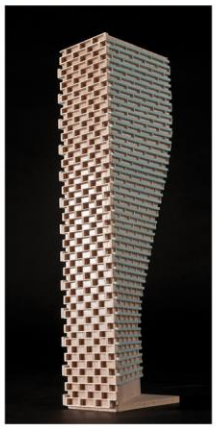
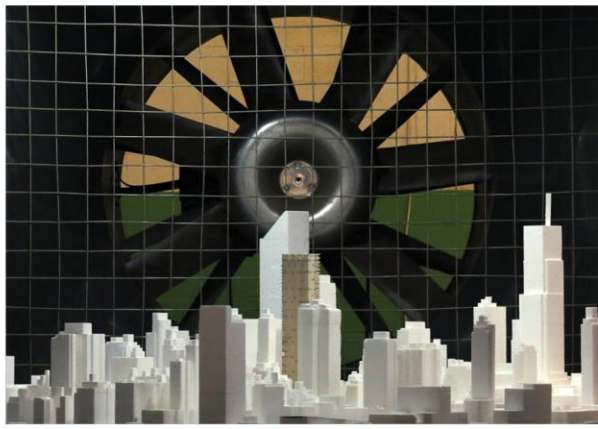
GRADIENTWIND
ENGINEERS & SCIENTISTS

# STATIONARY NOISE ASSESSMENT

1660 Merivale Road
Ottawa, Ontario

REPORT: 23-185– Stationary Noise





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PREPARED FOR

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# EXECUTIVE SUMMARY

This report describes a stationary noise assessment performed for the proposed modifications to an existing gas bar/car wash site located at 1660 Merivale Road in Nepean Ottawa, Ontario. The proposed study site is bounded by Viewmount Drive to the northwest, Merivale Road to the northeast, and Glenmanor Drive to the southwest. Throughout this study, Merivale Road direction is referred to as east. The major sources of stationary noise impacting the surrounding buildings are rooftop units (RTU) serving the new convenience store and restaurant, the drive-thru intercom speaker, and idling cars in queue at the drive-thru and carwash. Figure 1 illustrates a site plan with the surrounding context and Figure 2 shows the location of stationary noise sources.

The focus of this study is the exterior noise levels generated by the stationary noise sources. 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 MRA Architecture + Design, dated February 2024; (iv) sound power data of the rooftop units (RTU), idling car, the drive-thru intercom speaker and carwash entrance and exit were based on Gradient Wind's past experience with similar developments.

Our stationary noise assessment indicates that noise levels at nearby points of reception are expected to fall below the ENCG noise criteria provided that the assumptions outlined in Section 2.1 and the sound power levels of the stationary noise sources do not exceed the levels shown in Table 2.

As such, the proposed development is expected to be compatible with the existing noise-sensitive land uses. A review of the equipment selections and locations that will form the requirements of the construction documents/contract should be made by a qualified acoustical engineer; final equipment selections will be verified to meet or exceed the performance requirements prior to the installation of the equipment.

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## 1. INTRODUCTION

Gradient Wind Engineering Inc. (Gradient Wind) was retained by Design and Planning Harnois Energies to undertake a stationary noise assessment for the proposed modifications to an existing gas bar/carwash site located at 1660 Merivale Road in Nepean Ottawa, Ontario. This report summarizes the methodology, results and recommendations related to a stationary noise assessment.

The present scope of work involves assessing the impact of the stationary noise sources of the proposed development on the surrounding residential neighbourhood. 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 MRA Architecture + Design, dated February 2024, stationary noise sources data which are based on Gradient Wind's past experience with similar projects.

## 2. TERMS OF REFERENCE

The focus of this stationary noise assessment is an existing gas bar/carwash site located at 1660 Merivale Road in Nepean Ottawa, Ontario. The proposed study site is bounded by Viewmount Drive to the northwest, Merivale Road to the northeast, and Glenmanor Drive to the southwest. Throughout this study, Merivale Road direction is referred to as east.

The nearest noise-sensitive properties are located along Glenmanor Drive, as well as to the direct south of the study site. An existing car wash station will remain at the same location, to the south on the study site. The existing gas pumps are to be relocated east on the site where the new gas pump island is proposed, overlooking Merivale Road, adjacent to an existing bus shelter. The proposed development comprises a new convenience store and drive-thru restaurant, located northwest of the study site. This study is based on drawings prepared by MRA Architecture + Design, dated February 2024.

