
R1	POW – 2594 Rideau Road	35	45	Yes
R2	POW – 2594 Rideau Road	43	45	Yes
R3	OPOR – 2594 Rideau Road	45	45	Yes
R4	POW – 2600 Rideau Road	30	45	Yes
R5	POW – 2600 Rideau Road	35	45	Yes
R6	OPOR – 2600 Rideau Road	37	45	Yes
R7	POW – 2628 Rideau Road	37	45	Yes
R8	POW – 2628 Rideau Road	36	45	Yes
R9	OPOR – 2628 Rideau Road	36	45	Yes

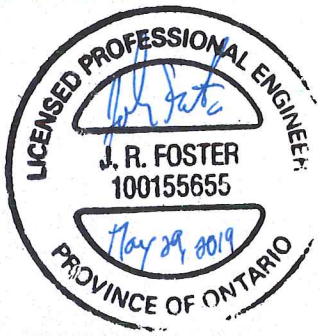
6. CONCLUSIONS AND RECOMMENDATIONS

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 Figure 4 for daytime conditions. The main contributor of noise at these locations is the paint booth exhaust. The new dust collector location is positioned favorably behind the addition. With consideration of Gradient Wind's recommendations, the proposed development is expected to be compatible with the existing land uses. 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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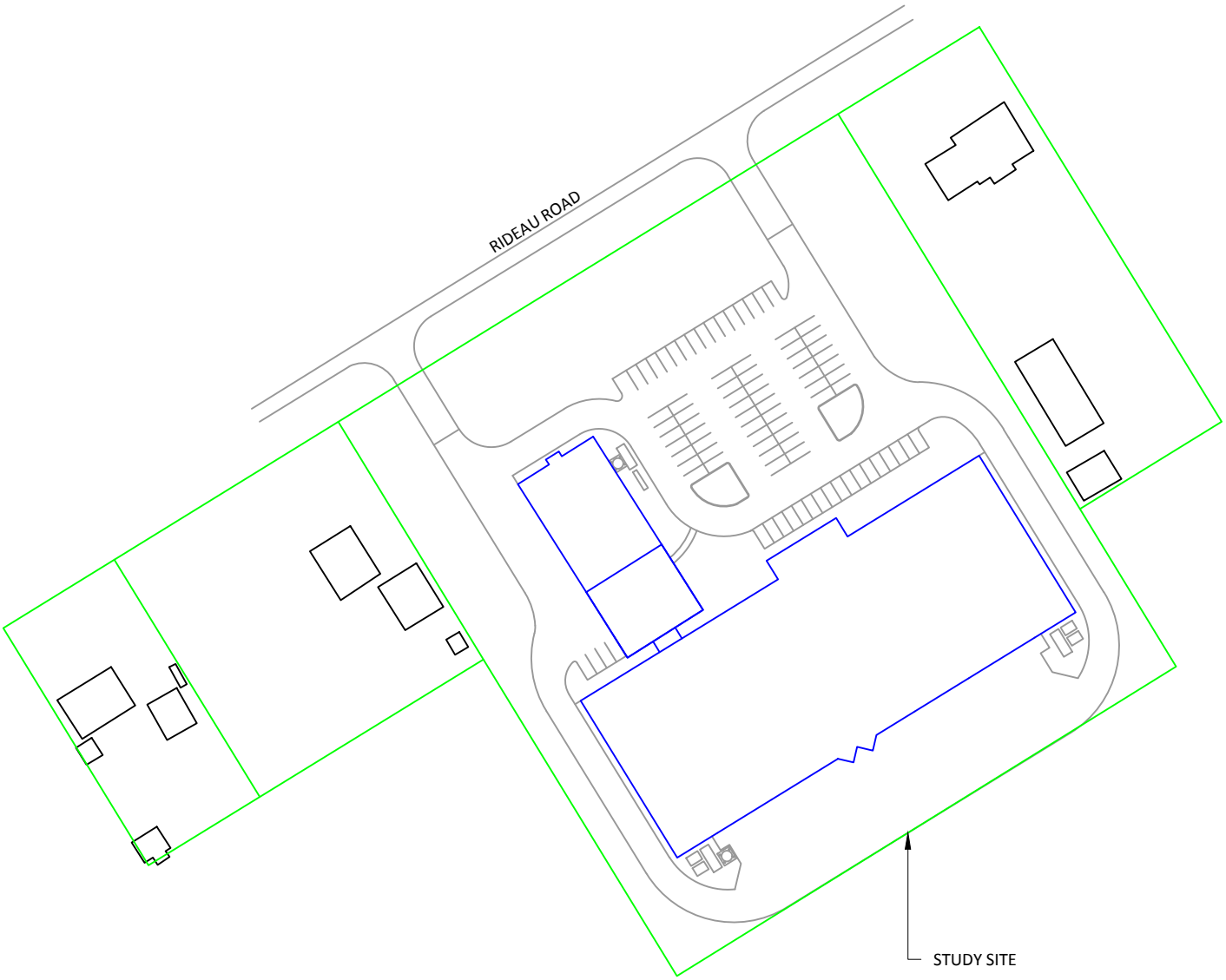
Gradient Wind File #: 19-092 – Stationary Noise



