Noise and Vibration Assessment Report

Completed in Support of the:

Napanee Generating Station Expansion

PREPARED FOR:

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Land Acknowledgement

Atura Power respectfully acknowledges that the land on which the Napanee Generating Station and any proposed future project(s) at this site are in the traditional and treaty territory of the Mississauga Anishinaabeg.

We believe that it is important to recognize the Mississauga Anishinaabeg for their care and teachings about the earth and our relations, and to honor those teachings through our interactions every day. We also acknowledge the Mohawks of the Bay of Quinte whose treaty territory is in the neighboring location of Tyendinaga and recognize these lands have been the home of many Indigenous peoples over the centuries, including the Huron-Wendat, the Métis and Haudenosaunee.

As a community, we have a shared responsibility for stewardship of the land on which we live and work.

Atura Power is committed to fostering positive and mutually beneficial relationships with Indigenous peoples and communities, in peace, respect, and friendship.

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Acronyms

AADT .... annual average daily traffic

ANSI .... American National Standards Institute

dB .... decibel(s)

dBA .... A-weighted decibel(s)

DPH .... dew point heater

ECA .... Environmental Compliance Approval

ERR .... Environmental Review Report

GJ/hr .... gigajoules per hour

GSU .... generator step-up

hr .... hour

HHV .... higher heating value

Hz .... Hertz

ISO .... International Organization for Standardization

kg .... kilogram(s)

km .... kilometre(s)

kW .... kilowatt(s)

kPAg .... kilopascal gauge

L/hr .... litre(s) per hour

L/m .... litre(s) per minute

L90 .... sound level exceeded for 90% of a given time period

Leq .... energy equivalent sound level

LFN .... low frequency noise

LGS .... Lennox Generating Station

m .... metre(s)

m^3/hr .... cubic metre(s) per hour

m^3/s .... cubic metre(s) per second

MECP .... Ontario Ministry of the Environment, Conservation and Parks

MTO .... Ontario Ministry of Transportation

MW .... megawatt(s)

NGS .... Napanee Generating Station

NIST .... National Institute of Standards and Technology

POR.................... point of reception

ORNAMENT....... Ontario Road Noise Analysis Method for Environment and Transportation

OPG …………… Ontario Power Generation

UTM.................... Universal Transverse Mercator

1. Introduction

1.1 Project Overview

Portlands Energy Centre L.P. (Atura Power), a subsidiary of Ontario Power Generation (OPG), is proposing to expand the existing natural gas fuelled Napanee Generating Station (NGS) to increase its electricity generating capacity to support year-round electricity generation in Ontario. The proposed NGS Expansion (the project) will include adding a simple cycle combustion turbine generator unit with a nameplate capacity of 430 megawatts (MW) and gross output capacity of approximately 420 MW (at reference conditions with evaporative cooling system in service) and supporting systems.

The project will be located north of the Lake Ontario shoreline in the Town of Greater Napanee, Ont., west[1] of the existing NGS facility, within the existing OPG owned Lennox Generating Station (LGS) boundaries, as shown in **Figure 1**. Access to the project site is via an existing driveway to Highway 33 (Loyalist Parkway), located on the adjacent NGS property to the east. No expansion beyond the current NGS and LGS properties will be required.

1.2 Report Purpose

This technical report is supplementary to the discussion of the noise and vibration assessment provided in the Environmental Review Report (ERR) for the project. The purpose of this supplemental report is to provide additional technical details on the noise and vibration assessment methodology, including an overview of the project assessment scenarios, calculations, modelling methods, and modelling outputs.

The purpose of the noise assessment is to identify and, where possible, quantify the environmental impacts due to the potential for noise from project activities to be audible off-site and is applicable to human impacts only. Analysis completed in support of the Natural Heritage Impact Assessment is included in **Attachment A** and discussed in the ERR sections and supporting documents for that discipline.

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[1] *For ease of reading and to reflect local conventions, cardinal directions in the project documentation refer to the project as located directly west of the NGS, although in reality it is located southwest of the project site as shown on figures.*