[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 major sources of stationary noise impacting the surrounding buildings are rooftop units (RTU) serving the new convenience store and restaurant, the drive-thru intercom speaker, and idling cars in queue at the drive-thru and carwash. Figure 1 illustrates a complete site plan with the surrounding context. Figure 2 illustrates the locations of receptors as well as the stationary noise sources.

## 2.1 Assumptions

The sound power levels of the stationary noise sources are based on Gradient Wind's past experience in similar projects. A review of the equipment selections and locations that will form the requirements of the construction documents/contract will be required to be made by a qualified acoustical engineer; final equipment selections will be verified to meet or exceed the performance requirements prior to the installation of the equipment. The following assumptions have been made in the analysis:

(i) Two rooftop units (RTU) were assumed to be located on the rooftops of the new convenience store and the restaurant. The RTUs were modelled as point sources located 1.5 metres above the rooftop.

(ii) Idling cars were assumed to be waiting in queues at the restaurant's drive-thru and carwash. Idling cars were modelled as point sources 0.75 metres above the ground.

(iii) The RTUs are assumed to operate continuously over a 1 hour period during the daytime/evening period and for 50% of the time during the nighttime period.

(iv) The idling cars are assumed to operate continuously over a 1 hour period during the daytime/evening period and for 30% of the time during the nighttime period.

(v) Existing carwash entrance and exit doors were modelled as emitting façades. The carwash was assumed to operate 50% of the time during daytime and 10% of the time during nighttime.

(vi) The screening effects of the buildings as well as reflections from the façades of the buildings have been considered in the analysis.

(vii) The existing noise screen to the south of the carwash exit was modelled as a wall having a height of 2.5 metres (see Figure 2).

(viii) Default ground surfaces were taken to be reflective, only the green area at the study site and the foliage as well as the green area at the closest house parcels were modelled as absorptive.

(ix) The sound power levels of all the stationary noise sources were assumed to be as shown in Table 2.

(x) A total of 15 receptors were strategically placed on existing buildings surrounding the site. The location of the receptors as well as the noise sources can be seen in Figure 2.

## 3. OBJECTIVES

The main goals of this work are to (i) calculate the future noise levels on the neighbouring noise-sensitive buildings produced by stationary sources of the proposed development 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 noise-sensitive 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. 15 receptor locations were selected around the study site, as illustrated in Figure 2.

### 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 ($2\times10^{-5}$ 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, 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 Leq 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 daycares. As the site is located in a fully developed urban area and bordered by one arterial and one collector road, the area is considered a Class 1 area as per the ENCG. The recommended maximum noise levels for a Class 1 area at a POR are outlined in Table 1 below.

**TABLE 1: 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 |

[3] City of Ottawa Environmental Noise Control Guidelines, page 10
[4] City of Ottawa Environmental Noise Guidelines, page 9

## 4.3 Determination of Noise Source Power Levels

Sound power data of the rooftop units (RTU), idling cars, and the carwash exit and entrance were based on Gradient Wind's past experience with similar developments. Table 2 summarizes the sound power levels used for each source in the analysis. Figure 2 illustrates the location of these stationary noise sources.

**TABLE 2: STATIONARY NOISE SOURCES SOUND POWER LEVELS (DBA)**

| Source ID | Description | Height Above Grade / Rooftop (m) | Frequency (Hz) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | Lw(A) |
| S1, S2 | RTU | 1.5 | 67 | 72 | 75 | 80 | 79 | 76 | 73 | 70 | **85** |
| S3 | Idling Cars | 0.75 | 55 | 65 | 57 | 65 | 66 | 63 | 62 | 54 | **72** |
| S4 | Carwash Entrance | 3x4* | 54 | 66 | 70 | 85 | 86 | 85 | 80 | 71 | **91** |
| S5 | Carwash Exit | 3x4* | 54 | 62 | 67 | 83 | 84 | 84 | 82 | 79 | **90** |
| S6 | Drive-thru Intercom | 1.5 | | | | | 65 | | | | **65** |

