Environmental Noise Feasibility Study

84 Nancy Street, Bolton

Proposed Residential Development

Town of Caledon

August 22, 2018
Project: 118-0214

Prepared for

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VALCOUSTICS Canada Ltd.

Version History

Version #	Date	Comments
1.0	August 22, 2018	Issued to Client

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Proposed Residential Development

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EXECUTIVE SUMMARY

Valcoustics Canada Ltd. (VCL) was retained to prepare an Environmental Noise Feasibility Study to support a rezoning application submission to the Town of Caledon. The proposed project will consist of one nine-storey condominium building with two levels of partially-underground parking.

The significant transportation noise source is road traffic on Queen Street South (also known as Peel Regional Road #50). The significant stationary source of noise is the Albion & Bolton Community Centre/Caledon Public Library – Albion-Bolton Branch to the south.

The sound levels on site have been determined and compared with the applicable Ministry of the Environment, Conservation and Parks (MECP), Region of Peel and Town of Caledon noise guideline limits to determine the need for noise mitigation.

To meet the applicable transportation noise source guideline limits:

- air conditioning is mandatory for all residential suites, to allow exterior windows to remain closed for noise control purposes; and
- the applicable indoor noise guidelines are predicted to be met with exterior wall construction meeting a minimum Sound Transmission Class (STC) 45, and exterior windows meeting STC 30.

Sound barriers are not required for noise control purposes at the outdoor amenity areas ("Outdoor Living Areas" – OLAs).

Based on a preliminary assessment, the stationary noise source guideline limits are predicted to be met at the subject site without the need for mitigation measures. This should be confirmed through measurements of the rooftop Heating, Ventilation and Air Conditioning (HVAC) units and cooling tower.

Final noise mitigation requirements should be checked when detailed building and site grading plans are available.

1.0 INTRODUCTION

1.1 SCOPE

VCL was retained to prepare an Environmental Noise Feasibility Study for the proposed development in support of a rezoning application to the Town of Caledon. The potential sound levels and noise mitigation measures needed for the proposed development to comply with the MECP, Region of Peel and Town of Caledon noise guideline requirements are outlined herein.

1.2 THE SITE AND SURROUNDING AREA

The site is located west of Queen Street South, approximately 250 m south of King Street West in the community of Bolton.

The site is bounded by:

- existing single-family residential dwellings to the north;
- Queen Street South, with existing single-family residential dwellings beyond, to the east;
- a public park (Ted Houston Memorial Park), with single-family residential dwellings beyond, to the west; and,
- the Albion & Bolton Community Centre/Caledon Public Library – Albion-Bolton Branch to the south.

The site is currently occupied by detached dwellings that will be demolished as part of the development.

A Key Plan is included as Figure 1. The study is based on a Concept Site Plan and Massing Model, prepared by Markin Consulting dated May 2, 2018. The Concept Site Plan is included as Figure 2.

1.3 THE PROPOSED DEVELOPMENT

The proposed project will consist of one “L”-shaped nine-storey condominium building, with two levels of partially-underground parking. There will be grade level common outdoor amenity space at the south side of the building. The massing model indicates the north wing of the building will step back at various upper floors. These stepped back areas may be used as terraces. It is expected that these areas would be less than 4 m in depth.

2.0 NOISE SOURCES

2.1 TRANSPORTATION NOISE SOURCES

The transportation noise source with potential to impact the proposed development is road traffic on Queen Street South (Peel Regional Road #50). Traffic volumes on other nearby roadways are expected to be minor in comparison and are not considered further in the analysis.

Planned road traffic volumes, including medium and heavy truck percentages, day/night volume split and posted speed limit for Queen Street South were obtained from the Region of Peel. It is noted that the planned/ultimate traffic volumes are the same as the existing traffic volumes. The Region has indicated that this is intentional, as the volumes exceed the road capacity. The Region also notes the roadway will be narrowed from four lanes to two lanes just north of the site. Thus, the traffic volumes were not extrapolated for the assessment.

The road traffic data is summarized in Table 1. Correspondence related to the road traffic data is provided in Appendix A.

2.2 STATIONARY NOISE SOURCES

The Albion & Bolton Community Centre/Caledon Public Library – Albion-Bolton Branch is located to the south of the site. The west portion of the building contains a multi-use sports arena, while the east portion contains a library and offices. Both uses are operated by the Town of Caledon. The main noise sources associated with these uses are the rooftop HVAC units and a cooling tower associated with the ice rink. In addition, a telecommunications tower is located at the northwest corner of the Town of Caledon property. There is an outdoor emergency generator, within an enclosure, located at grade, associated with the telecommunications tower.

3.0 ENVIRONMENTAL NOISE GUIDELINES

3.1 MECP PUBLICATION NPC-300

The applicable noise guidelines for new residential development are those in MECP Publication NPC-300, *"Environmental Noise Guideline, Stationary and Transportation Sources – Approval and Planning"*.

The environmental noise guidelines of the MECP, as provided in Publication NPC-300, are discussed briefly below and summarized in Appendix B.

3.1.1 Transportation Noise Sources

3.1.1.1 Architectural Elements

In the daytime (0700 to 2300), the indoor criterion for road noise is $L_{eq\ Day}$(1) of 45 dBA for sensitive spaces such as living/dining rooms, dens and bedrooms. At night, the indoor criterion for road noise is $L_{eq\ Night}$(2) of 45 dBA for sensitive spaces such as living/dining rooms and dens and 40 dBA for bedrooms. The architectural design of the building envelope (walls, windows, etc.) must provide adequate sound isolation to achieve these indoor sound level limits.

3.1.1.2 Ventilation

In accordance with the MOE noise guideline for road traffic sources, if the daytime sound level ($L_{eq\ Day}$), at the exterior face of a noise sensitive window is greater than 65 dBA, means must be provided so that windows can be kept closed for noise control purposes and central air

(1) 16-hour energy equivalent sound level (0700-2300 hours).
(2) 8-hour energy equivalent sound level (2300-0700 hours).

conditioning is required. For daytime sound levels greater than 55 dBA and less than or equal to 65 dBA, there need only be the provision for adding air conditioning at a later date. A warning clause advising the occupant of the potential interference with some activities is also required. At nighttime, air conditioning would be required when the sound level is greater than 60 dBA ($L_{eq\ Night}$) at a noise sensitive window (provision for adding air conditioning is required when the sound level is greater than 50 dBA and less than or equal to 60 dBA).

3.1.1.3 Outdoors

For OLAs, the guideline is $L_{eq\ Day}$ of 55 dBA, with an excess not exceeding 5 dBA considered acceptable if it is technically not practicable to achieve the 55 dBA objective, provided warning clauses are registered on title. Note that for road traffic sources, a balcony is not considered an OLA, unless it is the only OLA for the occupant and it is:

- at least 4 m in depth; and
- unenclosed.

3.1.2 Stationary Noise Sources

The site and area are Class 1; i.e., an area where the ambient sound environment is dominated by "urban hum", primarily traffic noise during the daytime, and during the evening/nighttime.

The MECP requires a "worst case" one-hour operating scenario be analysed. This would typically occur when the background ambient sound level is at a minimum and the noise generated from the stationary noise sources is at a maximum.

The guideline limits apply to the outdoor plane of window of habitable spaces such as living/dining/family rooms and sleep areas as well at locations amenable for use outdoors. No indoor sound level guidelines are provided for stationary sources.

MECP Publication NPC-300 states that the guideline limits shall be defined by the higher of the ambient sound level, due to road traffic noise, or the minimum exclusion limits. For a Class 1 area, the minimum exclusion limits at a noise sensitive plane of window are 50 dBA in the daytime (0700 to 1900) and evening (1900 to 2300) and 45 dBA in the nighttime (2300 to 0700). The minimum exclusion limits at an outdoor point of reception is 50 dBA in the daytime and 50 dBA in the evening. The sound level limits do not apply at an outdoor point of reception at night.

Noise emissions from emergency equipment (such as an emergency generator) are assessed separately from those from non-emergency equipment. In addition, the sound level limits are 5 dBA higher (less stringent) than those for the non-emergency equipment.

In this case, for all receptors, the minimum exclusion limits from NPC-300 have been taken to apply.

3.2 REGION OF PEEL

The Region of Peel noise guidelines are essentially the same as the MECP noise guidelines for transportation noise sources except that the nighttime sound level for triggering the air conditioning requirement is one dBA more stringent (i.e., less than) the sound levels specified by

the MOE; i.e., mandatory air conditioning for nighttime sound levels of 60 dBA or greater, and the provision for adding air conditioning for levels between 51 to 59 dBA inclusive.

A maximum desirable sound barrier height of 4.0 m (relative to roadway centreline) is indicated with a maximum acoustic fence component height of 2.4 m, although a height no more than 2.0 m is preferred.

3.3 TOWN OF CALEDON

For transportation noise sources, the Town of Caledon's general policy is not to accept the 5 dBA excess above the 55 dBA objective in OLAs. However, an excess may be acceptable if unreasonably high sound barriers are needed to meet the 55 dBA objective.

The Town's maximum acoustic fence height is 2.4 m. Higher barriers can be achieved using a combination of an acoustic fence and a berm.

Also, traffic noise impact is to be assessed based on the 20-year traffic forecast for the adjacent roadways and using a traffic speed 10 kph over the posted speed limit.

4.0 TRANSPORTATION NOISE

4.1 ASSESSMENT

4.1.1 Method

Using the road traffic data in Table 1, the sound levels in terms of $L_{eq\ Day}$ and $L_{eq\ Night}$, were determined using STAMSON V5.04 – ORNAMENT, the computerized road traffic noise prediction model of the MECP.

