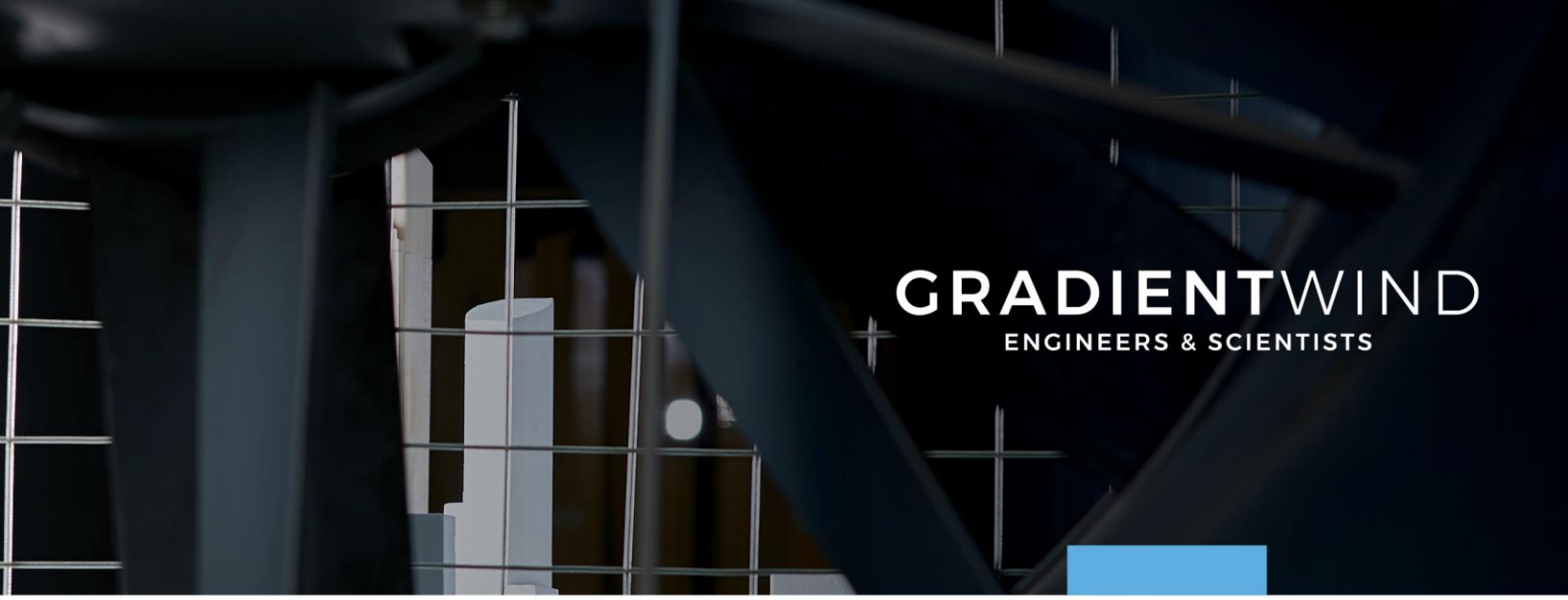

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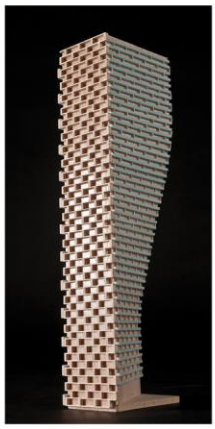
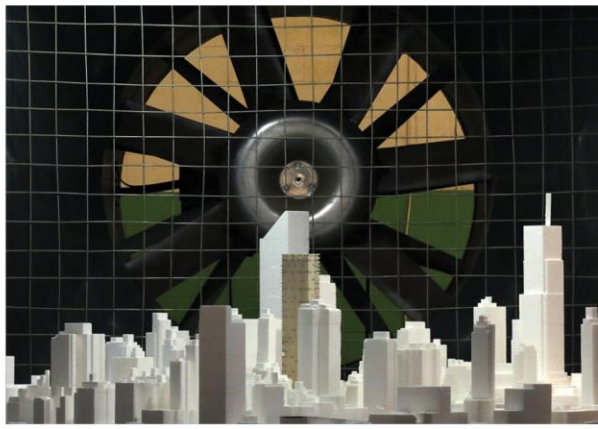
STATIONARY NOISE ASSESSMENT