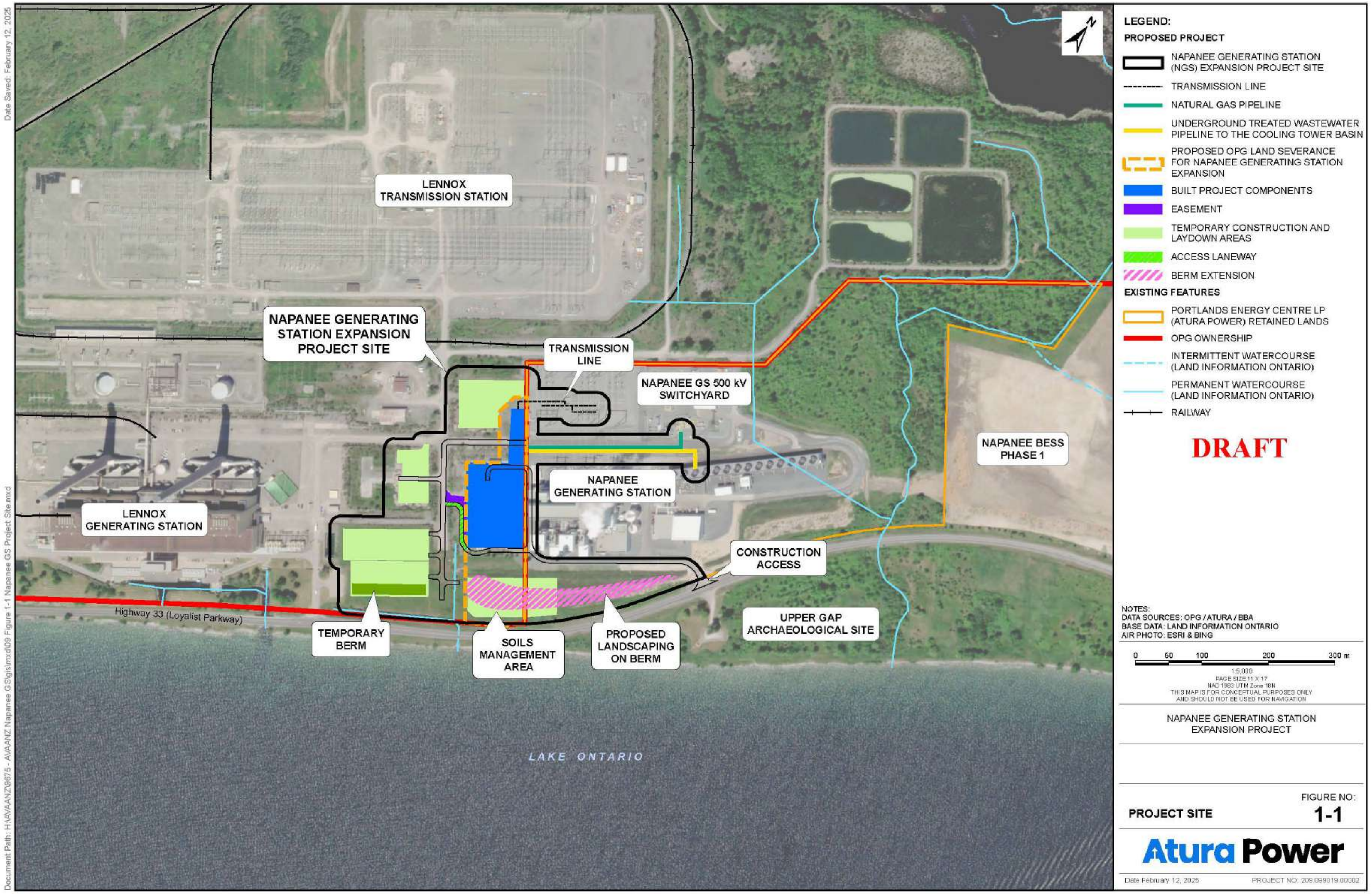

Figure 1: Project Location

2. Methodology

The following sections outline the methodology for the assessment, including the project effects criteria, the selection of the sensitive points of reception, and the analytical methods applied in the prediction of sound levels at the sensitive locations. The methodology is based on the guidance outlined by the Ontario Ministry of the Environment, Conservation and Parks (MECP) in its Publication Noise Pollution Control (NPC)-300 "*Environmental Noise Guideline – Stationary and Transportation Sources – Approval and Planning*" [1]. As this project is an expansion of the existing NGS operations, the sources associated with the expansion have been assessed cumulatively with the existing NGS operations as they may operate simultaneously. The existing operations have already been assessed in accordance with Publication NPC-300 and approved by the MECP under Environmental Compliance Approval (ECA) Number A-500-1716089792 Version 1.0, issued on June 9, 2022.

2.1 Project Effects Criteria

Effects to the acoustic environment are typically assessed in quantitative terms using regulatory guidelines and/or anticipated changes to existing levels. The applicable guidelines are discussed in the following sections.

