HGC ENGINEERING

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Noise Feasibility Study

Proposed Gas Station and Commercial Building

10819 Highway 9

Caledon, Ontario

Prepared for:

Tiger Automotive
10819 Highway 9
Caledon, Ontario
L7E 0G5

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1 Introduction & Summary

Howe Gastmeier Chapnik Limited (HGC Engineering) was retained by Tiger Automotive to investigate the potential environmental noise impact of a proposed gas station and commercial building located south of Highway 9, west of Tottenham Road, in Caledon, Ontario, on existing adjacent residences. This report summarizes the investigation.

This study is being updated to reflect the latest site plan prepared by GSAI Inc. dated March 5, 2020.

The analysis is based on a review of the aerial context plan, existing conditions map, facility operational information, a site visit, and sound level data from HGC Engineering project files. The analysis includes an assessment of the noise impact including trucking, movement of equipment, and repair activities anticipated at the closest existing residences, in accordance with Ministry of the Environment, Conservation and Parks (MECP) guidelines.

A computer model of the area was created, using acoustic modelling software, in order to predict the sound levels at the adjacent nearby residences. The results indicate that the sound emissions of the commercial development can be within the applicable noise guideline limits of the MECP at the nearby residential receptors with the use of rooftop mechanical equipment with sound levels as outlined in this report. Noise mitigation is not required for the commercial development. The results are summarized in this report.

2 Site Description

The commercial building is to be built south of Highway 9 and west of Tottenham Road in Caledon, Ontario. Figure 1 represents a key plan of the area. Figure 2 shows the proposed site plan prepared by GSAI Inc. dated March 5, 2020. The development consists of a gas station and an associated commercial building. The hours of operation of the commercial store will likely include day, evening, and nighttime hours every day.

2.1 Site Description

Currently, the subject site is occupied by an existing commercial building which is to be demolished. There is a contractor's facility, office and outside storage located west of the development. There are also existing two-storey residences surrounding the site. Highway 9 has five lanes with a centre turning lane in the area of the site. The subject site is located in a Class 1 (urban) acoustical environment where the background sound is primarily made up of the sounds of road traffic and human activity (the urban hum) in the daytime and nighttime hours.

2.2 Noise Source Description

The primary sources of sound associated with the commercial development are expected to be rooftop HVAC equipment. Typical sound levels associated with these sources were obtained from HGC Engineering's project files for similar past projects. These sound levels are included in Section 4. Sensitive receptor locations were taken at the most potentially impacted residences (R1 to R4) as shown in Figure 3. Each receptor location was assessed at the residence's closest top floor window as these represent the most potentially impacted locations.

3 Criteria for Noise from Commercial Facilities

3.1 Stationary Noise Criteria

MECP Guideline NPC-300, "Environmental Noise Guideline Stationary and Transportation Sources – Approval and Planning" is the MECP guideline for use in investigating Land Use Compatibility issues with regard to noise. An industrial or commercial facility is classified in MECP guidelines as a stationary source of sound (as compared to sources such as traffic or construction, for example) for noise assessment purposes. Noise from the proposed facility (gas station and commercial building) may impact neighbouring noise sensitive land uses.

NPC-300 is intended for use in the planning of both residential and commercial/industrial land uses and provides the acceptability limits for sound due to commercial operations in that regard. The facade of a residence (i.e., in the plane of a window), or any associated usable outdoor area is considered a sensitive point of reception.

Typical ambient sound levels can be determined through prediction of road traffic volumes in areas where traffic sound is dominant. Where it can be demonstrated that the hourly ambient sound levels are greater than the exclusionary minimum limits listed above, the criterion becomes the lowest predicted one-hour L_{EQ} sound level during each respective period. NPC-300 stipulates that the exclusionary sound level limit for a stationary noise source in semi-urban Class 2 areas are taken to be 50 dBA during daytime and evening hours (07:00 to 19:00 and 19:00 to 23:00), and 45 dBA during nighttime hours (23:00 to 07:00) at the plane of the windows of noise sensitive spaces.

Using the traffic volumes from 2016 provided by the Ministry of Transportation of Ontario (MTO), the traffic data for Highway 9 was applied to a generic 24 hour traffic pattern developed by the US Department of Transportation, Federal Highways Administration contained in the report titled "Summary of National and Regional Travel Trends 1970 – 1995" dated May 1996. Commercial vehicles percentages of 15% for this section of roadway was also obtained from the MTO and split into medium and heavy trucks using the standard MTO split. The traffic volumes were then used to predict sound levels at the dwelling units during the day/nighttime hours to determine the hourly background sound levels at those locations due to the traffic on the public roadways.