473 Albert Street
Ottawa, Ontario

REPORT: 19-215-Stationary Noise





March 2, 2021

PREPARED FOR

InterRent No. 3 Limited Partnership
485 Bank Street, Suite 207
Ottawa, ON
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PREPARED BY

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EXECUTIVE SUMMARY

This report describes a stationary noise assessment performed for the proposed redevelopment at 473 Albert Street in Ottawa, Ontario. The redevelopment comprises renovation of the existing 13-storey office building (incl. two penthouse levels) located at 473 Albert Street in Ottawa, Ontario. The existing building will be converted to residential apartments. Sources of stationary noise include rooftop air handling equipment and chiller, as well as the parking garage exhaust at grade. Figure 1 illustrates the site plan and surrounding context, and Figure 2 illustrates the location of all noise sources included in this study.

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) architectural drawings prepared by Linebox Studio; (iv) mechanical information prepared by Smith + Andersen, and; (v) surrounding street and building layouts obtained from the City of Ottawa and recent site imagery.

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 adhered to during the detailed design process. As such, the proposed development is expected to be compatible with the existing 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.

To ensure compliance with the ENCG, the following noise control measures are recorded:

- An approximately 4-metre-tall noise barrier has been assumed along the north and west sides of the rooftop outdoor mechanical area, matching the height of the penthouse (see Figure 2).

TABLE OF CONTENTS

1. INTRODUCTION

Gradient Wind Engineering Inc. (Gradient Wind) was retained by InterRent No. 3 Limited Partnership to undertake a stationary noise assessment for the proposed redevelopment at 473 Albert Street 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 mechanical equipment and garage exhaust fans. 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 Linebox Studio, mechanical information prepared by Smith + Andersen, surrounding street and building layouts obtained from the City of Ottawa, and recent site imagery.

2. TERMS OF REFERENCE

The redevelopment comprises renovation of the existing 13-storey office building (incl. two penthouse levels) located at 473 Albert Street in Ottawa, Ontario. The existing building will be converted to residential apartments. The ground floor comprises a lobby, a wellness & gym area, a business center, and two residential town units at the northwest corner. Level 2-11 comprise residential units. Various outdoor amenity spaces are present at grade, including seating areas and a flexible amenity space. The rooftop of the building will provide outdoor amenity areas at all sides at Level 12. The solid envelope of the mechanical penthouse at Level 12 will be partially removed to provide a glazed, pavilion structure accommodating indoor amenity space. The size of the mechanical penthouse at Level 13 will be increased and screens around the perimeter will be installed. The existing two levels of underground parking will remain. In most areas the existing building façade will remain with some areas removed to add new Julian balconies.

[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

The site is surrounded by low and medium-rise residential and office-use buildings in all directions. 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 and chiller, as well as the parking garage exhaust at grade. Figure 1 illustrates the site plan and surrounding context, and Figure 2 illustrates the location of all noise sources included in this study.

2.1 Assumptions

Preliminary mechanical information for the development is based on mechanical information prepared by Smith + Andersen. 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 locations, quantity and tonnage of rooftop units has been assumed based on mechanical information prepared by Smith + Andersen.
(ii) Sound data for rooftop units is based on manufacturer's data.
(iii) The rooftop air handling unit is assumed to operate continuously over a 1-hour period during the daytime and at 50% operation during the nighttime period.
(iv) The rooftop chiller unit is assumed to operate continuously over a 1-hour period during the daytime and nighttime periods.
(v) The garage exhaust fan is assumed to operate 5 minutes within an hour during the daytime and nighttime periods.
(vi) Screening effects of the parapets have been conservatively excluded in the modelling.
(vii) An approximately 4-metre-tall noise barrier has been assumed along the north and west sides of the rooftop outdoor mechanical area, matching the height of the penthouse (see Figure 2).

