Stationary Noise Assessment

605 Longfields Drive

Ottawa, Ontario

REPORT: GWE17-174 - Stationary Noise

Prepared For:

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EXECUTIVE SUMMARY

This document describes a stationary noise assessment performed for a proposed commercial retail development located at the intersection of Longfields Drive and Via Modugno Place in Ottawa, Ontario. The proposed 1-storey building is expected to rise approximately 4-metres in height. Figure 1 illustrates a site plan with surrounding context. The primary sources of noise from the development are ground-level mechanical equipment.

The assessment is based on: (i) theoretical noise prediction methods that conform to the Ministry of the Environment and Climate Change (MOECC) and City of Ottawa requirements; (ii) stationary noise level criteria as specified by the City of Ottawa's Environmental Noise Control Guidelines (ENCG); and (iii) architectural drawings provided by Paul A. Cooper Architect and mechanical equipment information provided by Campanale Homes.

Our stationary noise assessment for the proposed commercial development indicates that, provided equipment selections and locations are similar to the assumptions and recommendations in this report, noise levels at nearby points of reception are expected to fall below City of Ottawa's ENCG limits. Since the noise levels fall below the ENCG criteria, the proposed development is expected to be compatible with the existing and future noise sensitive land uses.

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1. INTRODUCTION

Gradient Wind Engineering Inc. (GWE) was retained by Campanale Homes to undertake a stationary noise assessment for a proposed commercial development located at the intersection of Longfields Drive and Via Modugno Place in Ottawa, Ontario. This report focuses on the noise impacts from mechanical equipment on nearby noise sensitive areas. This study is based on architectural drawings provided by Paul A. Cooper Architect, and mechanical equipment information provided by Campanale Homes, and recent aerial imagery.

2. TERMS OF REFERENCE

The focus of this stationary noise assessment is a proposed 1-storey commercial development located in Barrhaven, Ontario. The proposed building is to contain 15 retail units, and be approximately 4 metres in height. The site is surrounded by institutional land use to the northeast and residential in all other directions. The development is located at the intersection of Longfields Drive and Via Modugno Place. The closest points of reception are located on a school to the northeast of the development. Figure 1 illustrates a complete site plan with surrounding context.

2.1 Equipment

Mechanical information for the development has been provided by Campanale Homes for the project. This study is based on available information at the time of the study, any changes to equipment selection and locations will require review by an acoustical engineer prior to installation. Our assessment is based on the following information:

(i) The locations and quantity of the HVAC equipment have been specified by Campanale Homes. All HVAC equipment is located at ground level at the rear façade of the property.

(ii) The sound data of the HVAC equipment have been provided by Campanale Homes

(iii) During daytime, and evening (07:00 to 23:00) and nighttime periods (23:00 to 7:00), all the HVAC equipment in the building are assumed to be in full operation

The equipment considered in the model consisted of:

(i) S1-S10: Condenser Units (York Affinity Model YXV48B21S)

(ii) S11: Condenser Units (York Affinity Model YXV60B21S)

(iii) S12-15: Condenser Units (York Affinity Model YXV36B21S)

Figure 2 illustrates the location of all stationary noise sources within the development.

3. OBJECTIVES

The main goals of the work are to assess the anticipated noise impacts from ground-level HVAC equipment on nearby noise sensitive receptors and, where necessary, describe noise control measures to ensure the development can operate in the area in compliance with the City of Ottawa's ENCG[1].

4. METHODOLOGY

4.1 Background

Noise can be defined as any obtrusive sound. It is created at a source, transmitted through a medium, such as air, and intercepted by a receiver. Noise may be characterized in terms of the power of the source or the sound pressure at a specific distance. While the power of a source is characteristic of that 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 City of Ottawa's 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*". The guidelines do not apply to gas stations, and

[1] City of Ottawa Environmental Noise Control Guidelines, January 2016

occasional movement of vehicles on property, such as infrequent deliveries of goods to convenience stores[2].