* Modelled as emitting façades

## 4.4 Stationary Source Noise Predictions

A total of 17 receptor locations were chosen on the surrounding noise-sensitive buildings to measure the noise impact at the outdoor point of reception (OPOR) and plane of window (POW) receptors during the daytime/evening period (07:00 – 23:00), as well as during the nighttime period (23:00 – 07:00). Receptor locations are described in Table 4 and illustrated in Figure 2. A total of 8 POW receptors were placed around the study site. Besides POW receptors, the noise levels investigated at 7 different OPOR locations. All rooftop units, the intercom speaker, and idling cars were represented as point sources while the carwash entrance and exit were represented as emitting façades in the Predictor model. Table 3 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: CALCULATION SETTINGS

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

## TABLE 4: RECEPTOR LOCATIONS

| Receptor ID / Type | Receptor Height Above Grade (m) | Receptor Location |
|---|---|---|
| R1/POW | 1.5 | 3 Glenmanor Dr - East |
| R2/POW | 1.5 | 1 Kingsbury Ave - North |
| R3/POW | 1.5 | 1 Kingsbury Ave - West |
| R4/POW | 1.5 | 2 Kingsbury Ave - North |
| R5/POW | 1.5 | 2 Kingsbury Ave - West |
| R6/POW | 1.5 | 8 Glenmanor Dr - West |
| R7/POW | 1.5 | 1672 Merivale Rd - East |
| | 4.5 | |
| R8/POW | 4.5 | Merivale Intermediate/High School |
| R9/OPOR | 4.5 | 3 Glenmanor Dr - Front Yard (South) |
| R10/OPOR | 1.5 | 1 Kingsbury Ave - Backyard (North) |
| R11/OPOR | 1.5 | 1 Kingsbury Ave - South Property Line |
| R12/OPOR | 1.5 | 2 Kingsbury Ave - Front Yard (North) |
| R13/OPOR | 1.5 | 2 Kingsbury Ave - Backyard (South) |
| R14/OPOR | 1.5 | 8 Glenmanor Dr - Backyard (East) |
| R15/OPOR | 1.5 | 1672 Merivale Rd - Backyard (West) |

## 5. RESULTS AND MITIGATION MEASURES

Table 5 shows the noise level results at the neighbouring noise-sensitive buildings.

### TABLE 5: STATIONARY NOISE LEVELS (dBA)

| Receptor ID/Type | Receptor Height Above Grade (m) | Receptor Location | Stationary Noise Level (dBA) | | Meets MECP Class 1 Criteria | |
|---|---|---|---|---|---|---|
| | | | Day* | Night | Day* | Night |
| R1/POW | 1.5 | 3 Glenmanor Dr - East | 47 | 43 | YES | YES |
| R2/POW | 1.5 | 1 Kingsbury Ave - North | 42 | 38 | YES | YES |
| R3/POW | 1.5 | 1 Kingsbury Ave - West | 48 | 43 | YES | YES |
| R4/POW | 1.5 | 2 Kingsbury Ave - North | 45 | 40 | YES | YES |
| R5/POW | 1.5 | 2 Kingsbury Ave - West | 45 | 40 | YES | YES |
| R6/POW | 1.5 | 8 Glenmanor Dr - West | 50 | 44 | YES | YES |
| R7/POW | 1.5 | 1672 Merivale Rd - East | 47 | 41 | YES | YES |
| | 4.5 | | 50 | 44 | YES | YES |
| R8/POW | 4.5 | Merivale Intermediate/High School | 44 | 39 | YES | YES |
| R9/OPOR | 4.5 | 3 Glenmanor Dr - Front Yard (South) | 48 | N/A** | YES | N/A** |
| R10/OPOR | 1.5 | 1 Kingsbury Ave - Backyard (North) | 48 | N/A** | YES | N/A** |
| R11/OPOR | 1.5 | 1 Kingsbury Ave - South Property Line | 47 | N/A** | YES | N/A** |
| R12/OPOR | 1.5 | 2 Kingsbury Ave - Front Yard (North) | 45 | N/A** | YES | N/A** |
| R13/OPOR | 1.5 | 2 Kingsbury Ave - Backyard (South) | 44 | N/A** | YES | N/A** |
| R14/OPOR | 1.5 | 8 Glenmanor Dr - Backyard (East) | 49 | N/A** | YES | N/A** |
| R15/OPOR | 1.5 | 1672 Merivale Rd - Backyard (West) | 44 | N/A** | YES | N/A** |

* Day values also represent the evening values.
** OPOR noise levels during the nighttime are not considered as per ENCG

## 6. CONCLUSIONS AND RECOMMENDATIONS

The results of the current study indicate that the noise levels at nearby points of reception are expected to fall below the ENCG noise criteria provided that the assumptions outlined in Section 2.1 and the sound power levels of the stationary noise sources do not exceed the levels shown in Table 2.