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. Twelve 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 the ENCG as "all sources of sound and vibration, whether fixed or mobile, that exist or operate on a premises, property or facility, the combined sound and vibration levels of which are emitted beyond the property boundary of the premises, property or facility, unless the source(s) is (are) due to 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,

[3] City of Ottawa Environmental Noise Control Guidelines, page 10

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 points of reception (POR). A POR is defined under the ENCG 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, campgrounds, 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 in a Class 1 area because it is located within the downtown core.

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

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	AHU	2	65	74	76	80	84	82	80	76	**89**
S2	Chiller Unit	2	57	66	76	79	87	83	76	76	**89**
S3	Exhaust Fan	0.5	61	72	78	85	86	84	80	70	**91**

[4] City of Ottawa Environmental Noise Guidelines, page 9

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 nine 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. 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.

TABLE 3: RECEPTOR LOCATIONS

Receptor Number	Receptor Location	Height Above Grade (m)
R1	POW – 200 Bay Street	40
R2	POW – 200 Bay Street	40
R3	POW – 440 Albert Street	11
R4	POW – 440 Albert Street	11
R5	POW – 85 Bronson Avenue	41
R6	POW – 85 Bronson Avenue	41
R7	POW – 85 Bronson Avenue	41
R8	POW – 424 Queen Street	4.5
R9	POW – 410 Queen Street	4.5

TABLE 4: CALCULATION SETTINGS

Parameter	Setting
Meteorological correction method	Single value for C0
Value C0	2.0
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. 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 4 Criteria	
		Day	Night	Day	Night	Day	Night
R1	POW – 200 Bay Street	34	33	50	45	Yes	Yes
R2	POW – 200 Bay Street	36	35	50	45	Yes	Yes
R3	POW – 440 Albert Street	36	36	50	45	Yes	Yes
R4	POW – 440 Albert Street	38	37	50	45	Yes	Yes
R5	POW – 85 Bronson Avenue	43	42	50	45	Yes	Yes
R6	POW – 85 Bronson Avenue	40	39	50	45	Yes	Yes
R7	POW – 85 Bronson Avenue	40	40	50	45	Yes	Yes
R8	POW – 424 Queen Street	45	45	50	45	Yes	Yes
R9	POW – 410 Queen Street	39	39	50	45	Yes	Yes

As Table 5 summarizes, noise levels fall below ENCG criteria at all receptors. Noise contours at 41 m above grade can be seen in Figure 4 and 5 for daytime and nighttime conditions, respectively. The main contributor of noise at these locations is the air handing unit and the chiller unit.

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 adhered to during the detailed design process. As such, the proposed development is expected to be compatible with the existing 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.

To ensure compliance with the ENCG, the following noise control measures are recorded:

- An approximately 4-metre-tall noise barrier has been assumed along the north and west sides of the rooftop outdoor mechanical area, matching the height of the penthouse (see Figure 2).

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.