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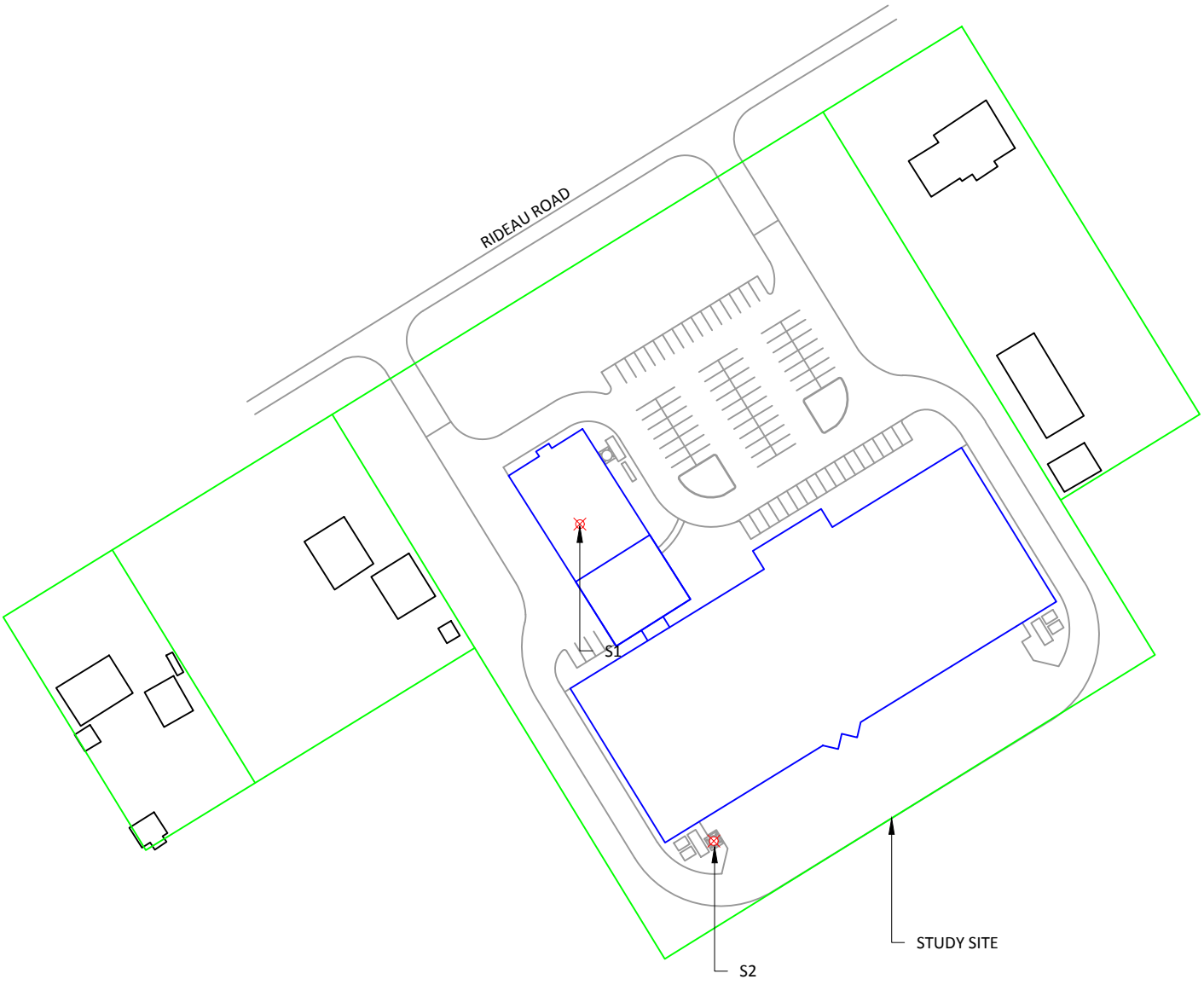
PROJECT	2610 RIDEAU ROAD, OTTAWA STATIONARY NOISE ANALYSIS		DESCRIPTION
SCALE	1:1500 (APPROX.)	DRAWING NO. GWE19-092-1	FIGURE 1: SITE PLAN AND SURROUNDING CONTEXT
DATE	MAY 29, 2019	DRAWN BY M.L.	