2.1.1 Provincial

2.1.1.1 Operations

In order to obtain an ECA amendment from the MECP, the NGS inclusive of the expansion must comply with the noise guidelines stipulated in the MECP Publication NPC-300 [1]. NPC-300 states that the assessment must be established based on the principle of "predictable worst-case" noise impact occurring at a noise sensitive point of reception (POR). A predictable worst-case noise impact means the noise impact associated with a planned and predictable mode of operation for stationary source(s), during the hour when the noise emissions from the stationary source(s) have the greatest impact at a point of reception, relative to the applicable limit. The predictable worst-case noise impact must address the following activities:

- **Regular, routine operation of equipment**: Operations of equipment are included in the predictable worst-case scenario.
- **Infrequent operation of equipment**: Operations of equipment (stationary sources) that occur at least twice a month and emit noise for at least one-half hour on each occasion are considered planned and predictable even if they are not occurring at precisely the same time on each occurrence and are included in the predictable worst-case scenario.
- **Operation of emergency equipment**: Activities related to the operation or testing of equipment used for emergency purposes, but in non-emergency situations, are addressed using separate sound level limits.

NPC-300 establishes sound level limits based on the characteristics of the sensitive receptors in proximity to the facility. The project site and the closest receptor locations are typical of a Class 3 (Rural) Area. A "Class 3 Area" is defined by the MECP as "*a rural area with an acoustical environment that is dominated by natural sounds having little or no road traffic, such as:*

- *a small community,*
- *agricultural area,*
- *a rural recreational area such as a cottage or a resort area, or*
- *a wilderness area.*" [1]

According to Section B4 of NPC-300, the Class 3 sound level limit at a point of reception is the higher of either the applicable exclusionary limit, or the minimum background sound level that occurs or is likely to occur during the time period corresponding to the operation of the stationary source under impact assessment (established either through modelling or monitoring). The lowest hourly modelled or measured energy-equivalent sound level[2] (Leq) value should be selected to represent the background sound level when not applying the exclusionary limits. The minimum exclusionary limits are presented in **Table 1**. No restrictions apply to stationary sources that result in a one-hour Leq lower than these minimum values.

Table 1: Class 3 Minimum One-Hour Leq by Time of Day

POR Location	Time of Day	Period Designation	Performance Limit (1-hr Leq, A-weighted decibels (dBA)
Outdoor	7:00 a.m. to 7:00 p.m.	Day	45
	7:00 p.m. to 11:00 p.m.	Evening	40
Plane of Window	7:00 a.m. to 7:00 p.m.	Day	45
	7:00 p.m. to 11:00 p.m.	Evening	40
	11:00 p.m. to 7:00 a.m.	Night	40

The sound level limits for noise produced by emergency equipment operating in non-emergency situations, such as testing or maintenance of equipment such as emergency generators, are 5 decibels (dB) greater than the sound level limits that are otherwise applicable to stationary sources (i.e., 5 dB higher than the applicable limit from **Table 1**). In accordance with NPC-300, the

[2] *An energy equivalent sound level is used to describe time-varying noise in terms of a single number. The one-hour Leq is therefore the steady sound level that contains the same amount of energy as the varying noise levels experienced over a one-hour period.*

noise produced by emergency equipment operating in non-emergency situations is assessed independently of all other stationary sources of noise.

Finally, if the stationary source contains sources with any noticeable features such as tonal components or buzzing, a 5 dB tonal penalty must be added to the noise level of the source in accordance with MECP Publication NPC-104 "*Sound Level Adjustments*" [2]. It should also be noted that the MECP does not currently have a methodology or criteria for the assessment of low frequency noise (LFN). As there is potential for LFN from combustion turbine generators, an assessment methodology has been discussed separately in **Section 2.1.4**.

2.1.1.2 Construction

The MECP does not regulate construction noise, as this is considered a municipal rather than provincial issue (see **Section 2.1.2** for a discussion of the municipal noise by-law). However, in its *Model Municipal By-Law*, the MECP has outlined sound emission standards for various types of individual construction equipment according to its power rating and date of manufacture in its Publication NPC-115 "*Construction Equipment*" [3] and NPC-118 "*Motorized Conveyances*" [4]. These publications do not provide receptor-based permissible sound level limits for overall construction activities; the limits are instead applicable to individual pieces of equipment at a reference distance. **Table 2** provides a summary of the sound emission standards and the associated reference distances for the various types of equipment covered.

Table 2: Summary of Ontario MECP Construction Sound Level Guidance (NPC- 115 and NPC-118)

Source	Equipment	Power Rating (kW)	Maximum Sound Level (dBA)(1)	NPC-103 Measurement Procedure	Measurement Distance (m)
NPC-115	Excavation Equipment, Dozers, Loaders, Backhoes or Other Equipment Capable of Being Used for Similar Application.	<75	83	NPC-103 Section 6 (Society of Automotive Engineers (SAE) J88a)	15
		>75	85		
	Pneumatic Pavement Breakers	All	85	NPC-103 Section 7 (Machinery and Equipment Manufacturers' Association of Canada (MEMAC))	7
	Portable Air Compressors	All	76	NPC-103 Section 7 (MEMAC)	7
	Tracked Drills	All	100	NPC-103 Section 6 (SAE J88a)	15

Source	Equipment	Power Rating (kW)	Maximum Sound Level (dBA)(1)	NPC-103 Measurement Procedure	Measurement Distance (m)
NPC-118	Heavy Vehicles with Governed Diesel Engines	All	95	NPC-103 Section 9 (Canadian Standards Association) 107.22-M)	15

Notes: (1) as measured using the MECP Publication NPC-103 [5] procedure identified in adjacent column.