To assess the levels of background road traffic noise which will impact the existing sensitive receptors, noise predictions were made using a numerical computer modelling package (*Cadna/A version 2020 MR1 (32 bit) build 177.5010*). The model is based on the methods from ISO Standard 9613-2.2, "Acoustics – Attenuation of Sound During Propagation Outdoors", which account for reduction in sound level with distance due to geometrical spreading, air absorption attenuation and acoustical shielding by intervening structures. The recommended criteria during the daytime and nighttime at each receptor are shown in Table I.

Table I: Predicted Minimum Hourly Sound Levels and Noise Level Criteria at Existing Sensitive Receptors [dBA]

Receptor	Daytime (07:00-23:00)	Nighttime (23:00-07:00)
R1	50	45
R2	50	45
R3	50	45
R4	50	45

Commercial activities such as the occasional movement of customer vehicles, occasional deliveries, and garbage collection are not of themselves considered to be significant noise sources in the MECP guidelines. Gas stations are not considered as stationary noise sources. Noise from safety equipment (e.g. back-up beepers) is also exempt from consideration and may be audible on occasion. The decision to include the sound from trucks in an assessment under MECP noise guidelines depends of the volume of trucking, and the nature of the facility. Occasional deliveries to retail stores and convenience stores are exempt, for example, but heavy trucking at a warehouse or busy shipping/receiving docks at an industry must generally be assessed.

The likely activities at the proposed development include the occasional movement of customer vehicles on the property, the infrequent delivery of goods, and garbage collection and are not of themselves considered to be significant noise sources in the MECP guidelines. It is not expected that there will be significant tractor trailer truck traffic or refrigerated trucks associated with these relatively small commercial units. Accordingly, these sources have not been considered in the study.

The MECP guidelines stipulate that the sound level impact during a “predicable worst-case hour” be considered. This is defined to be an hour when a typically busy “planned and predictable mode of operation” occurs at the subject facility, coincident with a period of minimal background sound. Compliance with MECP criteria generally results in acceptable levels of sound at residential receptors although there may still be residual audibility during periods of low background sound.

4 Stationary Source Assessment

Predictive noise modelling was used to assess the potential sound impact of the commercial building at the most potentially impacted residential receptors. The noise prediction model was based on

sound emission levels for mechanical equipment, assumed operational profiles, and established engineering methods for the prediction of outdoor sound propagation. These methods include the effects of distance, air absorption, and acoustical screening by barrier obstacles.

The noise sources associated with the commercial development are expected to be the rooftop mechanical equipment (i.e. deliveries, if any, would be sporadic, light and during daytime hours only) as assumed from similar past projects. Lennox LGA060 models (5 Tons) were assumed for the rooftop air conditioning units. This analysis considers two rooftop units on the proposed commercial building in addition to a single exhaust fan. Table 1 below summarizes the sound data used in the analysis for the rooftop HVAC units.

Table 1: Sound Power Levels for Rooftop HVAC Units [dB re 10-12 W]

HVAC Unit	Octave Band Centre Frequency [Hz]							
	63	125	250	500	1k	2k	4k	8k
Lennox LGA060 (5 Tons)	--	72	70	71	68	63	57	48
Exhaust Fan	90	86	80	76	73	72	73	61

The above outlined sound levels were used as input to a predictive computer model. The software used for this purpose (*Cadna-A version 2020 (32 bit) MR1, build: 177.5010*) is a computer implementation of ISO Standard 9613-2.2 “Acoustics - Attenuation of Sound During Propagation Outdoors.” The ISO method accounts for reduction in sound level with distance due to geometrical spreading, air absorption, ground attenuation and acoustical shielding by intervening structures such as barriers.

The following information and assumptions were used in the analysis.

- The height of the commercial building was assumed to be 5.0 m.
- The most potentially impacted residences are two-storey buildings (R1 to R4). The second storey windows of the existing residences were assumed to be approximately 4.5 m above grade.
- The noise sources were assumed to be located as shown in Figure 3. The green crosses represent noise sources such as rooftop HVAC equipment. The rooftop equipment was assumed to be Lennox models, 1.5 m in height. The exhaust fan was assumed to be 0.6 m in

height. Sound data was obtained from HGC project files which were originally from the manufacturer. Based on the size of the commercial spaces, it is assumed that 5 ton units will be used on the roof.