As such, the proposed development is expected to be compatible with the existing noise-sensitive land uses. A review of the equipment selections and locations that will form the requirements of the construction documents/contract should be made by a qualified acoustical engineer; final equipment selections will be verified to meet or exceed the performance requirements prior to the 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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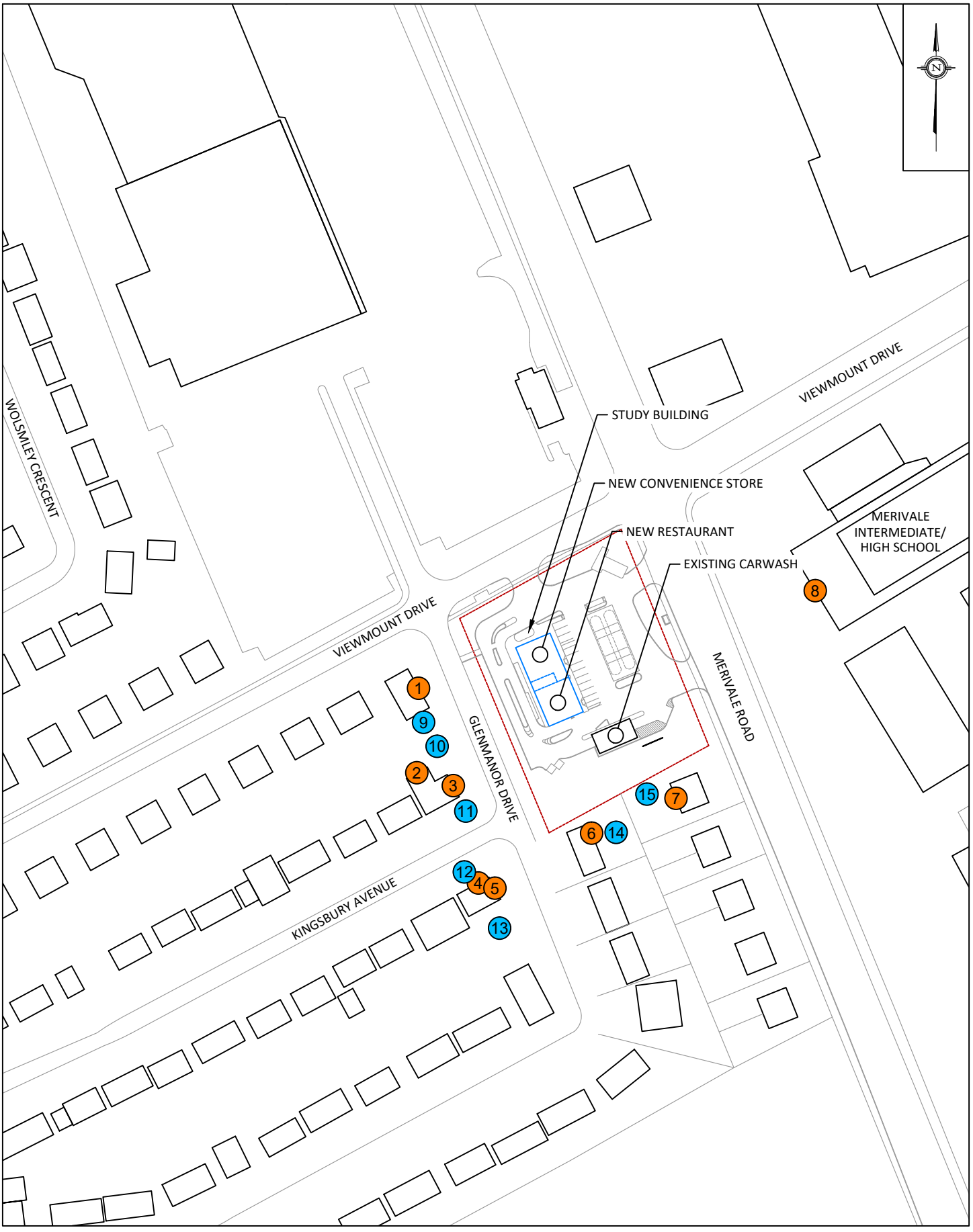
Acoustic Scientist