Michael Lafortune, C.E.T.
Environmental Scientist

Joshua Foster, P.Eng.
Principal

Gradient Wind File #19-215-Stationary Noise

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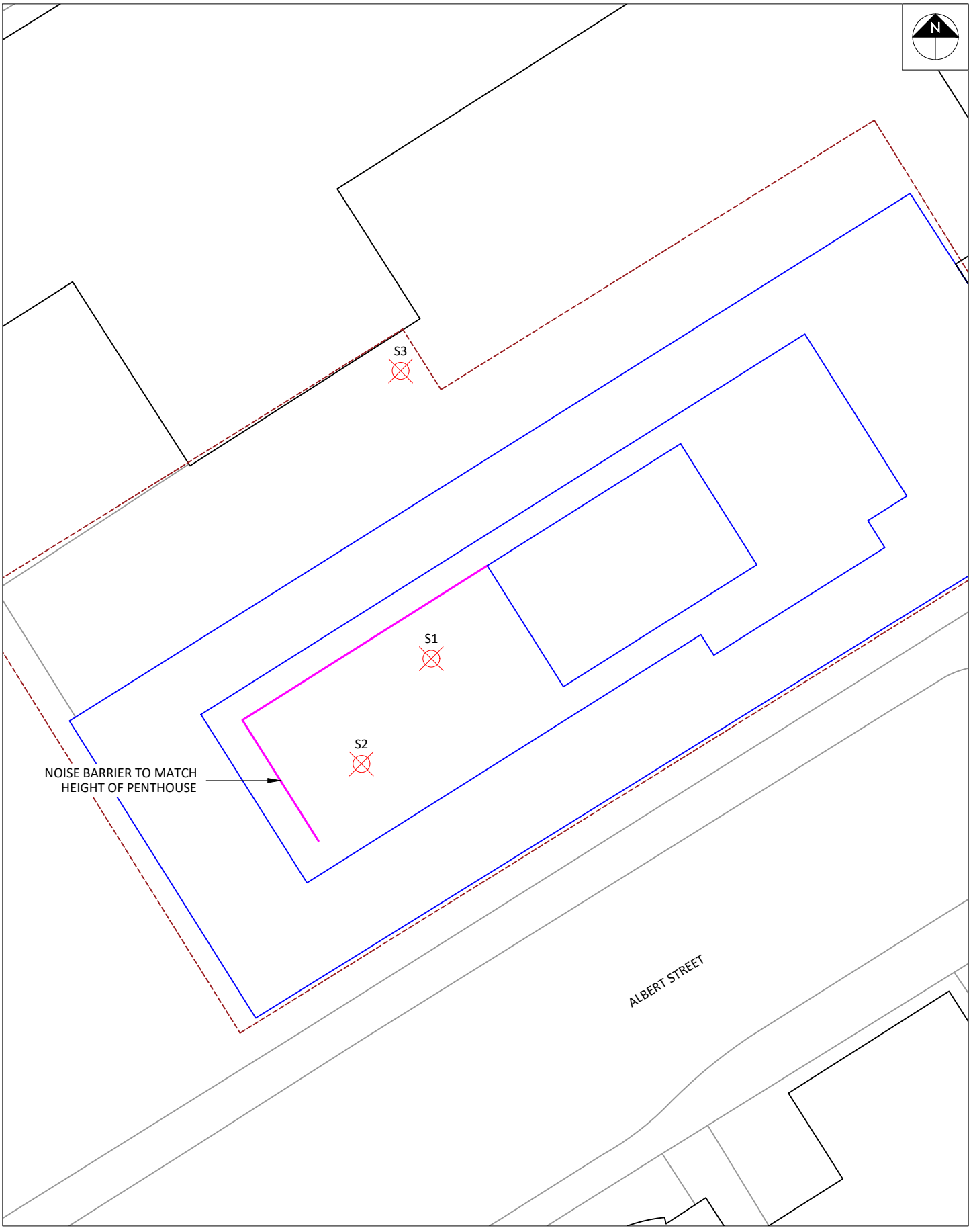
PROJECT	473 ALBERT STREET, OTTAWA STATIONARY NOISE ASSESSMENT		DESCRIPTION
SCALE	1:1000 (APPROX.)	DRAWING NO. GW19-215-1	FIGURE 1: SITE PLAN AND SURROUNDING CONTEXT
DATE	JANUARY 15, 2021	DRAWN BY M.L.	