The daytime and nighttime sound levels at the building facades were calculated at the top storey residential windows at the worst-case locations. The daytime OLA sound levels were taken at a point at the approximate centre of the outdoor amenity area, at a standing height of 1.5 m above grade. Inherent screening of each building face due to its orientation to the noise source as well as that provided by the subject development itself were included.

In the vicinity of the site, the grade of Queen Street decreases significantly in the northward direction. Based on estimated elevations of the roadway in the vicinity of the site, a grade change of 4.5% was included in the assessment. In addition, the grade of the site is elevated relative to Queen Street, with an embankment at the east edge of the site leading down to road level. This embankment, which provides some acoustical screening, has been considered in the assessment of the OLA sound levels.

4.1.2 Results

Table 2 summarizes the predicted sound levels outdoors at specific locations.

A sample sound level calculation is included in Appendix C.

At the building facades, the highest daytime/nighttime sound levels of 69 dBA/62 dBA are predicted to occur at the east facade of the building, closest to Queen Street South.

The unmitigated daytime OLA sound levels at the grade level amenity areas (pergola and BBQ pit) are predicted to be 57 dBA and 56 dBA, respectively.

4.2 NOISE ABATEMENT REQUIREMENTS

The noise control measures can generally be classified into two categories which are interrelated, but which can be treated separately for the most part:

a) architectural elements to achieve acceptable indoor noise guidelines for transportation sources; and

b) design features to protect the OLAs.

Noise abatement requirements are summarized in Table 3 and in the notes to Table 3.

4.2.1 Indoors

4.2.1.1 Architectural Requirements

The indoor noise exposure guidelines for the transportation sources can be achieved by using appropriate construction for exterior walls, windows and doors.

In determining the worst-case architectural requirements for the residential units, wall and window areas were assumed to be 50% and 50%, respectively, of the associated floor area, at facades directly exposed to and at an angle to the noise sources, for both living/dining rooms and bedrooms.

Based on the predicted sound levels, exterior wall construction meeting a minimum STC 45 with exterior windows meeting a minimum STC 30 will be required to meet the indoor noise criteria.

The final sound isolation requirements should be reviewed when architectural plans are developed. Wall and window constructions should also be reviewed at this point to ensure that they will meet the required sound isolation performance. This is typically done at the time of building permit application.

4.2.1.2 Ventilation Requirements

Based on the predicted daytime and nighttime sound levels, all residential suites require mandatory air conditioning to allow windows to remain closed for noise control purposes.

4.2.2 Outdoors

The unmitigated daytime OLA sound levels at the pergola and barbeque pit are predicted to be 57 dBA and 56 dBA, respectively. This represents a 1 to 2 dB excess over the 55 dBA design objective, which would be insignificant in practice.

A 1.8 m high acoustic fence around the along the east and south sides of the landscaped/amenity area would mitigate the OLA sound levels at the pergola and barbeque pit to 54 dBA and 53 dBA, respectively. However, the resulting change in sound level provided by the sound barrier is minor, at only 3 dB. A 3 dB change in sound level would be barely detectable to the human ear. In

addition, the unmitigated sound levels are within the 5 dB leeway permitted under the MECP guidelines. Thus, in this context, sound barriers would not be recommended.

4.2.3 Warning Clauses

Warning clauses are a tool to inform prospective owners/occupants of potential annoyance due to existing noise sources. Where the guideline sound level limits are exceeded, appropriate warning clauses should be registered on title or included in the development agreement that is registered on title. The warning clauses should also be included in agreements of Offers of Purchase and Sale and lease/rental agreements to make future occupants aware of the potential noise situation.

Table 3 and the notes to Table 3 summarize the warning clauses for the site.

5.0 STATIONARY NOISE SOURCE IMPACT ASSESSMENT

5.1 NOISE SOURCES

The stationary noise source of significance is the Albion & Bolton Community Centre/Caledon Public Library – Albion-Bolton Branch located to the south of the site. Community spaces and offices are located in the eastern portion of the building and a sports arena is located in the western portion of the building. The arena is used for sports such as ball hockey in the summer months and ice hockey in the winter months (approximately September to April). In addition, a telecommunication tower is located at the northwest corner of the property.

The main noise sources at the facility include:

- seventeen (17) HVAC units located on the roof of the east portion of the building;
- a cooling tower at the west end of the arena; and
- an outdoor emergency generator located at the base of the telecommunications tower.

Based on the information provided by the Town of Caledon staff, the cooling tower is associated with the ice rink and operates during the winter months only, when the arena is used for ice hockey. The cooling tower is shut off during the summer months.

A site visit was done by VCL staff on June 1, 2018. Access to the roof to do sound measurements could not be obtained at this time. In addition, the cooling tower had been shut off for the summer. Thus, the sound data for the sources was based on manufacturer's data or data from similar sources as follows:

- Mechanical information, including make and model number for each rooftop HVAC unit, was provided by the Town of Caledon. Manufacturer's sound data was used to model each unit.

- Sound level data for a similar sized cooling tower was used in the assessment.

- Emergency generator – the facility does not appear to have an Environmental Compliance Approval (ECA) for the outdoor unit. As such, it was assumed that the outdoor unit meets the requirements of the exempting regulation, Ontario Regulation (O.Reg) 524/98. (Meeting the requirements of O.Reg 524/98 exempts the facility from needing an ECA for the generator). Under O.Reg 524/98, *"…the sound pressure level resulting from the discharge*

of sound from the unit and related exhaust stacks must not be greater than 75 decibels (A-weighted) at a distance of seven metres from the unit". Thus, the generator was modelled using a sound level of 75 dBA at 7 m to the unit.

Source locations and IDs are shown on Figure 3. The source sound power levels are summarized in Table 4.

5.2 ANALYSIS METHOD

A 3-D acoustic model of the proposed development site was created using CadnaA 2018 MR 1 environmental noise modelling software, which follows the protocol of ISO Standard 9613-2, *"Acoustics – Attenuation of Sound During Propagation Outdoors"*, to predict sound levels at each of the receptor locations. Accounting for distance, atmospheric absorption and ground attenuation, the sound level from all the relevant noise sources (hourly L_{eq}) was determined at the worst-case receptors. Hard ground (G = 0) was used for paved areas and soft ground (G=1) was used elsewhere. Two orders of sound reflection from the building facades was included in the acoustical model.

Three representative assessment receptors were used in the analysis. POR1 and POR2 represent the south facade. POR3 represents the west facade. All receptors were assessed at top storey height of 25.5 m above grade.

5.3 OPERATING SCENARIOS

The MECP noise guidelines require assessing the noise impact during the "predictable worst case" hour. There are two main operating scenarios associated with the facility: summer and winter. During the summer months, the HVAC units operate in cooling mode and the cooling tower is shut off. During the winter months, the HVAC units operate in heating mode and the cooling tower is operational. It is expected that the HVAC units will be significantly quieter when they are operating in heating mode. To be conservative, a worst case scenario with the HVAC units operating in cooling mode together with the cooling tower was assessed.

The operating times for the HVAC units and cooling tower used in the assessment were:

- Daytime and evening hours (0700 to 2300):
  - All HVAC units operating at 100% duty cycle (for the full hour); and
  - Cooling tower operates for the full hour.
- Nighttime hours (2300 to 0700):
  - All HVAC units operating at 50% duty cycle (operating for 30 minutes out of the hour); and
  - Cooling tower operates for the full hour.

Emergency generator testing was assumed to occur during the daytime and evening hours only. It was assumed that the generator would operate for a full hour during testing.

5.4 SOUND LEVEL ASSESSMENT

The predicted sound levels due to the HVAC units and cooling tower are shown on Figure 4 and summarized in Table 5. The predicted sound levels due to the emergency generator are shown on Figure 5 and summarized in Table 6.

As shown in the figures and tables, the sound levels are predicted to comply with the stationary noise sources guideline limits at the subject site without mitigation measures.

5.5 DISCUSSION

The assessment was based on sound power data from a similar-sized cooling tower and manufacturer's data for the HVAC units. Sound level measurements of the cooling tower and HVAC units should be done when the units are operating to confirm the results. If the measured sound levels are higher than those used in the assessment, the mitigation requirements should be reviewed.

This could be done as part of a later stage of the approvals process, for example as part of the site plan application.

6.0 NOISE IMPACT FROM THE PROPOSED DEVELOPMENT

The main source of noise associated with this development, with the potential for impact on surrounding noise sensitive buildings, is the mechanical equipment.

Mechanical equipment interfacing with the exterior must comply with the MECP noise guideline limits in NPC-300. By proper engineering design, all requirements can be met and no significant noise impact would be created for surrounding uses. Appropriate choice of location, equipment type, and noise control features should be considered during detailed design for such items as rooftop equipment and air intakes and exhausts, including underground parking garage ventilation systems. Parking garage air shafts located immediately adjacent to residential uses may need special noise control treatment such as acoustically lining the shaft or providing silencers, in addition to appropriate choice of fan type.

For any emergency generators, appropriate steps should be taken to ensure that the equipment placement, treatment, and the routine testing schedule will not generate significant noise impact on neighbouring properties. The generator will require silencers on the intake and exhaust cooling air paths, as well as a muffler on the combustion exhaust.

An assessment of the noise impact from the building onto neighbouring developments should be done once the relevant mechanical and electrical details are known. This is typically done as part of the detailed design of the building.

7.0 CONCLUSIONS

The assessment concludes that the applicable MECP noise guidelines can be met, and a suitable acoustical environment provided for the occupants. The proposed development is considered feasible, acoustically.

The assessment of the Albion & Bolton Community Centre/Caledon Public Library – Albion-Bolton Branch should be updated using sound measurements of the mechanical units. This can be part of a future noise assessment, done as part of the site plan approval stage.