Joshua Foster, P.Eng.
Lead Engineer

*Gradient Wind File #23-185 – Stationary Noise*

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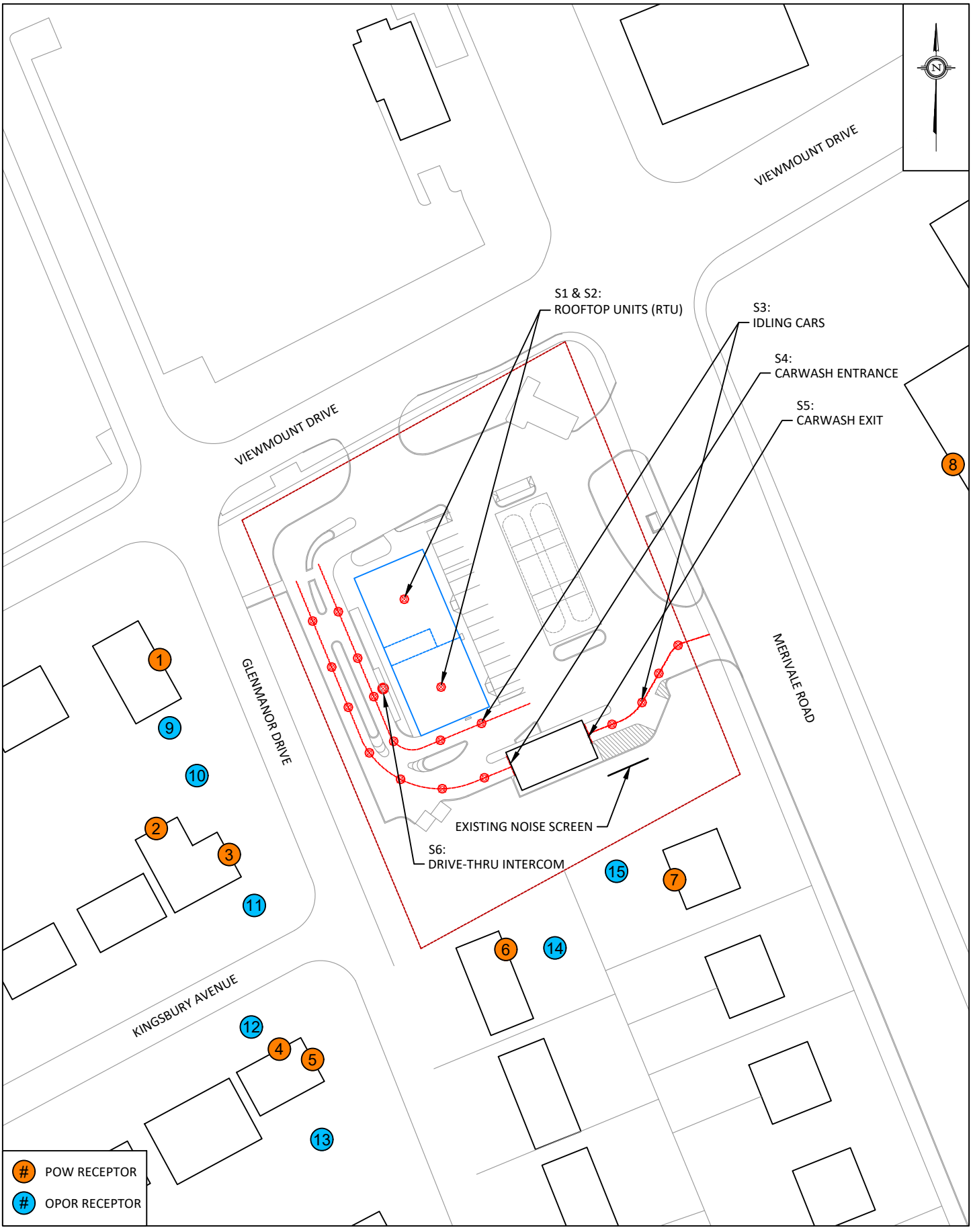
| SCALE | 1:2000 (APPROX.) |
| DRAWING NO. | GW23-185-1 |
| DATE | MARCH 7, 2024 |
| DRAWN BY | E.K. |