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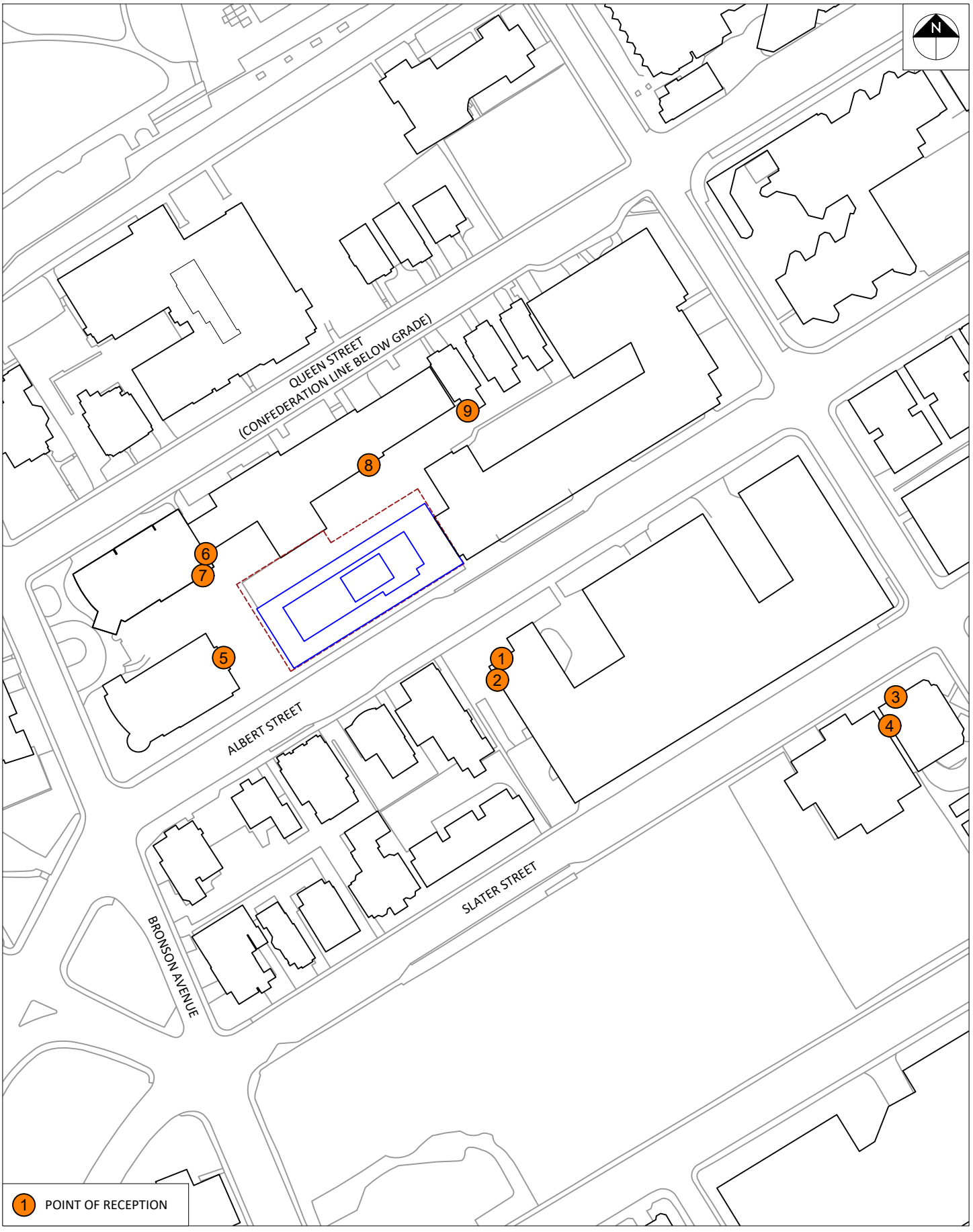
PROJECT	473 ALBERT STREET, OTTAWA STATIONARY NOISE ASSESSMENT		DESCRIPTION
SCALE	1:1000 (APPROX.)	DRAWING NO. GW19-215-2	FIGURE 2: SOURCE LOCATIONS
DATE	JANUARY 15, 2021	DRAWN BY M.L.	