8.0 REFERENCES

1. PC STAMSON 5.04, “Computer Program for Road Traffic Noise Assessment”, Ontario Ministry of the Environment.

2. Building Practice Note No. 56: "Controlling Sound Transmission into Buildings", by J. D. Quirt, Division of Building Research, National Council of Canada, September 1985.

3. “Stationary and Transportation Sources – Approval and Planning”, Ontario Ministry of the Environment, Publication NPC-300, August 2013.

4. Ontario Regulation 524/98: “Environmental Compliance Approvals – Exemptions from Section 9 of the Act”, February 2017.

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TABLE 1: ROAD TRAFFIC DATA

Roadway	24-hour Planned Volume	% Trucks (Day/Night)		Day/Night Volume (%) [3]	Speed Limit (kph)
		Medium	Heavy		
Queen Street South (Regional Rd. 50)[1]	34 687	2.3 / 2.7	3.0 / 2.5	90/10	60[2]

Notes:

(1) Obtained from the Region of Peel.
(2) Posted speed limit shown. Vehicle speed of 70 kph (10 kph higher than the posted speed limit) was used in the analysis, per Town of Caledon guidelines

TABLE 2: PREDICTED UNMITIGATED SOUND LEVELS OUTDOORS[1]

Location[2]	Source	Distance (m)[3]	$L_{eq\ Day}$ (dBA)	$L_{eq\ Night}$ (dBA)
East Wing Southeast Corner East Face	Queen Street South	40	69	62
East Wing Southeast Corner South Face	Queen Street South	40	66	59
North Wing Northeast Corner East Face	Queen Street South	88	64	57
North Wing Northeast Corner North Face	Queen Street South	88	63	56
Outdoor amenity area BBQ Pit	Queen Street South	56	56	—
Outdoor amenity area Pergola	Queen Street South	53	57	—

Notes:

(1) Facade receptors were assessed at the top floor windows. OLA receptors were assessed at 1.5 m above grade.
(2) See Figure 2.
(3) Distance indicated is from the centreline of the noise sources to facade or OLA.

TABLE 3: MINIMUM NOISE ABATEMENT MEASURES

Location	Air Conditioning(1)	Exterior Wall(2)	Exterior Window(2)	Sound Barrier(3)	Warning Clauses(4)
All residential units	Mandatory	STC 45	Up to STC 30	None	A + B + C

Notes:

(1) Where methods must be provided to allow windows to remain closed for noise control purposes, a commonly used technique is that of air conditioning.

(2) STC - Sound Transmission Class Rating (Reference ASTM-E413). Analyses were based upon the assumption that all wall and window areas are as indicated in Section 3.1.1.1 of text. Requirements should be checked once floor plans have been finalized and exterior wall construction details are defined.

(3) Sound barriers must be of solid construction with no gaps cracks or holes, and must meet a minimum surface density of 20 kg/m².

(4) Standard example warning clauses to be registered on title and be included in Offers of Purchase and Sale for designated lots:

A. "Purchasers/tenants are advised that despite the inclusion of noise control features in the development and within the building units, sound levels due to increasing road traffic may on occasions interfere with some activities of the dwelling occupants as the sound levels exceed the sound level limits of the Municipality and/or the Ministry of the Environment and Climate Change."

B. "This dwelling unit has been supplied with an air conditioning system which will allow windows and exterior doors to remain closed, thereby ensuring that the indoor sound levels are within the sound level limits of the Municipality and the Ministry of the Environment and Climate Change."

C. "Purchasers/occupants are advised that due to the proximity of the existing Albion & Bolton Community Centre / Caledon Public Library – Albion-Bolton Branch, sound from these facilities may, at times, be audible."

(5) All exterior doors shall be fully weatherstripped.

TABLE 4: STATIONARY NOISE SOURCE – SOURCE LISTING

Source ID	Make and Model	Sound Power Level (dBA)	Operating Time (min/hour)		Source Height
			Daytime & Evening	Nighttime	
RTU01	Carrier 48TJF020	88(1)	60	30	2.0 (5)
RTU02	Lennox GCS16-048	82(1)	60	30	2.0 (5)
RTU03	Lennox GCS16-090	86(1)	60	30	2.0 (5)
RTU04	Lennox GCS16-060	82(1)	60	30	2.0 (5)
RTU05	Lennox GCS16-180	88(1)	60	30	2.0 (5)
RTU06	Lennox GCS16-024	80(1)	60	30	2.0 (5)
RTU07	Lennox GCS16-036	80(1)	60	30	2.0 (5)
RTU08	Lennox GCS16-120	84(1)	60	30	2.0 (5)
RTU09	Lennox GCS16-090	86(1)	60	30	2.0 (5)
RTU10	Lennox GCS16-036	80(1)	60	30	2.0 (5)
RTU11	Lennox GCS16-036	80(1)	60	30	2.0 (5)
RTU12	Lennox GCS16-036	80(1)	60	30	2.0 (5)
RTU13	Lennox GCS16-036	80(1)	60	30	2.0 (5)
RTU14	Lennox LGH072	81(1)	60	30	2.0 (5)
RTU15	Lennox LGH072	81(1)	60	30	2.0 (5)
RTU16	Lennox LGH072	81(1)	60	30	2.0 (5)
RTU17	Lennox LGH072	81(1)	60	30	2.0 (5)
CT (Cooling Tower)	Evapco ATC150B(2)	93(3)	60	60	8.5 (6)
EPG (Generator)	Kohler Power Systems	100(4)	60	—	3.0 (6)

Notes:

(1) Manufacturer sound data.
(2) Make and model of similar-sized unit used in the analysis.
(3) Sound power level of similar cooling tower.
(4) Based on O.Reg. 524/98 exempting regulation for emergency power generators located outdoors. Assessed during day / evening testing only.
(5) Assumed height above roof.
(6) Assumed height above local grade.

TABLE 5: SOUND LEVELS DUE TO HVAC UNITS AND COOLING TOWER

Location	Predicted Sound Level (Leq1hr) (dBA)		Guideline Limits (dBA)	
	Daytime & Evening (0700 to 2300)	Nighttime (2300 to 0700)	Daytime & Evening (0700 to 2300)	Nighttime (2300 to 0700)
POR1	48	45	50	45
POR2	47	44	50	45
POR3	45	45	50	45

Note:

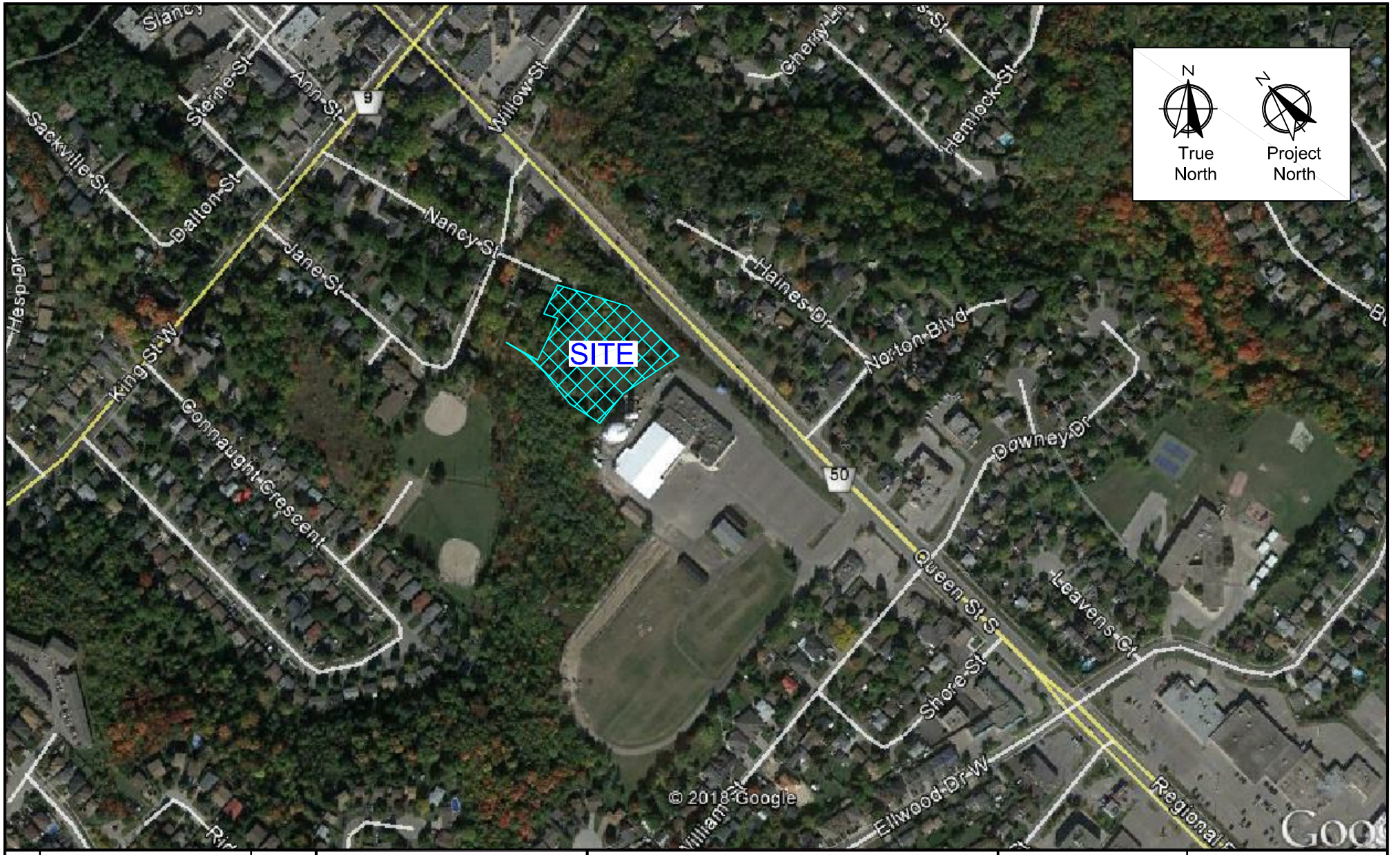
(1) See Figure 4.