In this impact assessment, we have considered typical worst-case (busiest hour) scenarios for each time period to be as follows:

Assumed day worst-case scenario:

- All rooftop equipment and A/C unit operating continuously at full capacity;

Assumed night worst-case scenario:

- All rooftop equipment and A/C unit operating on a 50% duty cycle;

4.1 Results

The calculations consider the acoustical effects of distance and shielding by the buildings. The calculated sound levels from the proposed development at the residences are summarized in Table 2, and presented graphically in Figures 4 and 5.

Table 2: Predicted Sound Levels from the Proposed Commercial Development [dBA]

	Daytime/Evening (07:00 – 23:00)	Nighttime (23:00 – 07:00)	Criteria (Daytime / Nighttime)
R01 (Two-Storey Residence)	<35	<30	50 / 45
R02 (Two-Storey Residence)	<35	<30	50 / 45
R03 (Two-Storey Residence)	<35	<30	50 / 45
R04 (Two-Storey Residence)	<35	<30	50 / 45

The results of the calculations indicate that the sound levels from the proposed commercial development are less than the MECP's sound level criteria at the most potentially impacted residential receptors during daytime and nighttime hours, indicating they will meet the sound level criteria at all existing neighbouring residential receptors.

4.2 Recommendations

HGC Engineering has predicted the sound levels near the proposed commercial building, reviewed typical sound rating data for rooftop units, and performed calculations to determine the impact at the existing residential units with respect to MECP guidelines. The configuration of the commercial

building on the site can achieve MECP guidelines, as long as the following are met.

1) When further details of the roof plans and mechanical equipment selections are available, an acoustical engineer should verify that the source sound level specifications and locations for the HVAC units conform to the assumptions made in this report and that acceptable sound levels will result at all offside residential receptors. Use of larger and louder rooftop equipment may result in the requirement for rooftop acoustic screens.

2) Before the issuance of building permits, an acoustical consultant should review the plans and specifications to certify that the required noise control measures and rooftop equipment and specifications have been included in their entirety.

3) After construction, the municipal building inspector or a Professional Engineer qualified to perform acoustical engineering services in the Province of Ontario should certify that the rooftop mechanical equipment and/or acoustic screens or parapets (if deemed necessary) have been installed with the specifications contained in this report and/or the drawings reviewed before building permit.

5 Conclusion

Assuming typical worst-case equipment and operating scenarios as described in this report, the analysis indicates that the noise impact of the commercial development will comply with MECP criteria at the existing residential buildings without additional noise mitigation measures. The reader is referred to previous sections of this report where the recommendations are discussed in detail.

FIGURE 1

NUCON PROPERTY DEVELOPMENTS INC. &
2203315 ONTARIO CORP.