Another potentially significant source of construction noise is the increase in local traffic associated with the construction workforce. There is no specific guidance from the MECP to assess the effect of a temporary increase in road traffic such as this. As such, impacts associated with future temporary increases in road traffic due to the construction workforce have been assessed with consideration to the predicted change in ambient sound levels using the criteria described in **Section 2.1.3**.

2.1.2 Municipal

The Corporation Town of Greater Napanee outlines its requirements for noise control in By-law No. 2023-0043 [6]. This By-law does not provide quantitative noise limits for industrial or construction noise sources, rather it outlines time and place prohibitions for noise caused by various types of activity. Regarding industrial noise sources, the By-law effectively defers to the provincial approvals process (see **Section 2.1.1**). Regarding construction noise, Section 5(h) exempts construction activities during the hours of 7:00 a.m. to 7:00 p.m., and notes that the exemption does not apply when construction equipment is “*being operated without the originally installed muffling devices or their equivalent in good working order and in constant operation*.” Section 6 of the By-law outlines a process for applying for a temporary noise permit, which would grant an exemption from any prohibition in the By-law. If approved, the temporary permit may be issued with conditions, such as meeting certain sound level limits and completing noise monitoring during the exempted activity.

2.1.3 Change in Ambient Conditions

In addition to the regulatory criteria outlined above, consideration was given the potential for changes in broadband noise levels relative to the existing ambient conditions. Generally, changes in noise levels of less than 3 dBA are barely perceptible to most individuals, whereas a 10 dBA change is normally perceived as a doubling in loudness. **Table 3** provides a summary of the criteria used to assess the relative significance of changes in sound levels.

Table 3: Magnitude of Changes in Broadband Sound Levels

Incremental Change in Sound Level (dBA)	Human Perception of Change in Sound Level	Significance
0 to 3	Imperceptible	Insignificant
3 to 5	Noticeable	Low
5 to 10	Clearly Noticeable	Moderate
>10	Highly Perceptible	High

2.1.4 Low Frequency Noise

While an assessment of LFN is not required under the provincial assessment approach outlined in Publication NPC-300, it is appropriate to assess this potential as combustion turbines are capable of producing LFN. LFN is not generally well perceived by the human ear; however, it may induce vibration in building elements that could be perceptible. The American National Standards Institute (ANSI) has proposed a standard for the assessment of LFN based on the predicted sound levels at a point of reception in frequency bands less than 100 Hertz (Hz). ANSI outlines that the energy sum of sound levels in the 16, 31.5 and 63 Hz octave bands should be less than 70 dB (linear, not A-weighted) to prevent rattling due to LFN [7]. For this assessment, predictions are available for frequencies as low as the 31.5 Hz octave band. The results of the assessment of LFN are discussed in **Section 4.1.1.2**.

2.2 Sensitive Receptor Locations

A POR is defined by MECP in Publication NPC-300 as “any location on a noise sensitive land use where noise from a stationary source is received” [1]. Noise sensitive land uses include properties that accommodate a dwelling (i.e., residential properties, inclusive of legal non-conforming residential, but excluding dwellings that are within the property boundary of the stationary source), as well as properties that contain a noise sensitive commercial purpose building (e.g., hotels, motels) or noise sensitive institutional purpose building (e.g., educational facility, hospital, place of worship).

A total of seven PORs have been identified as being representative of the most sensitive locations in the vicinity of the NGS facility (inclusive of the expansion). These locations include five PORs that have been identified historically for approvals associated with the NGS (POR1 to POR5) and two that have been added based on community and regulatory feedback. POR6 has been included based on feedback to Atura Power from the MECP in January 2024 during a review of an independent acoustic audit at the NGS completed in 2023. The MECP Kingston District Office had received an inquiry into noise levels from a property owner and requested that Atura Power include this location in all subsequent noise analyses. POR7, located in Cressy, Ont., west of Amherst Island, was included in the analysis based on a noise concern raised by the property owner during the public engagement for the NGS Expansion. The property is located approximately 3.7 kilometres (km) south-west of the NGS Expansion site across the Bay of Quinte in Lake Ontario.