TABLE 6: PREDICTED EMERGENCY GENERATOR TESTING SOUND LEVELS

Location	Predicted Sound Level (Leq1hr) (dBA) Daytime & Evening (0700 to 2300)	Guideline Limit (dBA) Daytime & Evening (0700 to 2300)
POR1	36	55
POR2	53	55
POR3	52	55

Note:

(1) See Figure 5.



No.	Revision/Issue	Date

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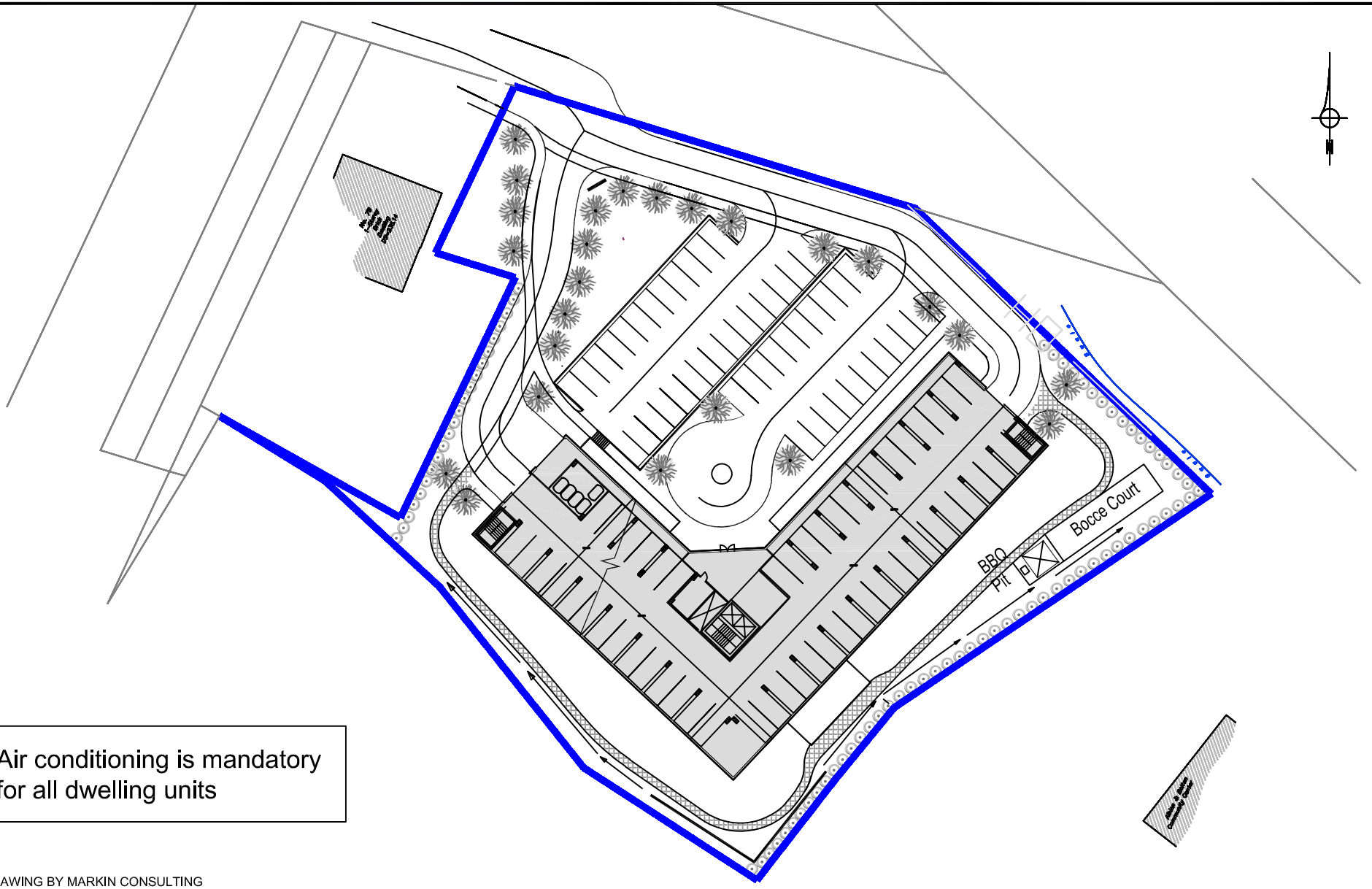
Title: Key Plan		Project No.: 118-0214	Date: July 9. 2018
Project Name: 84 Nancy Street, Bolton		Scale: N.T.S.	Figure: 1



Air conditioning is mandatory for all dwelling units

BASE DRAWING BY MARKIN CONSULTING

No.	Revision/Issue	Date

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Title: Concept Site Plan

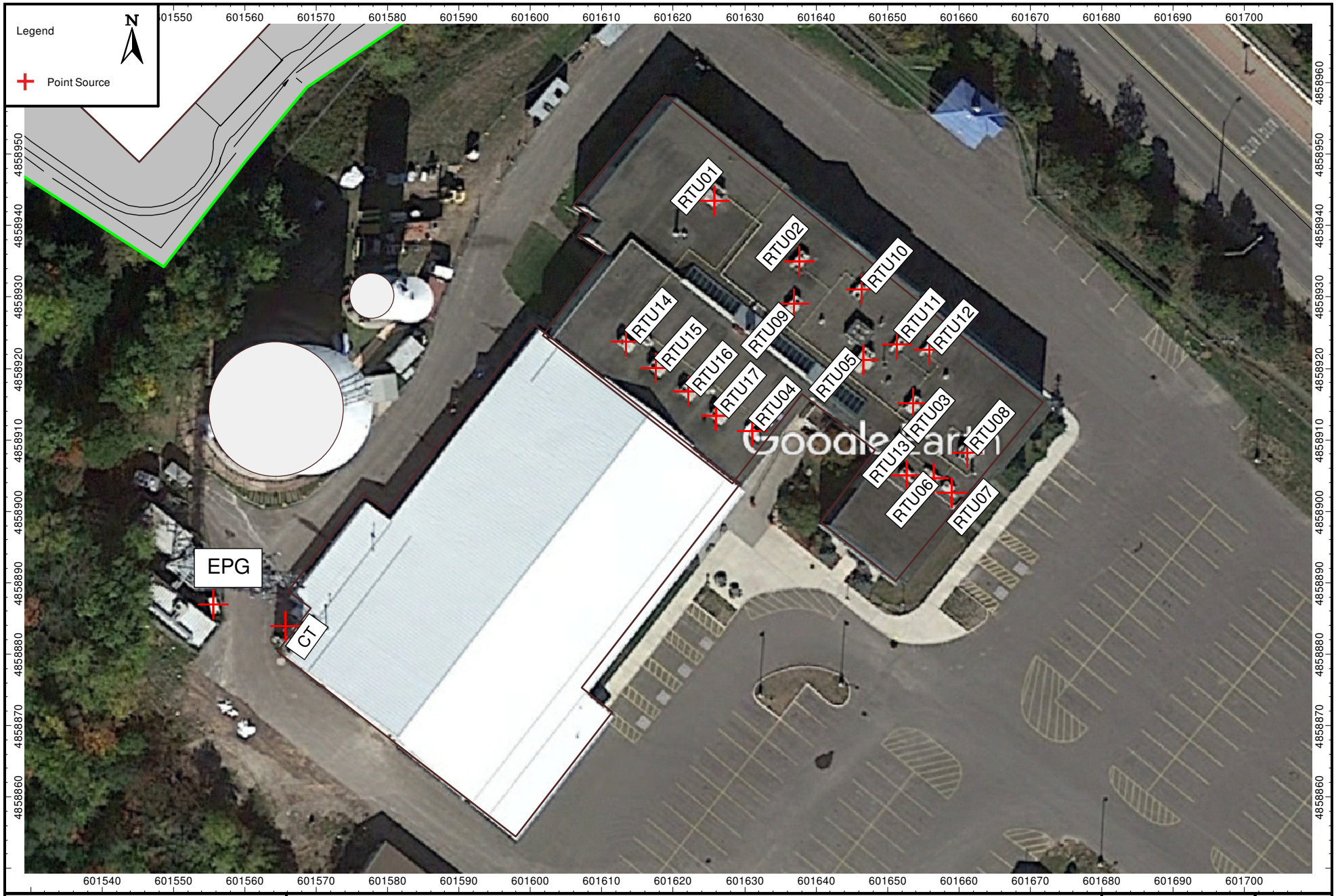
Project No.: 118-0214

Date: July 9, 2018

Project Name: 84 Nancy Street, Bolton

Scale: N.T.S.