AERIAL CONTEXT PLAN

10795 & 10819 HIGHWAY 9, CALEDON, ONTARIO

LEGEND

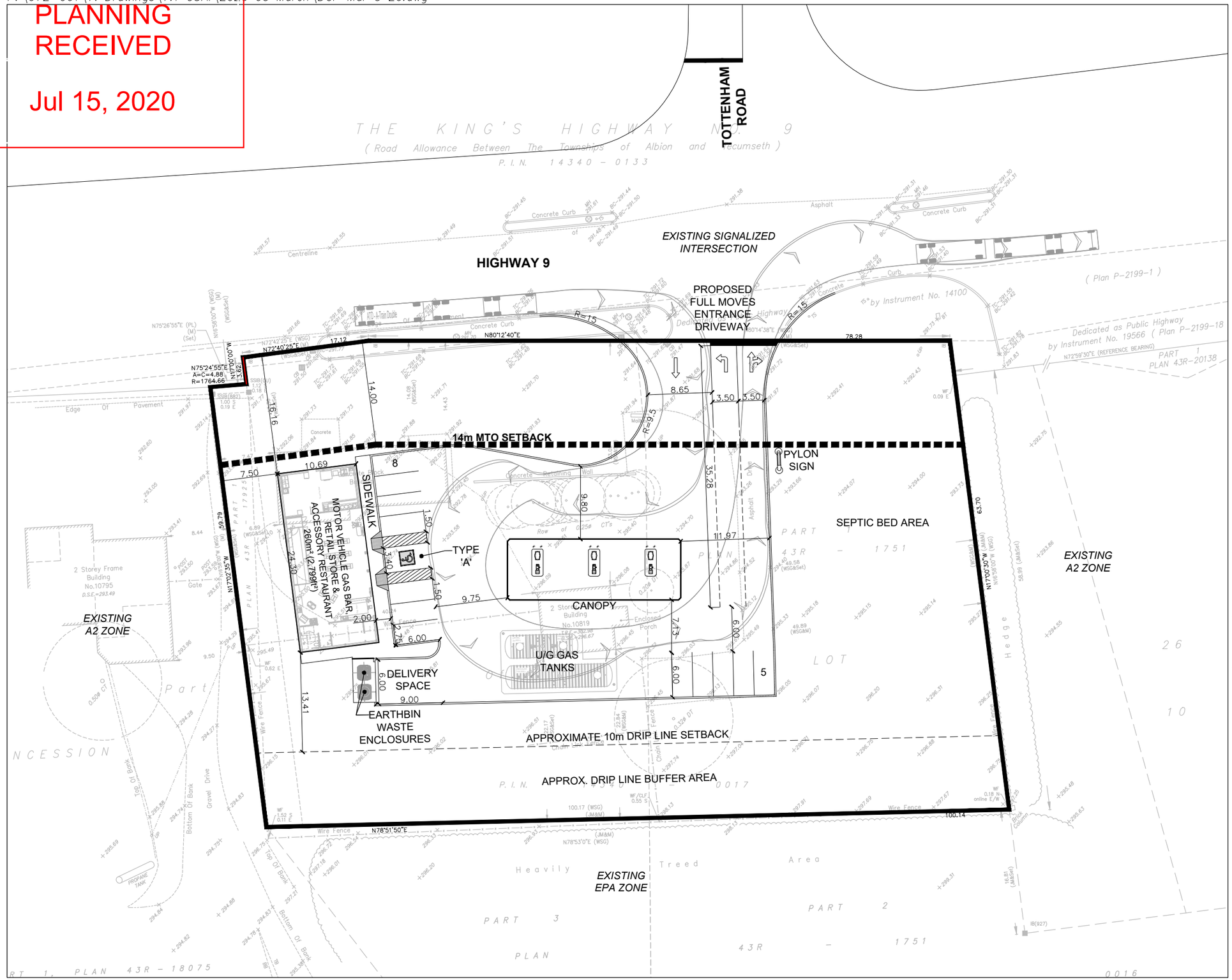
Subject Property

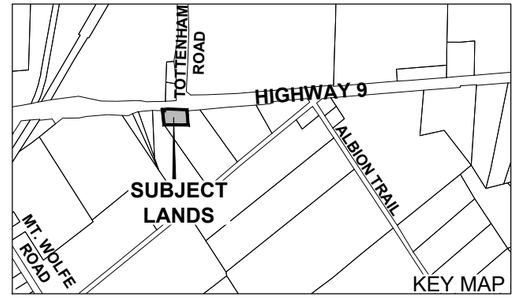
Scale 1:3000
April 13, 2018

GLEN SCHNARR & ASSOCIATES INC.
URBAN & REGIONAL PLANNERS, LAND DEVELOPMENT CONSULTANTS
SUITE 700 10 KINGSBRIDGE GARDEN CIRCLE,
MISSISSAUGA, ONTARIO, L5R 3K6
TEL (905) 568-8888 FAX (905) 568-8894 www.gsai.ca

Figure 1: Aerial Context Plan

P:\972-001\7. Drawings\7.1 GSAI\2020 03 March\DCP Mar 5 20.dwg





DEVELOPMENT CONCEPT PLAN
PROPOSED GAS BAR

10819 HIGHWAY 9
PART OF LOT 26,
CONCESSION 10 (ALBION)
TOWN OF CALEDON
REGIONAL MUNICIPALITY OF PEEL

DEVELOPMENT STATISTICS

TOTAL SITE AREA:	0.64ha (1.58ac)
TOTAL DRIP LINE BUFFER AREA*:	0.09ha (0.22ac)
TOTAL 14m MTO SETBACK AREA:	0.14ha (0.35ac)
NET DEVELOPABLE AREA:	0.41ha (1.01ac)
TOTAL SITE LANDSCAPED AREA %:	0.31ha (48%)
LANDSCAPED AREA % EXCL. MTO SETBACK:	0.20ha (40%)