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PROJECT	473 ALBERT STREET, OTTAWA STATIONARY NOISE ASSESSMENT
SCALE	1:1500 (APPROX.)
DRAWING NO.	GW19-215-3
DATE	JANUARY 15, 2021
DRAWN BY	M.L.
DESCRIPTION	FIGURE 3: RECEPTOR LOCATIONS

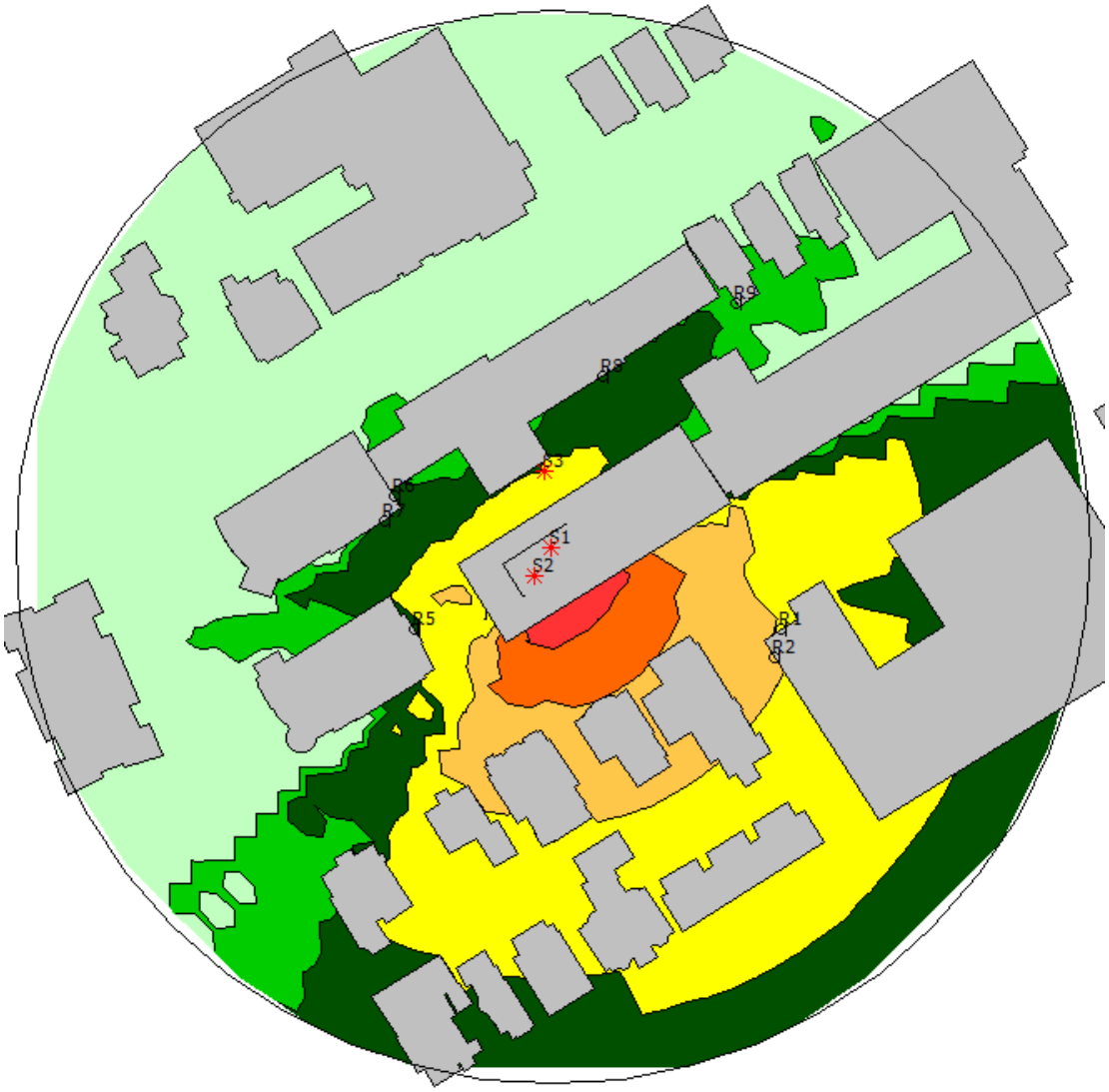

FIGURE 4: DAYTIME NOISE CONTOURS (41 M ABOVE GRADE)