4.2 Stationary Noise Source Assessment and 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 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 apply to outdoor points of reception (POR) and Plane of Window (POW) receivers. A point of reception is defined under ENCG as "*any location on a noise sensitive land use where noise from a stationary source is received*". 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, places of worship and daycare facilities. According to the ENCG, the recommended maximum noise level for an suburban (Class 2) environment at a POR is either the lowest one-hour background noise level due to other sources, or the exclusionary limits outlined in Table 1, whichever is higher. As the site is located at the intersection of an arterial road, ambient noise levels are expected to persist into the evening period. As per the ENCG requirements, developments within Barrhaven are considered Class II acoustical environments. For these reasons, we considered the site to be situated in a Class 2 urban environment.

[2] City of Ottawa Environmental Noise Control Guidelines, January 2016 – Section 3.0

TABLE 1: EXCLUSIONARY LIMITS FOR CLASS 2 AREA

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

4.3 Determination of Noise Source Power Levels

Sound power data for the ground-level HVAC equipment were provided by Campanale Homes. Equipment on the ground includes 15 Condenser Units consisting of 3-models. Table 2 summarizes the sound power levels of each source assumed in our analysis. The information is based on manufactures' data of the proposed equipment. Figure 2 illustrates the location of all stationary sources on the study building.

TABLE 2: EQUIPMENT SOUND POWER LEVELS (dBA)

Source ID	Height above grade (m)	Description	Frequency (Hz)								
			63	125	250	500	1000	2000	4000	8000	Total
S1-S10	1.1	York Affinity – YXV48B21S	46	57	62	68	69	65	60	53	73
S11	1.2	York Affinity – YXV60B21S	49	60	64	69	70	66	62	54	74
S12-S15	1.0	York Affinity – YXV36B21S	45	59	60	68	69	66	60	52	73

4.4 Stationary Source Noise Predictions

The impact of the 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 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 Environment and Climate Change (MOECC) as part of Environmental Compliance Approvals applications.

A total of 10 receptor locations were chosen around the site to measure the noise impact at points of reception (POR) during the daytime and evening period (07:00 – 23:00), as well as the nighttime period (23:00 – 07:00), as illustrated in Figure 3. POR locations included outdoor points of reception (OPOR) and the plane of windows (POW) of the adjacent residential properties and school 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 settings are typical and have been based on ISO 9613 standards and guidance from the MOECC.

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. Further modelling data is available upon request.

TABLE 3: RECEPTOR LOCATIONS

Receptor Number	Location	Height Above Grade (m)
R1A	POW – 615 Longfields West Façade – 2nd Floor	4.5
R1B	POW – 615 Longfields West Façade – 4th Floor	10.5
R2A	POW – 615 Longfields North Façade – 2nd Floor	4.5
R2B	POW – 615 Longfields North Façade – 4th Floor	10.5
R3	POW – 600 Via Campanale – 2nd Floor	4.5
R4	POW – 601 Via Campanale – 2nd Floor	4.5
R5	OPOR – 601 Via Campanale – OLA	1.5
R6	POW – 601 Longfields Drive West Facade – 1st Floor	1.5
R7	OPOR – 601 Longfields Drive – OLA Rear of School	1.5
R8	OPOR – 601 Longfields Drive – OLA Playground	1.5
R9	POW – 601 Longfields Drive – Portables	1.5
R10	OPOR – 601 Longfields Drive – OLA Soccer Field	1.5

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 produced by HVAC equipment at all outdoor points of reception and other plane of window receptors fall below the ENCG criteria. Equipment operations were assumed to be continuous during the daytime, evening and nighttime for all sources. The nighttime period has the more stringent criteria. The results for noise levels due to HVAC equipment are presented in Table 5 and 6, while noise contours are illustrated in Figures 4-5 for 1.5 metres and 4.5 metres above grade, respectively.

The development is expected to be compatible with the existing and future noise sensitive land uses, provided that the assumptions are consistent with Section 2.1 and 4.3 with respect to HVAC equipment.