BUILDING STATISTICS

TOTAL GROSS FLOOR AREA:	260m² (2,799ft²)
BUILDING COVERAGE:	4%
BUILDING COVERAGE EXCL. MTO SETBACK:	5%

PARKING STATISTICS *(1 SPACE PER 20m²)*:

GAS BAR PARKING REQUIRED:	13 SPACES
GAS BAR PARKING PROVIDED:	13 SPACES

NOTES:

* NHS AREA & BUFFER LIMITS TO BE CONFIRMED BY TRCA
\- SEPTIC AREA TO BE CONFIRMED BY ENGINEER
\- POTABLE WATER WELL TO BE CONFIRMED

SCALE 1:500
MARCH 5, 2020

GSAI
Glen Schnarr & Associates Inc.

Figure 2: Proposed Site Plan

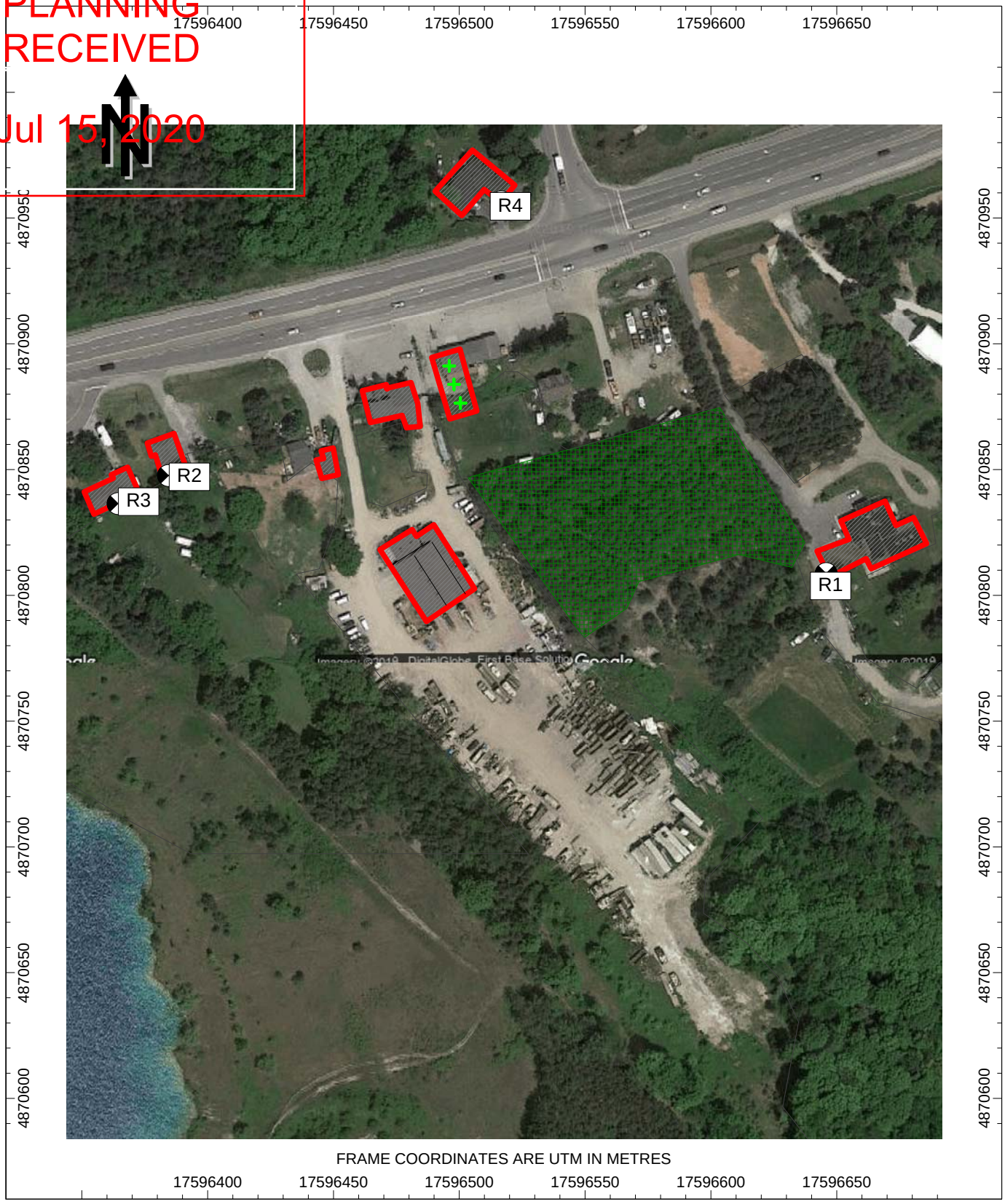