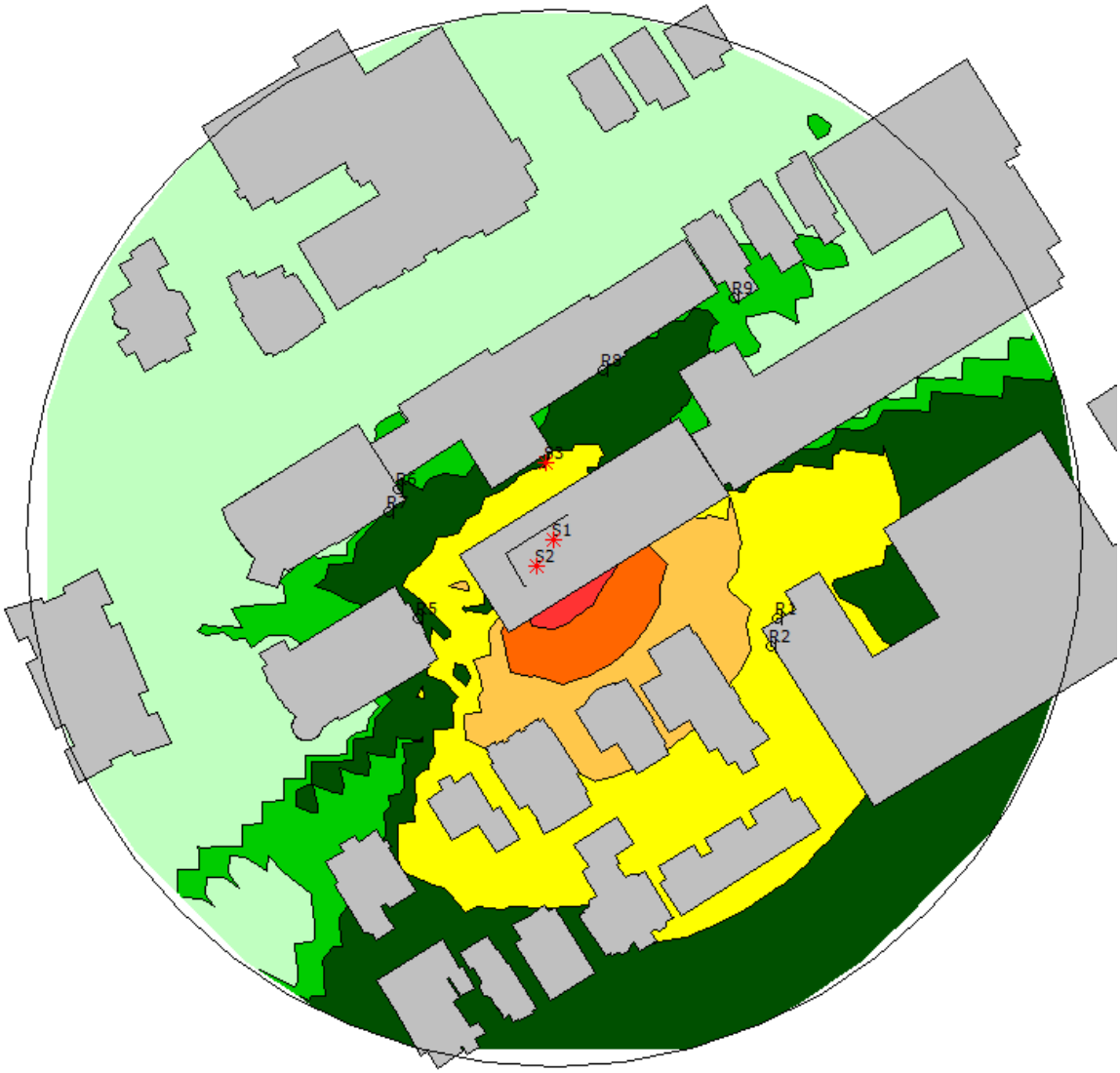

FIGURE 5: NIGHTTIME NOISE CONTOURS (41 M ABOVE GRADE)