Figure: 2



VALCOUSTICS Canada Ltd. consulting acoustical engineers	Title: **Source ID's**	Date: **July 9, 2018**	Figure: **3**
	Project Name: **84 Nancy Street, Caledon**	Project No.: **118-0214**	

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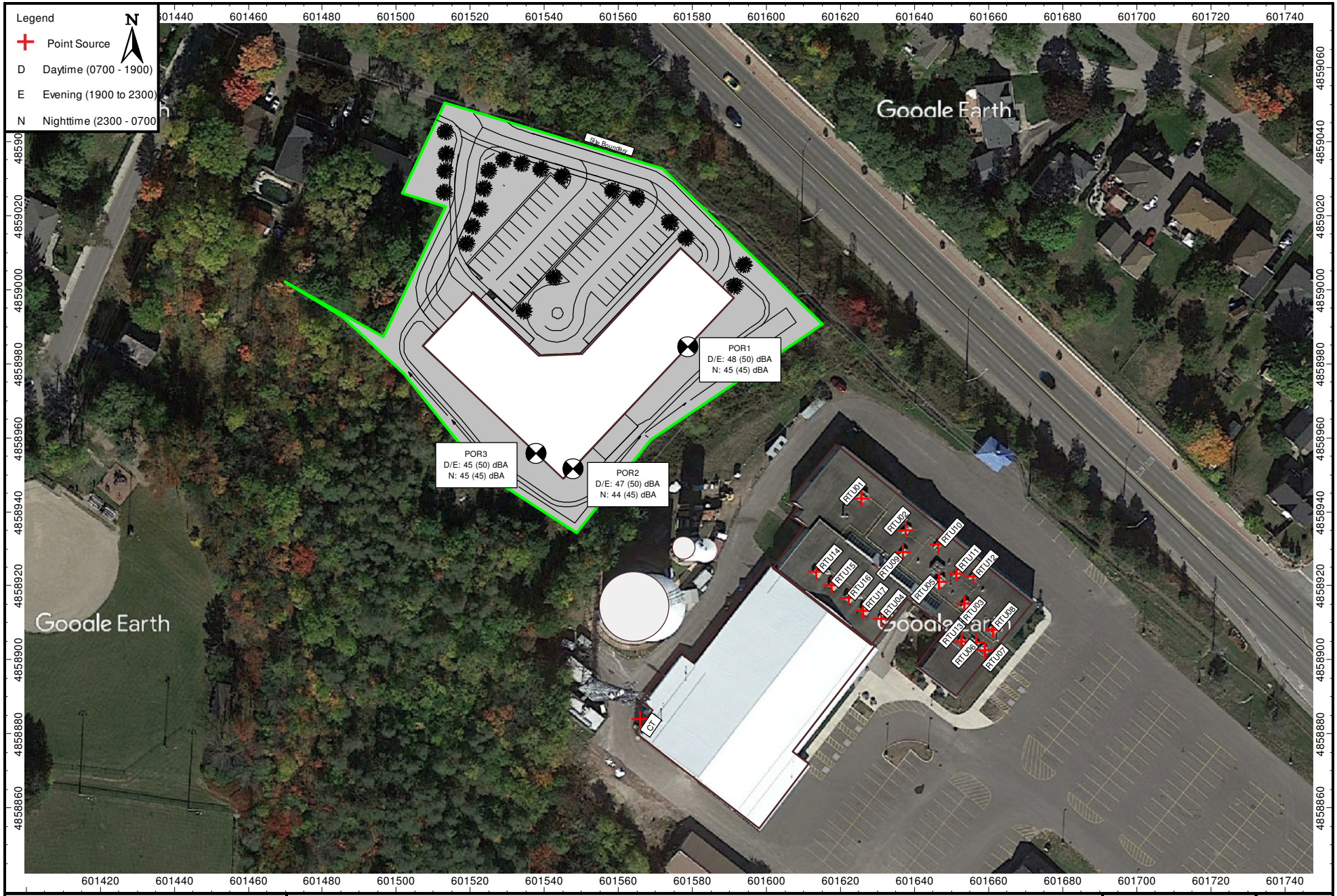
Date Plotted: 08.07.18

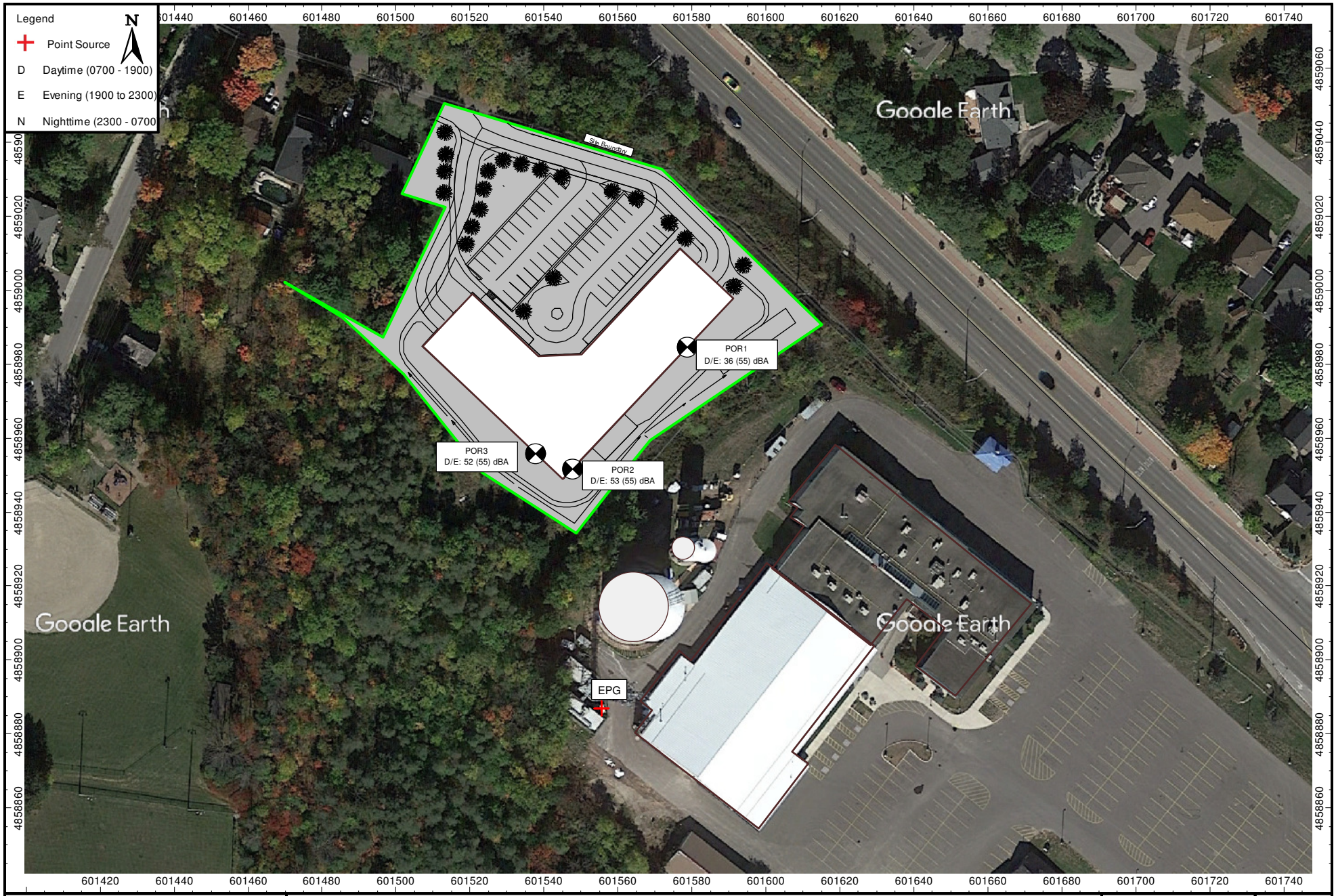


VALCOUSTICS Canada Ltd.
consulting acoustical engineers

Title: **Hourly Sound Levels due to HVAC Units and Cooling Tower (dBA)**	Date: **July 9, 2018**	Figure: **4**
Project Name: **84 Nancy Street, Caledon**	Project No.: **118-0214**	

J:\2018\118021400\Analysis\Cadna\2018-07-08 84 Nancy St, Bolton.cna

Date Plotted: 08.07.18



VALCOUSTICS
Canada Ltd.
consulting acoustical engineers

Title: **Hourly Sound Levels due to Emergency Generator (dBA)**		Date: **July 9, 2018**	Figure: **5**
Project Name: **84 Nancy Street, Caledon**		Project No.: **118-0214**	

J:\2018\118214\000\Analysis\Cadna\2018-07-08 84 Nancy St, Bolton.cna

Date Plotted: 08.07.18

APPENDIX A
ROAD TRAFFIC DATA

May 8, 2018

Seema Nagaraj,
Valcoustics Canada LTD.
Re: FW: Road Traffic Data Request (VCL File: 118-0214)

Seema:

As per your request, we are providing the following traffic data.

Queen Street South, south of King Street

	Existing	Planned
24 Hour Traffic Volume	34,687	34,687*
# of Lanes **	4	4
Day/Night Split	90/10	90/10
Day Trucks *** (% of Total Volume)	2.3% Medium 3.0% Heavy	2.3% Medium 3.0% Heavy
Night Trucks *** (% of Total Volume)	2.7% Medium 2.5% Heavy	2.7% Medium 2.5% Heavy
Right-of-Way Width	20 metres	
Posted Speed Limit	60 km/h	

* The Planned/Ultimate volumes exceed the road capacity and have intentionally been estimated to be the same as Existing volumes.
**Queen Street N/S will be narrowed from 4-2 lanes in downtown Bolton, from Hickman Street to just South of King St.
*** There is an official restriction for Heavy Trucks on the road

If you require further assistance, please contact me at (905) 791-7800 ext. 8594

Regards,

Parshan Bahrami, EIT
Transportation Planner, Infrastructure Planning & Design
Transportation Division, Public Works, Region of Peel

10 Peel Centre Drive, Suite B, 4th Floor, Brampton, ON, L6T 4B9
E: parshan.bahrami@peelregion.ca • W: 905-791-7800 x8594

APPENDIX B

ENVIRONMENTAL NOISE GUIDELINES

APPENDIX B

ENVIRONMENTAL NOISE GUIDELINES

MINISTRY OF THE ENVIRONMENT, CONSERVATION AND PARKS (MECP)

Reference: MECP Publication NPC-300, October 2013: *"Environmental Noise Guideline, Stationary and Transportation Source – Approval and Planning"*.