DESCRIPTION

FIGURE 1:
SITE PLAN AND SURROUNDING CONTEXT

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| DATE | MARCH 7, 2024 |
| DRAWN BY | E.K. |

DESCRIPTION

FIGURE 2:
RECEPTOR &
STATIONARY NOISE SOURCE LOCATIONS

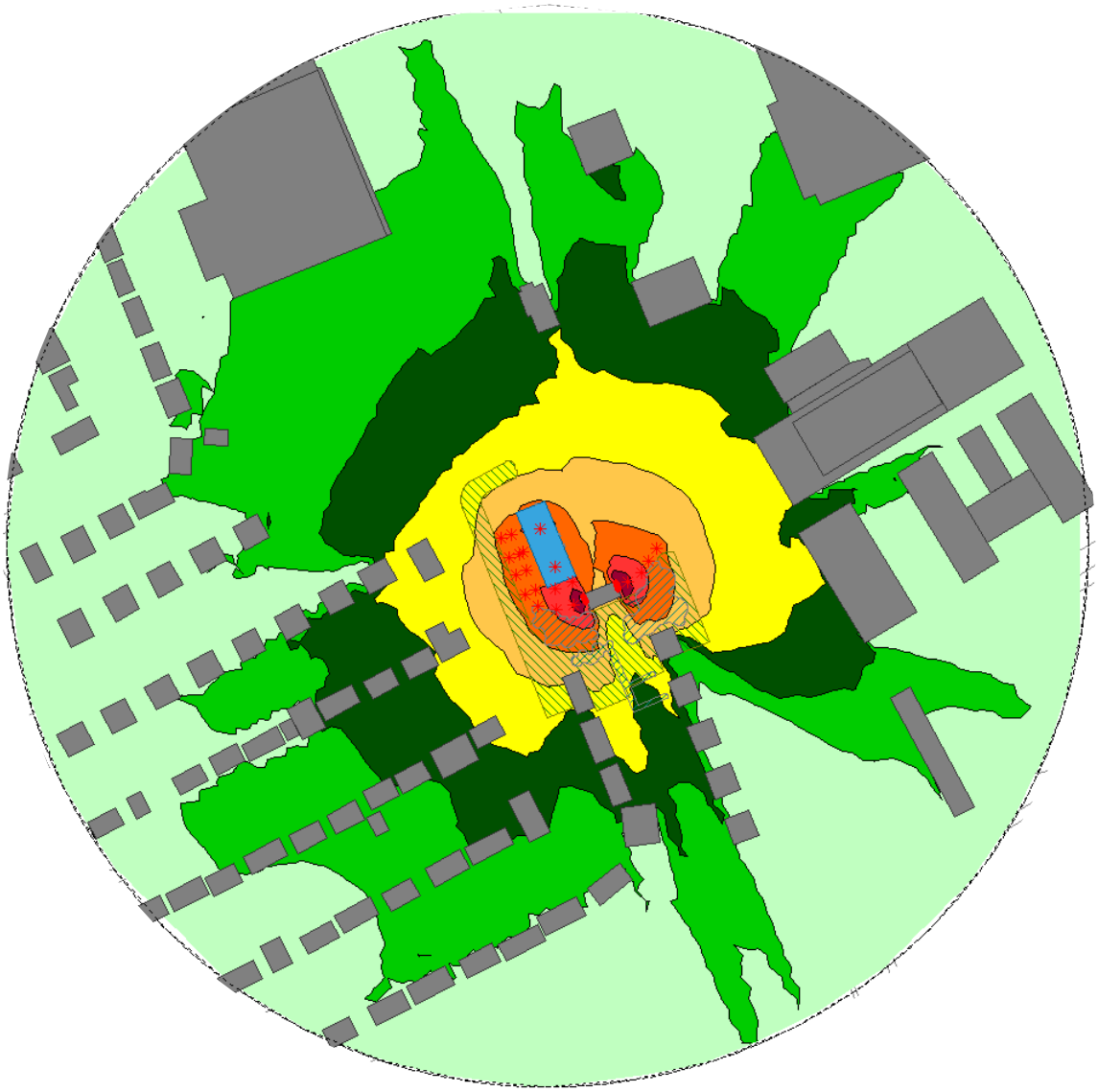


**FIGURE 3: DAYTIME NOISE CONTOURS (4.5 M ABOVE GRADE)**

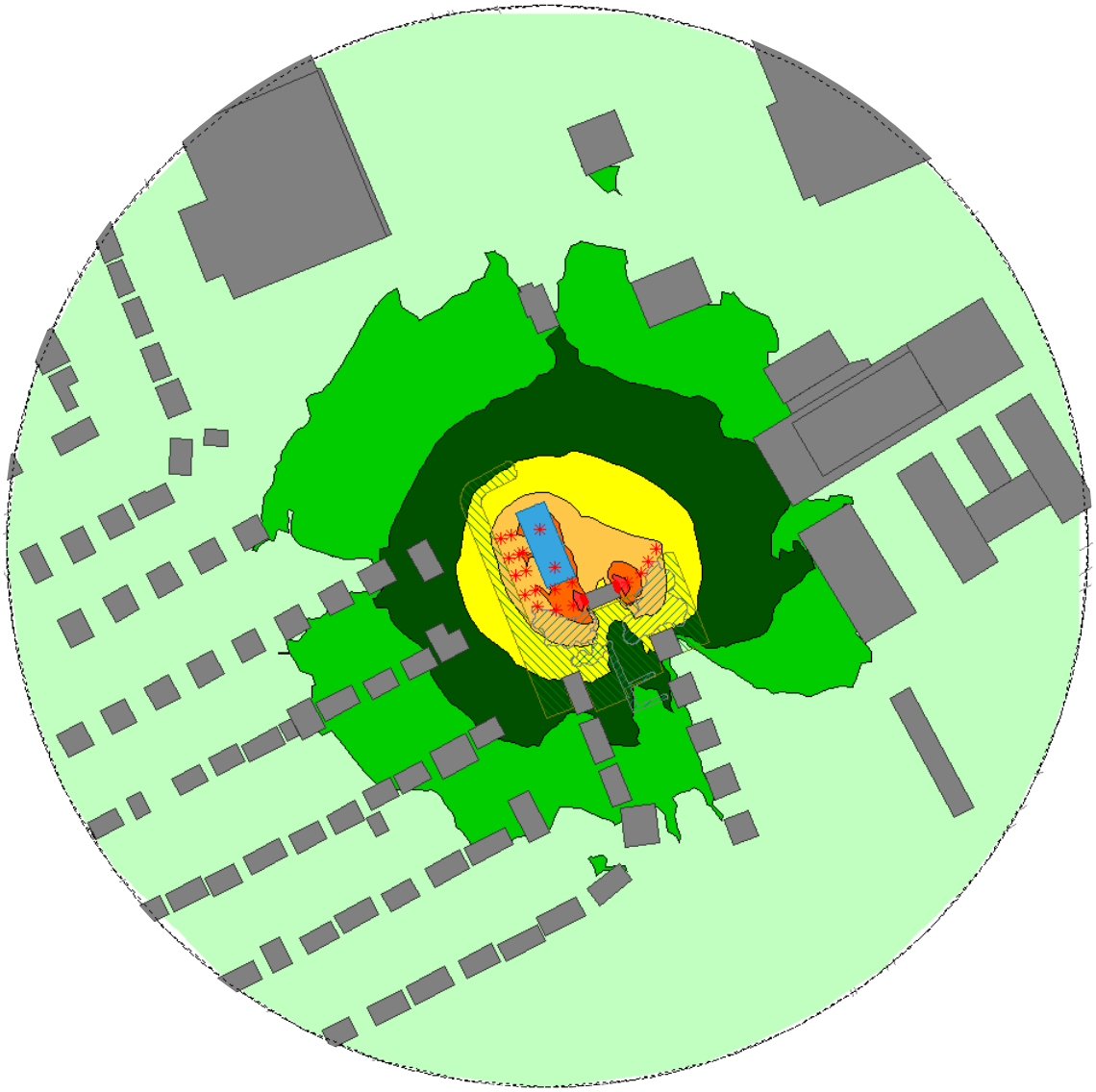

**FIGURE 4: NIGHTTIME NOISE CONTOURS (4.5 M ABOVE GRADE)**

*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*