Per NPC-300, the purpose assessment report is to identify the predictable worst-case noise impact at the POR locations. The predictable worst-case noise impact is defined as "*the noise impact associated with a planned and predictable mode of operation for stationary source(s), during the hour when the noise emission(s) have the greatest impact at a point of reception, relative to the applicable limit*" [1]. The locations at which the assessment has identified as the worst-case location are identified in the following paragraphs. In accordance with NPC-300, each noise sensitive property includes two PORs: one outdoor POR in the yard or outdoor amenity area, and one POR at the plane of window of a noise sensitive interior space. These are demarcated with a subscript to the POR ID, being 'a' for the outdoor location, and 'b' for the plane of window. The locations are shown in **Figure 2**.

POR1 is a residential property located at 7487 Highway 33, to the west of the NGS facility. This property is on land zoned by the Town of Greater Napanee as *Rural Residential (RR)* [6]. The property accommodates a single-storey residential dwelling and surrounding yardage. The receptor property is located approximately 2 km from the nearest NGS facility property line.

The outdoor point of reception (POR1a) was placed in the side yard closest to the NGS facility (i.e., to the east of the dwelling) at a height of 1.5 metres (m) above grade. The plane of window point of reception (POR1b) was placed at the maximum point of impact on the building façade, being the east façade, at a height of 1.5 m above grade.

POR2 is an agricultural property located at 497 County Road 21, to the north of the NGS facility. This property is on land zoned by the Town of Greater Napanee as *Prime Agriculture (PA)* [6]. The property accommodates a single-storey residential dwelling and surrounding yardage and agricultural lands. The receptor property is located approximately 2.4 km from the nearest NGS facility property line.

The outdoor point of reception (POR2a) was placed in the yard closest to the NGS facility (i.e., to the south of the dwelling) at a height of 1.5 m above grade. The plane of window point of reception (POR2b) was placed at the maximum point of impact on the building façade, being the south façade, at a height of 1.5 m above grade.

POR3 is a residential property located at 6915 Highway 33, to the east of the NGS facility. This property is on land zoned by the Town of Greater Napanee as *Rural (RU)* [8]. The property accommodates a single-storey residential dwelling and surrounding yardage. The receptor property is located approximately 400 m from the nearest facility property line.

The outdoor point of reception (POR3a) was placed in the back yard at a location closest to the facility along the fence line at a height of 1.5 m above grade. The plane of window point of reception (POR3b) was placed at the maximum point of impact on the building façade, being the west façade, at a height of 1.5 m above grade.

POR4 is a residential property located at 15355 Front Road, to the south of the NGS facility, on Amherst Island. This property is on land zoned by Loyalist Township as *Shoreline Residential (SR)* [9]. The property accommodates a single-storey residential dwelling and surrounding yardage. The receptor property is located approximately 2.6 km from the nearest NGS facility property line.

The outdoor point of reception (POR4a) was placed in the front yard closest to the NGS facility (i.e., to the north of the dwelling) at a height of 1.5 m above grade. The plane of window point of reception (POR4b) was placed at the maximum point of impact on the building façade, being the east façade, at a height of 1.5 m above grade.

POR5 is a residential property located at 6905 Highway 33, to the east of the NGS facility. This property is on land zoned by the Town of Greater Napanee as *Rural (RU)* [8]. The property accommodates a two-storey residential dwelling and surrounding yardage. The receptor property is located approximately 500 m from the nearest facility property line.

This receptor does not include an outdoor point of reception as the outdoor location at POR3a is the worst-case for PORs to the east. This receptor location was included despite being further away from POR3 because it accommodates a two-storey dwelling, and the associated plane of window point of reception may therefore have greater exposure than the plane of window receptor at POR3b. POR5 was placed at the maximum point of impact on the building façade, being the east façade, at a height of 4.5 m above grade.

POR6 is a residential property located at 40 Jarvis Lane, to the south-west of the NGS facility. This property is on land zoned by Prince Edward County as *Limited Service Residential (LSR)* [10]. The property was included as a two-storey residential dwelling and surrounding yardage. The receptor property is located approximately 6 km from the nearest NGS facility property line.

The outdoor point of reception (POR6a) was placed in the yard closest to the NGS facility (i.e., to the north of the dwelling) at a height of 1.5 m above grade. The plane of window point of reception (POR6b) was placed at the maximum point of impact on the building façade, being the north façade, at a height of 4.5 m above grade.

POR7 is a residential property located at 39 Lands End Lane, to the south-west of the NGS facility. This property is on land zoned by Prince Edward County as *Limited Service Residential (LSR)* [10]. The property was included as a two-storey residential dwelling and surrounding yardage. The receptor property is located approximately 3.7 km from the nearest NGS facility property line.