SPACE	SOURCE	TIME PERIOD	CRITERION
Living/dining, den areas of residences, hospitals, nursing homes, schools, daycare centres, etc.	Road	07:00 to 23:00	45 dBA
	Rail	07:00 to 23:00	40 dBA
	Aircraft	24-hour period	NEF/NEP 5
Living/dining, den areas of residences, hospitals, nursing homes, etc. (except schools or daycare centres)	Road	23:00 to 07:00	45 dBA
	Rail	23:00 to 07:00	40 dBA
	Aircraft	24-hour period	NEF/NEP 5
Sleeping quarters	Road	07:00 to 23:00	45 dBA
	Rail	07:00 to 23:00	40 dBA
	Aircraft	24-hour period	NEF/NEP 0
Sleeping quarters	Road	23:00 to 07:00	40 dBA
	Rail	23:00 to 07:00	35 dBA
	Aircraft	24-hour period	NEF/NEP 0
Outdoor Living Areas	Road and Rail	07:00 to 23:00	55 dBA
Outdoor Point of Reception	Aircraft	24-hour period	NEF/NEP 30#
	Stationary Source		
	Class 1 Area	07:00 to 19:00(1)	50* dBA
		19:00 to 23:00(1)	50* dBA
	Class 2 Area	07:00 to 19:00(2)	50* dBA
		19:00 to 23:00(2)	45* dBA
	Class 3 Area	07:00 to 19:00(3)	45* dBA
		19:00 to 23:00(3)	40* dBA
	Class 4 Area	07:00 to 19:00(4)	55* dBA
		19:00 to 23:00(4)	55* dBA

…./cont'd

SPACE	SOURCE	TIME PERIOD	CRITERION
Plane of a Window of Noise Sensitive Spaces	Stationary Source		
	Class 1 Area	07:00 to 19:00(1)	50* dBA
		19:00 to 23:00(1)	50* dBA
		23:00 to 07:00(1)	45* dBA
	Class 2 Area	07:00 to 19:00(2)	50* dBA
		19:00 to 23:00(2)	50* dBA
		23:00 to 07:00(2)	45* dBA
	Class 3 Area	07:00 to 19:00(3)	45* dBA
		19:00 to 23:00(3)	45* dBA
		23:00 to 07:00(3)	40* dBA
	Class 4 Area	07:00 to 19:00(4)	60* dBA
		19:00 to 23:00(4)	60* dBA
		23:00 to 07:00(4)	55* dBA

\# may not apply to in-fill or re-development.
* or the minimum hourly background sound exposure $L_{eq(1)}$, due to road traffic, if higher.
(1) Class 1 Area: Urban.
(2) Class 2 Area: Urban during day; rural-like evening and night.
(3) Class 3 Area: Rural.
(4) Class 4 Area: Subject to land use planning authority's approval.

Reference: MECP Publication ISBN 0-7729-2804-5, 1987: *"Environmental Noise Assessment in Land-Use Planning"*.

EXCESS ABOVE RECOMMENDED SOUND LEVEL LIMITS (dBA)	CHANGE IN SUBJECTIVE LOUDNESS ABOVE	MAGNITUDE OF THE NOISE PROBLEM	NOISE CONTROL MEASURES (OR ACTION TO BE TAKEN)
No excess (<55 dBA)	—	No expected noise problem	None
1 to 5 inclusive (56 to 60 dBA)	Noticeably louder	Slight noise impact	If no physical measures are taken, then prospective purchasers or tenants should be made aware by suitable warning clauses.
6 to 10 inclusive (61 - 65 dBA)	Almost twice as loud	Definite noise impact	Recommended.
11 to 15 inclusive (66 - 70 dBA)	Almost three times as loud	Serious noise impact	Strongly Recommended.
16 and over (>70 dBA)	Almost four times as loud	Very serious noise impact	Strongly Recommended (may be mandatory).

APPENDIX C

SAMPLE SOUND LEVEL CALCULATION

```
STAMSON 5.04        NORMAL REPORT        Date: 24-07-2018 13:33:28
MINISTRY OF ENVIRONMENT, CONSERVATION AND PARKS / NOISE ASSESSMENT

Filename: se_ef.te             Time Period: Day/Night 16/8 hours
Description: Southeast Corner - East Facade

Road data, segment # 1: Queen St S (day/night)
----------------------------------------------
Car traffic volume  : 29564/3288  veh/TimePeriod
Medium truck volume :   718/94    veh/TimePeriod
Heavy truck volume  :   937/87    veh/TimePeriod
Posted speed limit  :    70 km/h
Road gradient       :     4 %
Road pavement       :     1 (Typical asphalt or concrete)

Data for Segment # 1: Queen St S (day/night)
--------------------------------------------
Angle1   Angle2           : -90.00 deg   90.00 deg
Wood depth                :      0       (No woods.)
No of house rows          :      0 / 0
Surface                   :      1       (Absorptive ground surface)
Receiver source distance  :  40.00 / 40.00  m
Receiver height           :  25.50 / 25.50  m
Topography                :      1       (Flat/gentle slope; no barrier)
Reference angle           :   0.00

Results segment # 1: Queen St S (day)
-------------------------------------

Source height = 1.32 m

ROAD (0.00 + 69.21 + 0.00) = 69.21 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.00  73.47   0.00  -4.26   0.00   0.00   0.00   0.00  69.21
-------------------------------------------------------------------------------

Segment Leq : 69.21 dBA

Total Leq All Segments: 69.21 dBA

Results segment # 1: Queen St S (night)
---------------------------------------

Source height = 1.26 m

ROAD (0.00 + 62.37 + 0.00) = 62.37 dBA
Angle1 Angle2  Alpha RefLeq  P.Adj  D.Adj  F.Adj  W.Adj  H.Adj  B.Adj SubLeq
-------------------------------------------------------------------------------
   -90     90   0.00  66.62   0.00  -4.26   0.00   0.00   0.00   0.00  62.37
-------------------------------------------------------------------------------

Segment Leq : 62.37 dBA

Total Leq All Segments: 62.37 dBA

TOTAL Leq FROM ALL SOURCES (DAY): 69.21
                           (NIGHT): 62.37
```

APPENDIX D

SAMPLE STATIONARY SOURCE CALCULATION

118-0214 84 Nancy Street, Bolton

Point Sources

Name	M.	ID	Result. PWL			Lw / Li			Correction			Sound Reduction		Attenuation	Operating Time			K0	Freq.	Direct.	Height		Coordinates		
			Day	Evening	Night	Type	Value	norm.	Day	Evening	Night	R	Area		Day	Special	Night						X	Y	Z
			(dBA)	(dBA)	(dBA)			dB(A)	dB(A)	dB(A)	dB(A)		(m²)		(min)	(min)	(min)	(dB)	(Hz)		(m)		(m)	(m)	(m)
Kohler Power Systems 50	~	EPG	100.0	100.0	100.0	Lw	E		0.0	0.0	0.0				60.00	0.00	0.00	0.0		(none)	3.00	g	601555.55	4858886.90	3.00
Evapco ATC150B		CT	93.1	93.1	93.1	Lw	CT		0.0	0.0	0.0				60.00	60.00	60.00	0.0		(none)	8.50	g	601565.76	4858883.88	8.50
Carrier 48TJF020		RTU01	87.6	87.6	87.6	Lw	Carrier48TJF020		0.0	0.0	0.0				60.00	60.00	30.00	0.0		(none)	2.00	g	601625.73	4858943.51	12.00
Lennox GCS16-048		RTU02	82.0	82.0	82.0	Lw	GCS16_048_060		0.0	0.0	0.0				60.00	60.00	30.00	0.0		(none)	2.00	g	601637.59	4858934.94	12.00
Lennox GCS16-090		RTU03	86.0	86.0	86.0	Lw	GCS16_090		0.0	0.0	0.0				60.00	60.00	30.00	0.0		(none)	2.00	g	601653.55	4858915.20	12.00
Lennox GCS16-060		RTU04	82.0	82.0	82.0	Lw	GCS16_048_060		0.0	0.0	0.0				60.00	60.00	30.00	0.0		(none)	2.00	g	601631.03	4858911.17	12.00
Lennox GCS16-180		RTU05	87.6	87.6	87.6	Lw	Carrier48TJF020		0.0	0.0	0.0				60.00	60.00	30.00	0.0		(none)	2.00	g	601646.57	4858921.16	12.00
Lennox GCS16-024		RTU06	80.0	80.0	80.0	Lw	GCS16_024_036		0.0	0.0	0.0				60.00	60.00	30.00	0.0		(none)	2.00	g	601656.53	4858904.67	12.00
Lennox GCS16-036		RTU07	80.0	80.0	80.0	Lw	GCS16_024_036		0.0	0.0	0.0				60.00	60.00	30.00	0.0		(none)	2.00	g	601658.97	4858902.66	12.00
Lennox GCS16-120		RTU08	84.0	84.0	84.0	Lw	GCS16_120		0.0	0.0	0.0				60.00	60.00	30.00	0.0		(none)	2.00	g	601661.19	4858908.22	12.00
Lennox GCS16-090		RTU09	86.0	86.0	86.0	Lw	GCS16_090		0.0	0.0	0.0				60.00	60.00	30.00	0.0		(none)	2.00	g	601636.91	4858929.06	12.00
Lennox GCS16-036		RTU10	80.0	80.0	80.0	Lw	GCS16_024_036		0.0	0.0	0.0				60.00	60.00	30.00	0.0		(none)	2.00	g	601646.37	4858931.13	12.00
Lennox GCS16-036		RTU11	80.0	80.0	80.0	Lw	GCS16_024_036		0.0	0.0	0.0				60.00	60.00	30.00	0.0		(none)	2.00	g	601651.35	4858923.40	12.00
Lennox GCS16-036		RTU12	80.0	80.0	80.0	Lw	GCS16_024_036		0.0	0.0	0.0				60.00	60.00	30.00	0.0		(none)	2.00	g	601655.90	4858922.56	12.00
Lennox GCS16-036		RTU13	80.0	80.0	80.0	Lw	GCS16_024_036		0.0	0.0	0.0				60.00	60.00	30.00	0.0		(none)	2.00	g	601652.72	4858904.99	12.00
Lennox LGH072		RTU14	81.4	81.4	81.4	Lw	LGH072		0.0	0.0	0.0				60.00	60.00	30.00	0.0		(none)	2.00	g	601613.35	4858923.72	12.00
Lennox LGH072		RTU15	81.4	81.4	81.4	Lw	LGH072		0.0	0.0	0.0				60.00	60.00	30.00	0.0		(none)	2.00	g	601617.58	4858920.12	12.00
Lennox LGH072		RTU16	81.4	81.4	81.4	Lw	LGH072		0.0	0.0	0.0				60.00	60.00	30.00	0.0		(none)	2.00	g	601622.13	4858916.73	12.00
Lennox LGH072		RTU17	81.4	81.4	81.4	Lw	LGH072		0.0	0.0	0.0				60.00	60.00	30.00	0.0		(none)	2.00	g	601626.05	4858913.35	12.00