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PROJECT	2610 RIDEAU ROAD, OTTAWA STATIONARY NOISE ANALYSIS		DESCRIPTION
SCALE	1:1500 (APPROX.)	DRAWING NO. GWE19-092-2	FIGURE 2: SOURCE LOCATIONS
DATE	MAY 29, 2019	DRAWN BY M.L.	

1 POW RECEPTOR

1 OPOR RECEPTOR

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PROJECT	2610 RIDEAU ROAD, OTTAWA STATIONARY NOISE ANALYSIS		DESCRIPTION
SCALE	1:1500 (APPROX.)	DRAWING NO. GWE19-092-3	FIGURE 3: RECEPTOR LOCATIONS
DATE	MAY 29, 2019	DRAWN BY M.L.	

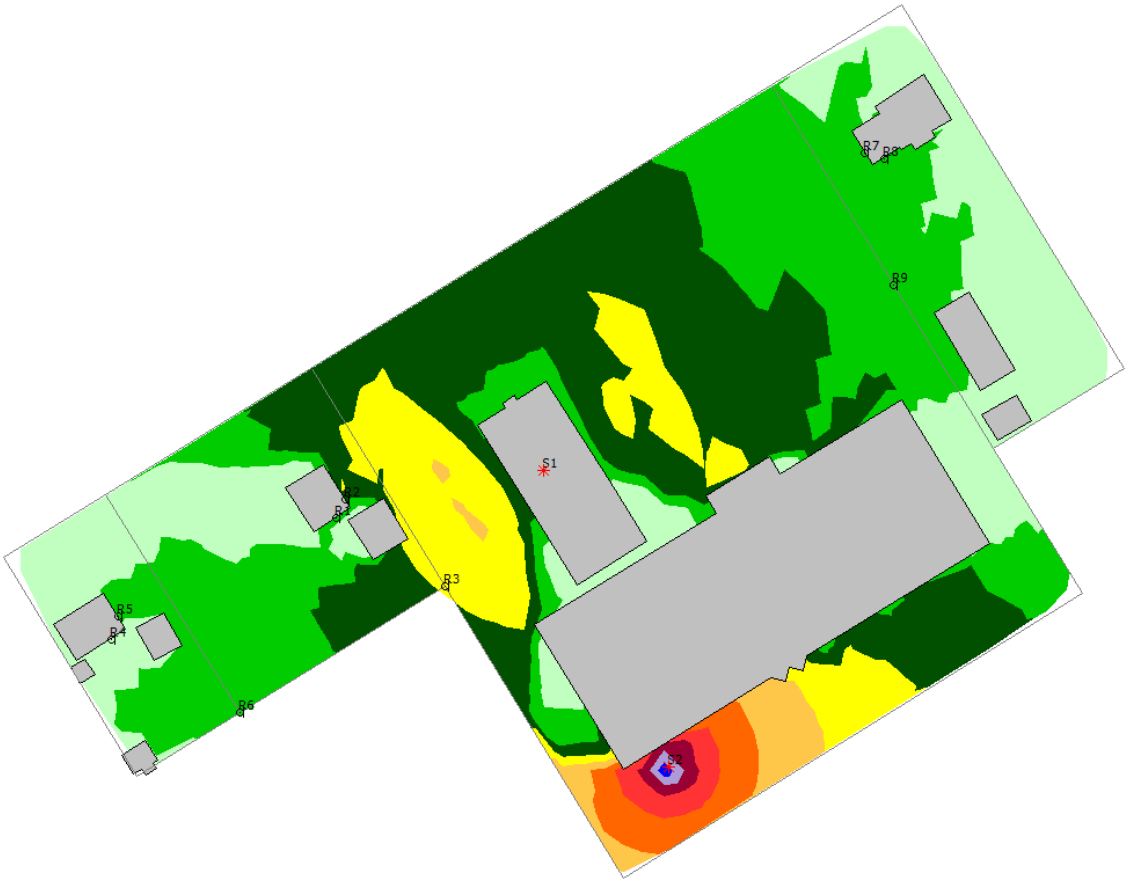

FIGURE 4: NOISE CONTOURS 1.5 M ABOVE GRADE (DAYTIME PERIOD)