TABLE 5: NOISE LEVELS FROM HVAC EQUIPMENT (1.5 M ABOVE GRADE)

Receptor Number	Receptor Location	1-HR L_{eq} (dBA)	ENCG Criteria (dBA)	Meets ENCG
		Daytime/Evening/ Nighttime	Nighttime	
R1A	POW – 615 Longfields West Façade – 2nd Floor	24	45	Yes
R1B	POW – 615 Longfields West Façade – 4th Floor	25	45	Yes
R2A	POW – 615 Longfields North Façade – 2nd Floor	25	45	Yes
R2B	POW – 615 Longfields North Façade – 4th Floor	26	45	Yes
R3	POW – 600 Via Campanale	31	45	Yes
R4	POW – 601 Via Campanale	37	45	Yes
R5	OPOR – 601 Via Campanale – OLA	35	45	Yes
R6	POW – 601 Longfields Drive	34	45	Yes
R7	OPOR – 601 Longfields Drive – OLA Rear of School	33	45	Yes
R8	OPOR – 601 Longfields Drive – OLA Playground	39	45	Yes
R9	POW – 601 Longfields Drive – Portables	37	45	Yes
R10	OPOR – 601 Longfields Drive – OLA Soccer Field	42	45	Yes

TABLE 6: NOISE LEVELS FROM HVAC EQUIPMENT (4.5 M ABOVE GRADE)

Receptor Number	Receptor Location	1-HR L_{eq} (dBA)	ENCG Criteria (dBA)	Meets ENCG
		Daytime/Evening/ Nighttime	Nighttime	
R1A	POW – 615 Longfields West Façade – 2nd Floor	24	45	Yes
R1B	POW – 615 Longfields West Façade – 4th Floor	25	45	Yes
R2A	POW – 615 Longfields North Façade – 2nd Floor	25	45	Yes
R2B	POW – 615 Longfields North Façade – 4th Floor	26	45	Yes
R3	POW – 600 Via Campanale	31	45	Yes
R4	POW – 601 Via Campanale	37	45	Yes
R5	OPOR – 601 Via Campanale – OLA	35	45	Yes
R6	POW – 601 Longfields Drive	34	45	Yes
R7	OPOR – 601 Longfields Drive – OLA Rear of School	33	45	Yes
R8	OPOR – 601 Longfields Drive – OLA Playground	39	45	Yes
R9	POW – 601 Longfields Drive – Portables	37	45	Yes
R10	OPOR – 601 Longfields Drive – OLA Soccer Field	42	45	Yes

6. CONCLUSIONS AND RECOMMENDATIONS

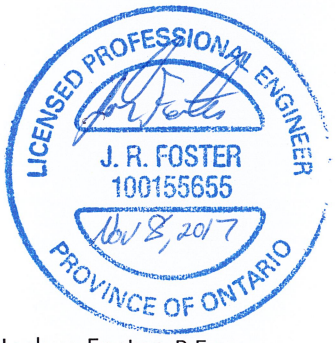
Our stationary noise assessment for the proposed commercial development indicates that, provided equipment selections and locations are similar to the assumptions and recommendations in this report, noise levels at nearby points of reception are expected to fall below the City of Ottawa's Environmental Noise Control Guidelines (ENCG). Since the noise levels fall below the ENCG criteria, the proposed development is expected to be compatible with the existing and future noise sensitive land uses.

As this study is based on available information at the time of the study, any changes to equipment selection and locations should be reviewed by an acoustical engineer prior to installation.

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.

Yours truly,

Gradient Wind Engineering Inc.