The outdoor point of reception (POR7a) was placed in the yard closest to the NGS facility (i.e., to the north of the dwelling) at a height of 1.5 m above grade. The plane of window point of reception (POR7b) was placed at the maximum point of impact on the building façade, being the north façade, at a height of 4.5 m above grade.

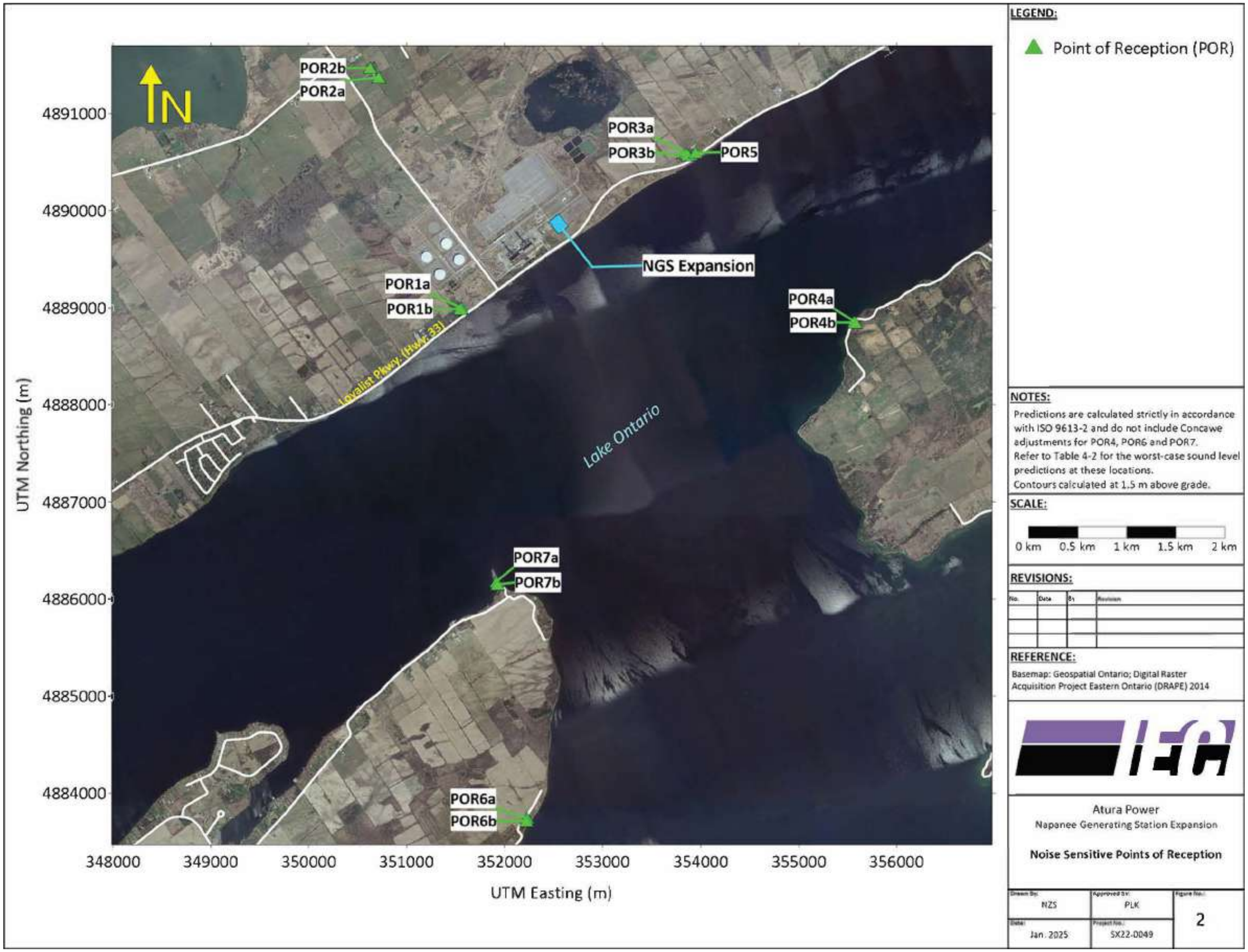

Figure 2: Noise Sensitive Points of Reception

2.3 Analytical Methods (Operations)

2.3.1 Source Identification

The design engineers for the NGS Expansion, Burns & McDonnell, identified the significant noise sources during the design of the facility and completed ongoing noise modelling in parallel with the facility design to account for any constraints imposed by the noise regulations. The significant noise sources include the following key equipment:

- One combustion turbine generator unit rated nominally at 419.9[3] MW gross output (at reference conditions with the evaporative cooling system in service), using natural gas as the primary fuel. The combustion turbine has a nominal natural gas firing rate of 3,951 gigajoules per hour (GJ/hr) higher heating value at reference conditions with the evaporative cooling system in service and the electric generator is rated at 543 megavolt-amperes.
- A combustion turbine inlet air filtration system, which includes filtration media and supports, as well as a filter housing structure incorporating a pulsing compressed-air cleaning system and an inlet air evaporative cooling system (described below).
- An evaporative cooling system which is designed to cool the inlet air to the combustion turbine (can be operated in ambient conditions above 15 degrees Celsius (°C)). The system operates by evaporating water over a dispersion media system, reducing the effective inlet air temperature and increasing the output.
- An inlet heating system, in which warm air will be bled from the compression cycle of the combustion turbine to reduce ice-build up which could damage the compressor blades of the turbine. The warm air will be internal to the inlet air system where it will heat the cold ambient air entering the combustion turbine before combustion.
- A glycol fin/fan heat exchanger air cooler used to cool and maintain temperatures of all operating equipment other than the turbine rotor.
- A combined fin/fan rotor air cooler / fuel gas heater will cool compressor air used for internal cooling of the turbine rotor as well as provide heating for the fuel gas before entering the combustion turbine.
- A combustion turbine auxiliary enclosure will house a lube oil reservoir, lube oil pumps, filters, mist separators and other miscellaneous lube oil piping, valves, and instruments. The enclosure will also include containment sized to contain a minimum of 110% of the lube oil volume.
- A horizontal turbine exhaust transition housing which connects and channels the flow of hot combustion exhaust from the combustion turbine to the vertical exhaust stack.
- A vertical rolled steel exhaust stack and silencer extending 47.4 m from grade. The stack has an inner diameter of 7.47 m and has an exhaust gas flow rate of 2,109 cubic

3. *Capacity rounded up to one decimal.*

metres per second (m^3/s) and exhaust gas temperature of 616°C during normal operations at 15°C ambient temperature. The stack will include lighting for personnel access which is normally kept off except for safety or maintenance activities.

- Two electric natural-gas compressors, which increase the natural gas pressure from the incoming natural gas feed to 5,861 kilopascal gauge (kPAg).
- One natural gas-fuelled dew point heater (DPH) rated at 16.9 GJ/hr (HHV) firing 438 cubic metres per hour (m^3/hr) of natural gas and exhausting at a maximum exhaust flow rate of 2.56 m^3/s and temperature of 177^oC through a stack inner diameter of 0.86 m and extending 7.5 m above grade. The DPH increases the temperature of the natural gas fuel supply to the combustion turbine generator above the dewpoint which prevents liquid formation in the fuel supply.
- One emergency standby diesel generator rated at 1,250 kilowatts (kW) firing ultra-low sulphur diesel fuel at a maximum rate of 392.3 litres per hour (L/hr) and exhausting through two exhaust stacks at a maximum exhaust flow rate of 2.36 m3/s each and exit temperature of 430°C through stack inner diameters of 0.24 m and extending 4.3 m above grade.
- Four oil-filled transformers which include: one generator step-up (GSU) transformer that increases the output voltage to 500 kV, one unit auxiliary transformer (UAT) to supply the project equipment, one static excitation transformer (SET), and one static frequency convertor (SFC) transformer.

2.3.2 Source Characterisation

Source sound levels for the expansion project were primarily referenced directly from manufacturer data sheets received by Burns & McDonnell during the design of the NGS Expansion. Mitsubishi (the original equipment manufacturer) provided sound power level data for all sources associated with the combustion turbine generator and related equipment. Sound power level data for the air-cooled heat exchanger and generator step-up transformer were also provided by the manufacturers. The remaining sources were characterised using engineering calculations from literature for common sources [11] as well as using specifications that the suppliers of the equipment will need to guarantee will be met in order to submit a tender. A source summary table for all sources included in the modelling of the NGS Expansion, including sound levels and references, is included in **Attachment B**.

2.3.3 Predictive Modelling

Cadna-A “state-of-the-art noise prediction software” from DataKustik GmbH [12] was used to assess the broadband noise impacts from anticipated project activities. The Cadna-A model is based on International Organization for Standardization (ISO) Standard 9613-2 *Attenuation of sound during propagation outdoors, Part 2: General method of calculation* [13]. The premise of the ISO standard is to quantify the various ways in which the sound energy from a noise source attenuates as it travels to a sensitive point of reception. The attenuation parameters include the attenuation due to distance (geometrical divergence), attenuation due to the atmosphere (e.g., relative humidity, temperature), attenuation due to the intervening ground type, and attenuation due to obstacles such as natural terrain variations, buildings, or barrier walls. Other parameters that factor into the calculation include source directivity, and the effect of other meteorological conditions such as wind speed and wind direction. The model calculates the sound attenuation between all sources and all receptors input to the model and logarithmically sums the individual source contributions at each receptor to provide an overall predicted sound level for each receptor. In a similar manner, a receptor grid can be established in the model space, with the same calculation occurring at each node point. This data can then be used to visually plot the sound propagation from the facility being modelled as a contour map, depicting the acoustic footprint of the project.