Sound Level Library

Name	ID	Type	Oktave Spectrum (dB)												Source
			Weight.	31.5	63	125	250	500	1000	2000	4000	8000	A	lin	
Carrier 48TJF020	Carrier48TJF020	Lw		0.0	90.8	88.7	86.4	84.3	83.5	78.4	75.6	66.8	87.6	94.7	Manufacturer
Lennox LGH072	LGH072	Lw		0.0	0.0	83.1	80.6	80.2	76.0	71.8	67.0	62.1	81.4	86.9	Manufacturer
Lennox GCS16-024 to 036	GCS16_024_036	Lw		0.0	0.0	81.7	79.2	78.8	74.6	70.4	65.6	60.7	80.0	85.5	Manufacturer SRN 80 dB
Lennox GCS16-048 to 060	GCS16_048_060	Lw		0.0	0.0	83.7	81.2	80.8	76.6	72.4	67.6	62.7	82.0	87.5	Manufacturer SRN 82 dB
Lennox GCS16-090	GCS16_090	Lw		0.0	0.0	87.7	85.2	84.8	80.6	76.4	71.6	66.7	86.0	91.5	Manufacturer
Lennox GCS16-120	GCS16_120	Lw		0.0	0.0	85.7	83.2	82.8	78.6	74.4	69.6	64.7	84.0	89.5	Manufacturer
Evapco CT	CT	Lw		0.0	97.0	96.0	92.0	89.0	88.0	85.0	82.0	80.0	93.1	101.0	Evapco LSTE-4612H
Enclosed Genset	E	Lw		0.0	102.4	108.4	104.4	96.4	92.4	86.4	76.4	68.4	100.0	110.8	75@7m, unmuffled AGA

Receiver
Name: (untitled)
ID: POR2
X: 601547.73 m
Y: 4858951.51 m
Z: 25.50 m

Point Source, ISO 9613, Name: "Evapco ATC150B", ID: "CT"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
3	601565.76	4858883.88	8.50	0	D	A	93.1	0.0	0.0	0.0	0.0	48.1	0.6	-1.1	0.0	0.0	10.8	0.0	0.0	34.7
3	601565.76	4858883.88	8.50	0	N	A	93.1	0.0	0.0	0.0	0.0	48.1	0.6	-1.1	0.0	0.0	10.8	0.0	0.0	34.7
3	601565.76	4858883.88	8.50	0	E	A	93.1	0.0	0.0	0.0	0.0	48.1	0.6	-1.1	0.0	0.0	10.8	0.0	0.0	34.7

Point Source, ISO 9613, Name: "Carrier 48TJF020", ID: "RTU01"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
6	601625.73	4858943.51	12.00	0	D	A	87.6	0.0	0.0	0.0	0.0	49.0	0.5	-1.5	0.0	0.0	0.0	0.0	0.0	39.6
6	601625.73	4858943.51	12.00	0	N	A	87.6	0.0	-3.0	0.0	0.0	49.0	0.5	-1.5	0.0	0.0	0.0	0.0	0.0	36.6
6	601625.73	4858943.51	12.00	0	E	A	87.6	0.0	0.0	0.0	0.0	49.0	0.5	-1.5	0.0	0.0	0.0	0.0	0.0	39.6
9	601625.73	4858943.51	12.00	1	D	A	87.6	0.0	0.0	0.0	0.0	49.6	0.5	-1.7	0.0	0.0	0.0	0.0	28.2	10.9
9	601625.73	4858943.51	12.00	1	N	A	87.6	0.0	-3.0	0.0	0.0	49.6	0.5	-1.7	0.0	0.0	0.0	0.0	28.2	7.9
9	601625.73	4858943.51	12.00	1	E	A	87.6	0.0	0.0	0.0	0.0	49.6	0.5	-1.7	0.0	0.0	0.0	0.0	28.2	10.9

Point Source, ISO 9613, Name: "Lennox GCS16-180", ID: "RTU05"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
11	601646.57	4858921.16	12.00	0	D	A	87.6	0.0	0.0	0.0	0.0	51.4	0.6	-2.0	0.0	0.0	0.0	0.0	0.0	37.6
11	601646.57	4858921.16	12.00	0	N	A	87.6	0.0	-3.0	0.0	0.0	51.4	0.6	-2.0	0.0	0.0	0.0	0.0	0.0	34.6
11	601646.57	4858921.16	12.00	0	E	A	87.6	0.0	0.0	0.0	0.0	51.4	0.6	-2.0	0.0	0.0	0.0	0.0	0.0	37.6

Point Source, ISO 9613, Name: "Lennox GCS16-090", ID: "RTU09"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
13	601636.91	4858929.06	12.00	0	D	A	86.0	0.0	0.0	0.0	0.0	50.4	0.4	-1.8	0.0	0.0	0.0	0.0	0.0	37.0
13	601636.91	4858929.06	12.00	0	N	A	86.0	0.0	-3.0	0.0	0.0	50.4	0.4	-1.8	0.0	0.0	0.0	0.0	0.0	34.0
13	601636.91	4858929.06	12.00	0	E	A	86.0	0.0	0.0	0.0	0.0	50.4	0.4	-1.8	0.0	0.0	0.0	0.0	0.0	37.0

Point Source, ISO 9613, Name: "Lennox GCS16-090", ID: "RTU03"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
16	601653.55	4858915.20	12.00	0	D	A	86.0	0.0	0.0	0.0	0.0	52.0	0.5	-2.1	0.0	0.0	0.0	0.0	0.0	35.5
16	601653.55	4858915.20	12.00	0	N	A	86.0	0.0	-3.0	0.0	0.0	52.0	0.5	-2.1	0.0	0.0	0.0	0.0	0.0	32.5
16	601653.55	4858915.20	12.00	0	E	A	86.0	0.0	0.0	0.0	0.0	52.0	0.5	-2.1	0.0	0.0	0.0	0.0	0.0	35.5

Point Source, ISO 9613, Name: "Lennox LGH072", ID: "RTU14"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
18	601613.35	4858923.72	12.00	0	D	A	81.4	0.0	0.0	0.0	0.0	48.2	0.4	-1.5	0.0	0.0	0.0	0.0	0.0	34.3
18	601613.35	4858923.72	12.00	0	N	A	81.4	0.0	-3.0	0.0	0.0	48.2	0.4	-1.5	0.0	0.0	0.0	0.0	0.0	31.3
18	601613.35	4858923.72	12.00	0	E	A	81.4	0.0	0.0	0.0	0.0	48.2	0.4	-1.5	0.0	0.0	0.0	0.0	0.0	34.3
20	601613.35	4858923.72	12.00	1	D	A	81.4	0.0	0.0	0.0	0.0	49.2	0.4	-1.4	0.0	0.0	0.0	0.0	10.5	22.7
20	601613.35	4858923.72	12.00	1	N	A	81.4	0.0	-3.0	0.0	0.0	49.2	0.4	-1.4	0.0	0.0	0.0	0.0	10.5	19.7
20	601613.35	4858923.72	12.00	1	E	A	81.4	0.0	0.0	0.0	0.0	49.2	0.4	-1.4	0.0	0.0	0.0	0.0	10.5	22.7

Point Source, ISO 9613, Name: "Lennox LGH072", ID: "RTU15"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
22	601617.58	4858920.12	12.00	0	D	A	81.4	0.0	0.0	0.0	0.0	48.8	0.4	-1.6	0.0	0.0	0.0	0.0	0.0	33.8
22	601617.58	4858920.12	12.00	0	N	A	81.4	0.0	-3.0	0.0	0.0	48.8	0.4	-1.6	0.0	0.0	0.0	0.0	0.0	30.8
22	601617.58	4858920.12	12.00	0	E	A	81.4	0.0	0.0	0.0	0.0	48.8	0.4	-1.6	0.0	0.0	0.0	0.0	0.0	33.8
24	601617.58	4858920.12	12.00	1	D	A	81.4	0.0	0.0	0.0	0.0	49.7	0.4	-1.5	0.0	0.0	0.0	0.0	10.8	22.1
24	601617.58	4858920.12	12.00	1	N	A	81.4	0.0	-3.0	0.0	0.0	49.7	0.4	-1.5	0.0	0.0	0.0	0.0	10.8	19.1
24	601617.58	4858920.12	12.00	1	E	A	81.4	0.0	0.0	0.0	0.0	49.7	0.4	-1.5	0.0	0.0	0.0	0.0	10.8	22.1