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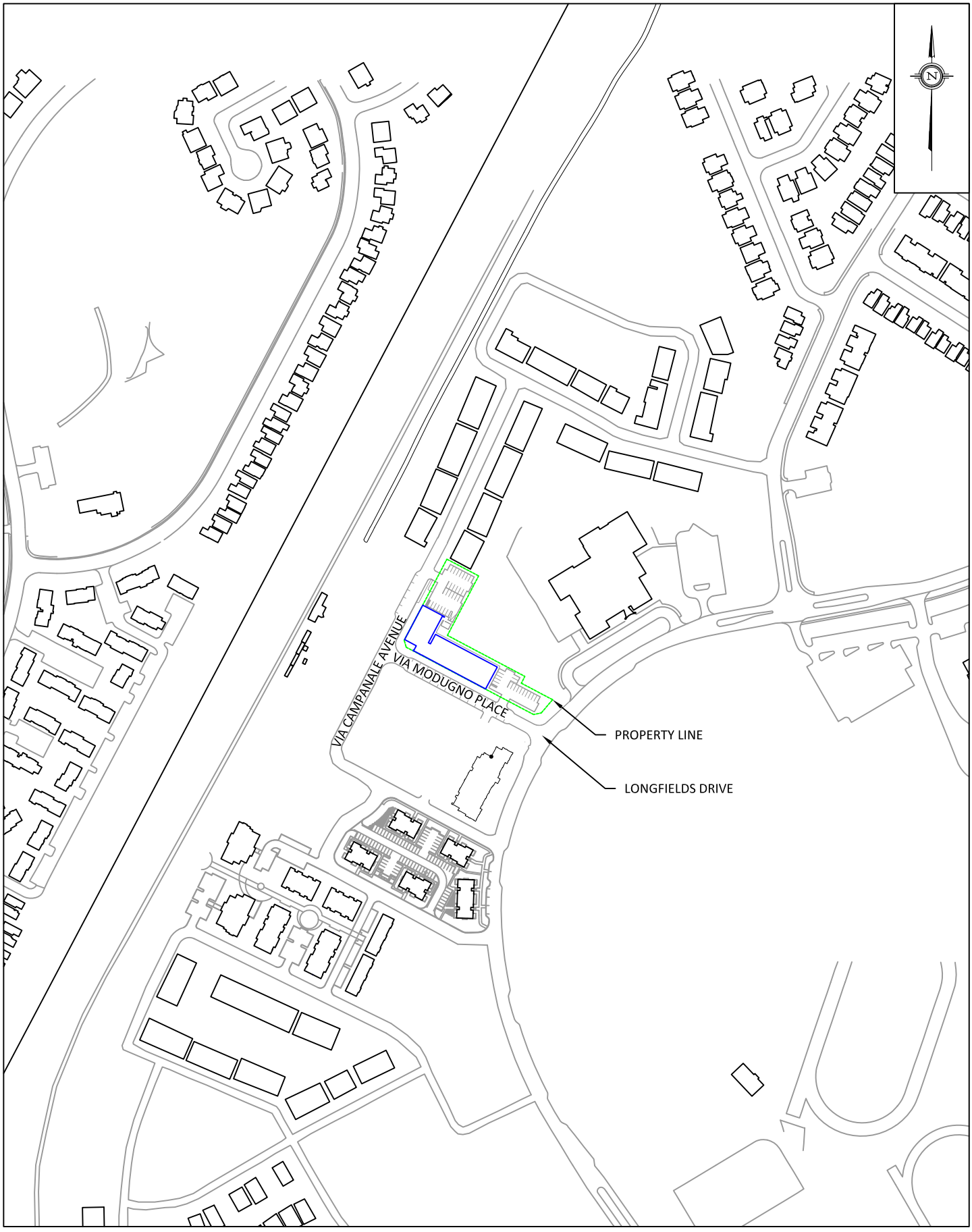