Figure 3 – Assumed Noise Source Locations and Key Residential Receptors

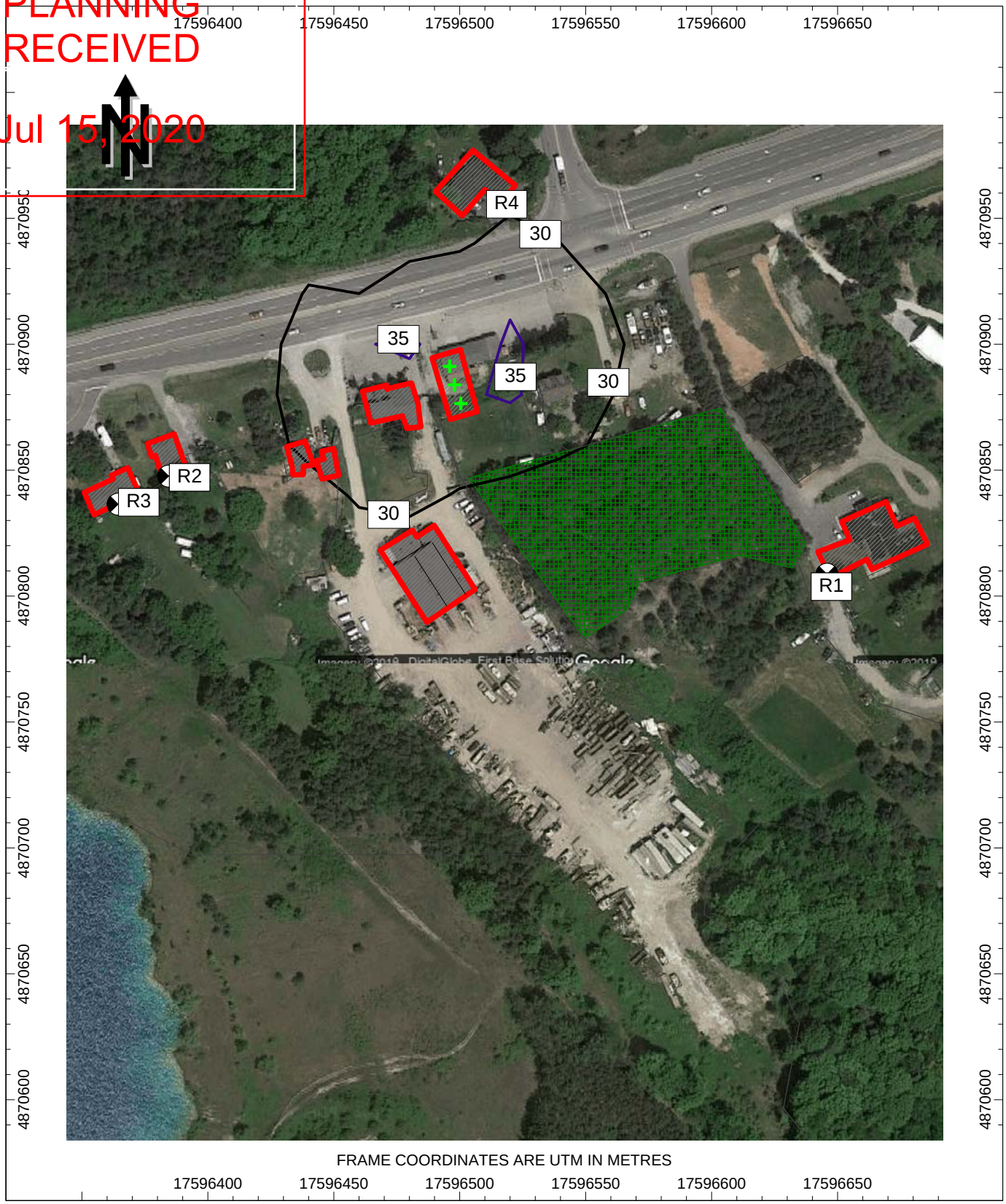


Figure 4 – Predicted Daytime Sound Level Contours at 4.5 m Height, dBA

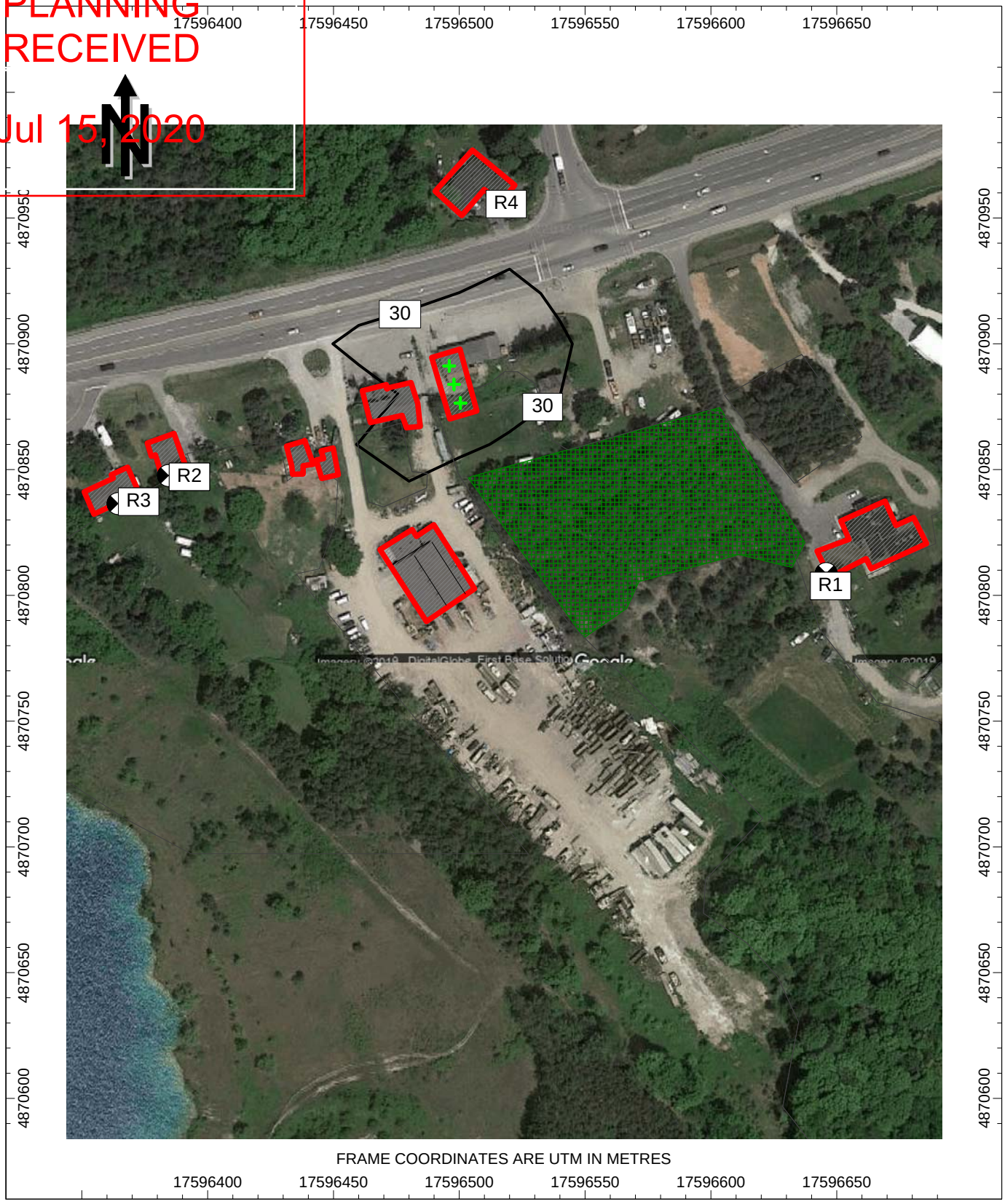


Figure 5 – Predicted Nighttime Sound Level Contours at 4.5 m Height, dBA