Point Source, ISO 9613, Name: "Lennox LGH072", ID: "RTU16"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
26	601622.13	4858916.73	12.00	0	D	A	81.4	0.0	0.0	0.0	0.0	49.4	0.4	-1.7	0.0	0.0	0.0	0.0	0.0	33.3
26	601622.13	4858916.73	12.00	0	N	A	81.4	0.0	-3.0	0.0	0.0	49.4	0.4	-1.7	0.0	0.0	0.0	0.0	0.0	30.3
26	601622.13	4858916.73	12.00	0	E	A	81.4	0.0	0.0	0.0	0.0	49.4	0.4	-1.7	0.0	0.0	0.0	0.0	0.0	33.3

Point Source, ISO 9613, Name: "Lennox GCS16-048", ID: "RTU02"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
28	601637.59	4858934.94	12.00	0	D	A	82.0	0.0	0.0	0.0	0.0	50.3	0.4	-1.8	0.0	0.0	0.0	0.0	0.0	33.0
28	601637.59	4858934.94	12.00	0	N	A	82.0	0.0	-3.0	0.0	0.0	50.3	0.4	-1.8	0.0	0.0	0.0	0.0	0.0	30.0
28	601637.59	4858934.94	12.00	0	E	A	82.0	0.0	0.0	0.0	0.0	50.3	0.4	-1.8	0.0	0.0	0.0	0.0	0.0	33.0

Point Source, ISO 9613, Name: "Lennox GCS16-060", ID: "RTU04"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
30	601631.03	4858911.17	12.00	0	D	A	82.0	0.0	0.0	0.0	0.0	50.4	0.4	-1.8	0.0	0.0	0.0	0.0	0.0	33.0
30	601631.03	4858911.17	12.00	0	N	A	82.0	0.0	-3.0	0.0	0.0	50.4	0.4	-1.8	0.0	0.0	0.0	0.0	0.0	30.0
30	601631.03	4858911.17	12.00	0	E	A	82.0	0.0	0.0	0.0	0.0	50.4	0.4	-1.8	0.0	0.0	0.0	0.0	0.0	33.0

Point Source, ISO 9613, Name: "Lennox LGH072", ID: "RTU17"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
32	601626.05	4858913.35	12.00	0	D	A	81.4	0.0	0.0	0.0	0.0	49.9	0.4	-1.8	0.0	0.0	0.0	0.0	0.0	32.8
32	601626.05	4858913.35	12.00	0	N	A	81.4	0.0	-3.0	0.0	0.0	49.9	0.4	-1.8	0.0	0.0	0.0	0.0	0.0	29.8
32	601626.05	4858913.35	12.00	0	E	A	81.4	0.0	0.0	0.0	0.0	49.9	0.4	-1.8	0.0	0.0	0.0	0.0	0.0	32.8

Point Source, ISO 9613, Name: "Lennox GCS16-120", ID: "RTU08"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
34	601661.19	4858908.22	12.00	0	D	A	84.0	0.0	0.0	0.0	0.0	52.7	0.6	-2.1	0.0	0.0	0.0	0.0	0.0	32.8
34	601661.19	4858908.22	12.00	0	N	A	84.0	0.0	-3.0	0.0	0.0	52.7	0.6	-2.1	0.0	0.0	0.0	0.0	0.0	29.8
34	601661.19	4858908.22	12.00	0	E	A	84.0	0.0	0.0	0.0	0.0	52.7	0.6	-2.1	0.0	0.0	0.0	0.0	0.0	32.8

Point Source, ISO 9613, Name: "Lennox GCS16-036", ID: "RTU10"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
36	601646.37	4858931.13	12.00	0	D	A	80.0	0.0	0.0	0.0	0.0	51.1	0.5	-1.9	0.0	0.0	0.0	0.0	0.0	30.3
36	601646.37	4858931.13	12.00	0	N	A	80.0	0.0	-3.0	0.0	0.0	51.1	0.5	-1.9	0.0	0.0	0.0	0.0	0.0	27.3
36	601646.37	4858931.13	12.00	0	E	A	80.0	0.0	0.0	0.0	0.0	51.1	0.5	-1.9	0.0	0.0	0.0	0.0	0.0	30.3

Point Source, ISO 9613, Name: "Lennox GCS16-036", ID: "RTU11"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
38	601651.35	4858923.40	12.00	0	D	A	80.0	0.0	0.0	0.0	0.0	51.7	0.5	-2.0	0.0	0.0	0.0	0.0	0.0	29.8
38	601651.35	4858923.40	12.00	0	N	A	80.0	0.0	-3.0	0.0	0.0	51.7	0.5	-2.0	0.0	0.0	0.0	0.0	0.0	26.8
38	601651.35	4858923.40	12.00	0	E	A	80.0	0.0	0.0	0.0	0.0	51.7	0.5	-2.0	0.0	0.0	0.0	0.0	0.0	29.8

Point Source, ISO 9613, Name: "Lennox GCS16-036", ID: "RTU12"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
40	601655.90	4858922.56	12.00	0	D	A	80.0	0.0	0.0	0.0	0.0	52.0	0.5	-2.0	0.0	0.0	0.0	0.0	0.0	29.5
40	601655.90	4858922.56	12.00	0	N	A	80.0	0.0	-3.0	0.0	0.0	52.0	0.5	-2.0	0.0	0.0	0.0	0.0	0.0	26.5
40	601655.90	4858922.56	12.00	0	E	A	80.0	0.0	0.0	0.0	0.0	52.0	0.5	-2.0	0.0	0.0	0.0	0.0	0.0	29.5

Point Source, ISO 9613, Name: "Lennox GCS16-036", ID: "RTU13"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
42	601652.72	4858904.99	12.00	0	D	A	80.0	0.0	0.0	0.0	0.0	52.3	0.5	-2.1	0.0	0.0	0.0	0.0	0.0	29.3
42	601652.72	4858904.99	12.00	0	N	A	80.0	0.0	-3.0	0.0	0.0	52.3	0.5	-2.1	0.0	0.0	0.0	0.0	0.0	26.3
42	601652.72	4858904.99	12.00	0	E	A	80.0	0.0	0.0	0.0	0.0	52.3	0.5	-2.1	0.0	0.0	0.0	0.0	0.0	29.3

Point Source, ISO 9613, Name: "Lennox GCS16-024", ID: "RTU06"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
44	601656.53	4858904.67	12.00	0	D	A	80.0	0.0	0.0	0.0	0.0	52.5	0.6	-2.1	0.0	0.0	0.0	0.0	0.0	29.0
44	601656.53	4858904.67	12.00	0	N	A	80.0	0.0	-3.0	0.0	0.0	52.5	0.6	-2.1	0.0	0.0	0.0	0.0	0.0	26.0

Point Source, ISO 9613, Name: "Lennox GCS16-024", ID: "RTU06"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
44	601656.53	4858904.67	12.00	0	E	A	80.0	0.0	0.0	0.0	0.0	52.5	0.6	-2.1	0.0	0.0	0.0	0.0	0.0	29.0

Point Source, ISO 9613, Name: "Lennox GCS16-036", ID: "RTU07"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
46	601658.97	4858902.66	12.00	0	D	A	80.0	0.0	0.0	0.0	0.0	52.7	0.6	-2.1	0.0	0.0	0.0	0.0	0.0	28.8
46	601658.97	4858902.66	12.00	0	N	A	80.0	0.0	-3.0	0.0	0.0	52.7	0.6	-2.1	0.0	0.0	0.0	0.0	0.0	25.8
46	601658.97	4858902.66	12.00	0	E	A	80.0	0.0	0.0	0.0	0.0	52.7	0.6	-2.1	0.0	0.0	0.0	0.0	0.0	28.8

Receiver
Name: (untitled)
ID: POR2
X: 601547.73 m
Y: 4858951.51 m
Z: 25.50 m

Point Source, ISO 9613, Name: "Kohler Power Systems 50", ID: "EPG"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
1	601555.55	4858886.90	3.00	0	D	A	100.0	0.0	0.0	0.0	0.0	47.8	0.2	-0.6	0.0	0.0	0.0	0.0	0.0	52.7
1	601555.55	4858886.90	3.00	0	N	A	100.0	0.0	-188.0	0.0	0.0	47.8	0.2	-0.6	0.0	0.0	0.0	0.0	0.0	-135.3
1	601555.55	4858886.90	3.00	0	E	A	100.0	0.0	-188.0	0.0	0.0	47.8	0.2	-0.6	0.0	0.0	0.0	0.0	0.0	-135.3
4	601555.55	4858886.90	3.00	1	D	A	100.0	0.0	0.0	0.0	0.0	47.8	0.2	-0.5	0.0	0.0	0.0	0.0	56.4	-3.8
4	601555.55	4858886.90	3.00	1	N	A	100.0	0.0	-188.0	0.0	0.0	47.8	0.2	-0.5	0.0	0.0	0.0	0.0	56.4	-191.8
4	601555.55	4858886.90	3.00	1	E	A	100.0	0.0	-188.0	0.0	0.0	47.8	0.2	-0.5	0.0	0.0	0.0	0.0	56.4	-191.8