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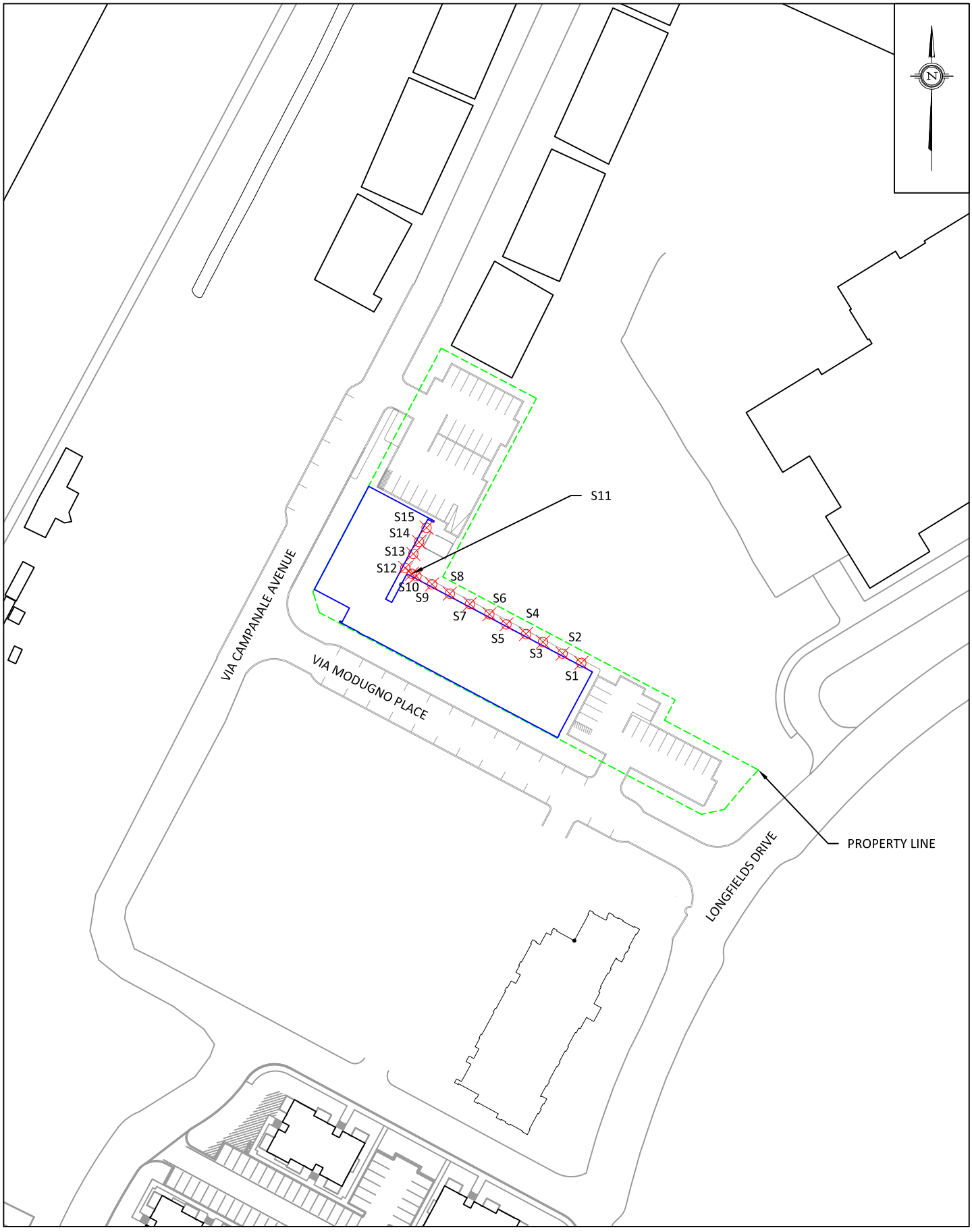
GRADIENT WIND ENGINEERING INC

PROJECT	605 LONGFIELDS DRIVE - STATIONARY NOISE ASSESSMENT		DESCRIPTION
SCALE	1:4000 (APPROX.)	DRAWING NO.	GWE17-174-1
DATE	NOVEMBER 8, 2017	DRAWN BY	O.D

FIGURE 1:
SITE PLAN AND SURROUNDING CONTEXT



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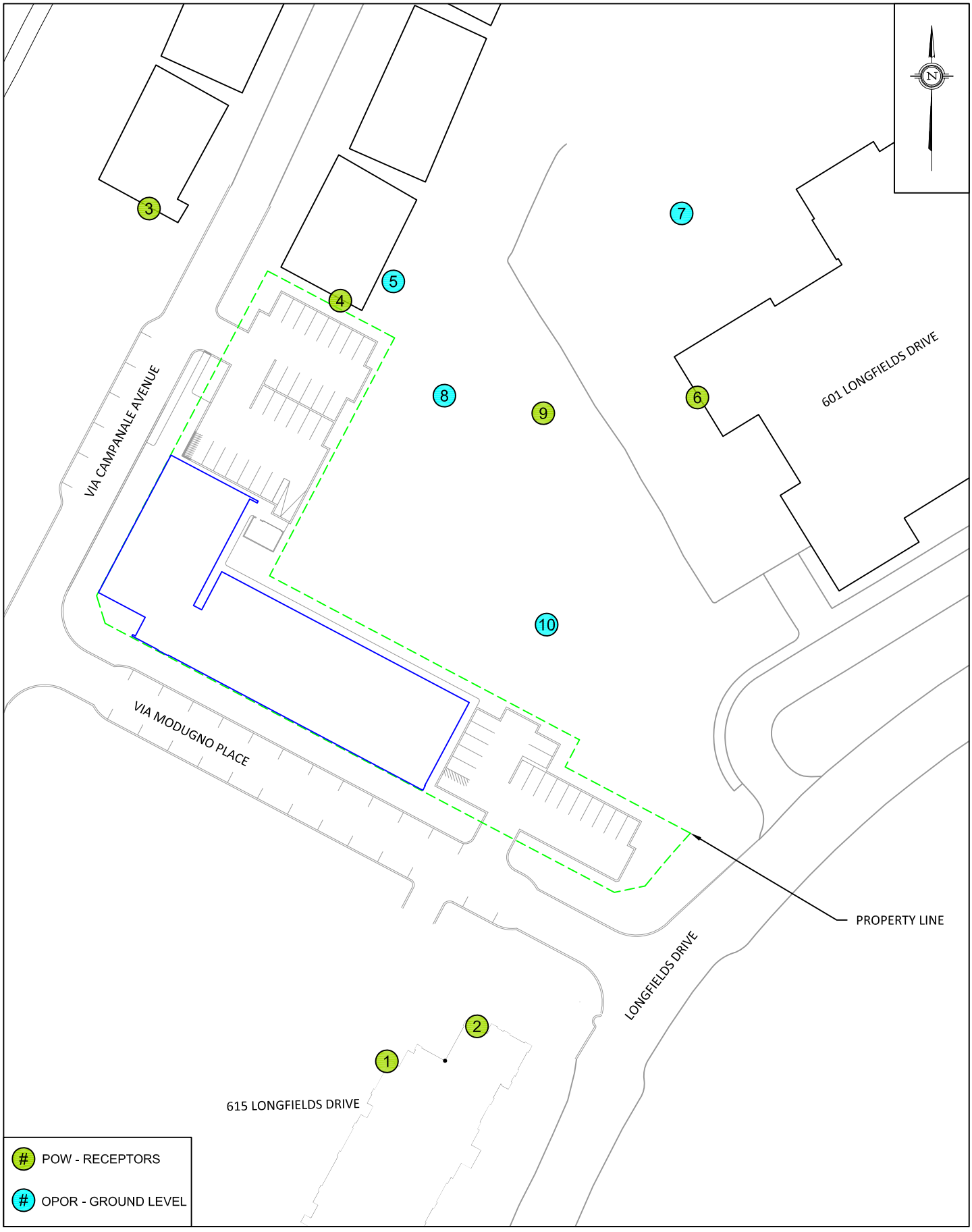
GRADIENT WIND ENGINEERING INC

PROJECT	605 LONGFIELDS DRIVE - STATIONARY NOISE ASSESSMENT
SCALE	1:750 (APPROX.)
DRAWING NO.	GWE17-174-2
DATE	NOVEMBER 8, 2017
DRAWN BY	O.D

DESCRIPTION

FIGURE 2:
SOURCE LOCATIONS



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GRADIENT WIND ENGINEERING INC

PROJECT	605 LONGFIELDS DRIVE - STATIONARY NOISE ASSESSMENT
SCALE	1:1000 (APPROX.)
DRAWING NO.	GWE17-174-3
DATE	NOVEMBER 8, 2017
DRAWN BY	O.D

DESCRIPTION

FIGURE 3:
RECEPTOR LOCATIONS

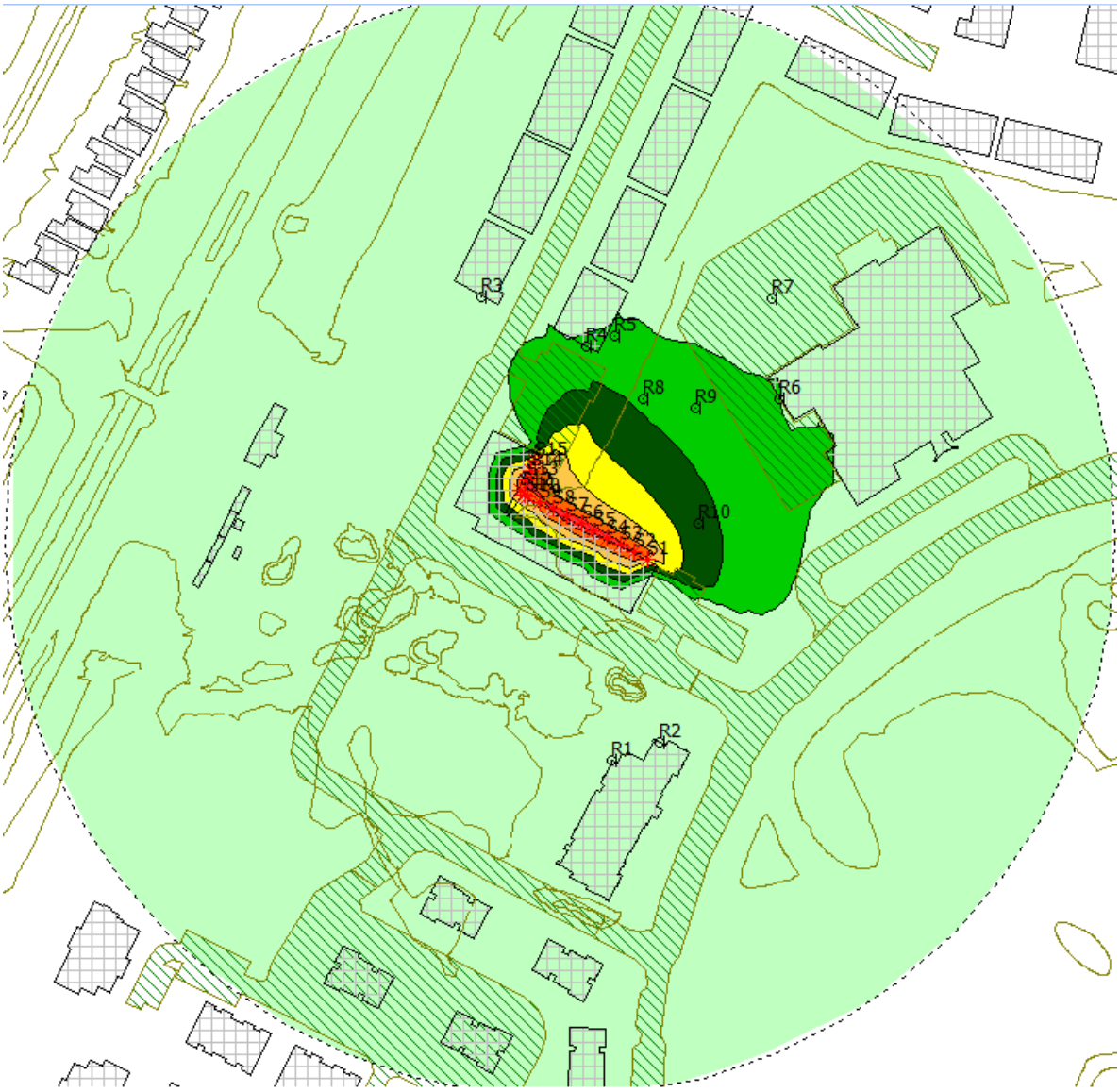

FIGURE 4: DAYTIME/EVENING/NIGHTTIME NOISE CONTOURS AT 1.5 M ABOVE GRADE (HVAC EQUIPMENT)

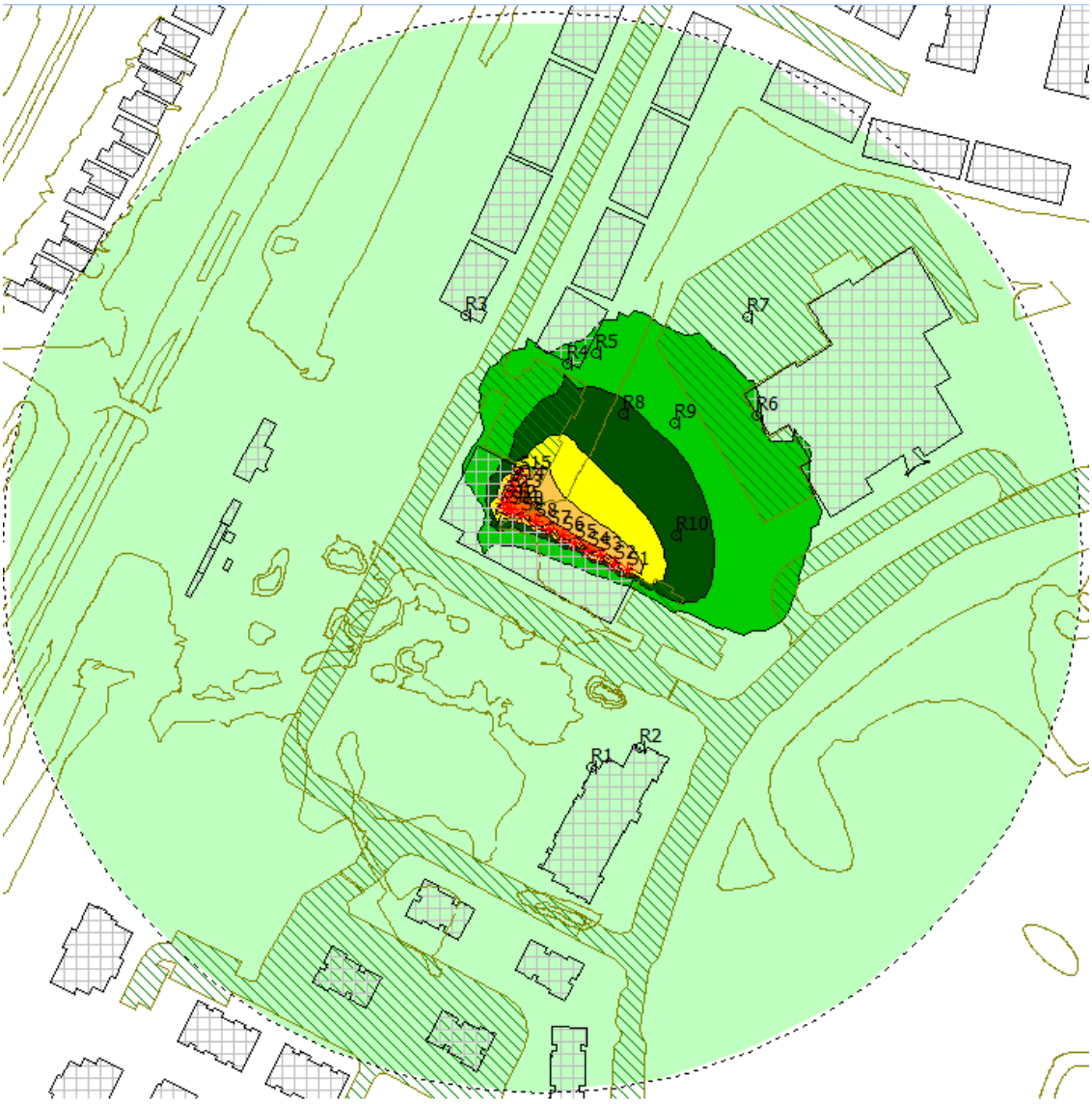

FIGURE 5: DAYTIME/EVENING/NIGHTTIME NOISE CONTOURS AT 4.5 M ABOVE GRADE (HVAC EQUIPMENT)