It should be noted that a Cadna-A model has already been developed for the existing NGS operation, and this model has been reviewed by and approved by the MECP. In addition, as a condition of its ECA, Atura Power had an independent third party complete an acoustic audit of the predictions at the sensitive receptors and confirmed that the sound levels due to the NGS operation were below the applicable sound level limits. The equipment associated with the NGS Expansion have been added to this approved model of the existing NGS facility as they are being evaluated cumulatively in this assessment. No changes were made to the approved modelling of the existing NGS operation, other than to remove the tonal penalties from the existing NGS transformers, as acoustic audits demonstrated there were no tonal effects at the receptor locations from existing equipment. The configuration of the model is discussed in the following sections.

2.3.3.1 Configuration / Global Settings

Prior to incorporating the NGS Expansion sources into the approved model of the existing NGS operations, the NGS Expansion sources were first modelled in isolation by the design engineers, Burns & McDonnell, for purposes of evaluating the need for noise controls. This model was developed to scale based on the site layout plans, using the same coordinate system as the approved NGS model (Universal Transverse Mercator (UTM) Zone 18, WGS84). Once finalised, the model of the NGS Expansion was imported to the approved model of the existing NGS operations to be evaluated cumulatively. As such, the final modelling used the same configuration that was applied in the approved NGS model, which accounts for the following:

- **Orders of reflection**: the model was set with three orders of reflection (i.e., the calculation will take into consideration the direct source-to-receiver path as well as any additional path that involves reflections off up to three surfaces).
- **Ground absorption**: the global ground absorption was set to 1 (absorptive) as the surrounding lands are primarily agricultural. Ground absorption areas were set locally in the model as necessary. Lake Ontario and paved roads were set with a ground absorption of 0 (perfectly reflective) while gravel areas were set with a ground absorption of 0.3.
- **Global meteorology**: the temperature and relative humidity were set to 10°C and 70%, respectively. The ISO 9613-2 standard assumes a moderate downwind condition for all receptors.

- **Surface absorption**: reflective characteristics of building surfaces were set with the Cadna-A "Structured Façade" setting, which applies an absorption coefficient of 0.37 (or 2 dB reflection loss).

2.3.3.2 Temperature Inversions

As three of the receptor locations are located across Lake Ontario from the NGS Expansion (POR4, POR6 and POR7), the calculations were further adjusted to account for the possibility of a strong temperature inversion over the water surface[4]. The ISO 9613-2 standard calculation takes moderate temperature inversion conditions, such as those that may occur over land, into consideration, but does not account for stronger inversion conditions that may occur over water. As such, the results for POR4, POR6 and POR7 have been adjusted using a method derived for Concawe[5] [14] to evaluate meteorological conditions of greater complexity than the default Cadna-A settings based strictly on ISO 9613-2. The Concawe reference document includes octave band adjustments that have been developed for six different meteorological categories, ranging from temperature lapse conditions to temperature inversion conditions. For the calculations supporting this assessment, the octave band adjustments for a stable atmosphere were applied, representing a strong temperature inversion (Category 6). These adjustments were applied to the octave band outputs from Cadna-A for receptors POR4, POR6 and POR7, which were then re-summed to provide overall adjusted sound level predictions for comparison to the assessment criteria.

2.3.3.3 Noise Control

As noted above, ongoing noise modelling of the NGS Expansion was completed throughout the design phase by the design engineers Burns & McDonnell. The noise modelling indicated that noise control measures would be required in order to meet the compliance requirements at all sensitive PORs. These measures included a silencer and noise mitigation for the inlet air duct and elbow to the combustion turbine, a silencer and an acoustic barrier around the bottom portion of the stack cylinder for the main exhaust stack from the combustion turbine, and three acoustic barriers.

The silencers and noise mitigation for the inlet air duct and exhaust stack have been designed into the system by the combustion turbine manufacturer and are included in the sound power levels for the inlet duct, stack outlet, and stack cylinder. One of the planned acoustic barriers is located on the east side of the combustion turbine, between the combustion turbine and the electrical equipment buildings (018 and 019). A second acoustic barrier is located south of the electrical equipment buildings, on the east side of the air-cooled heat exchanger, and the third acoustic barrier is located on the east side of the enhanced cooling air cooler. A plan view of the planned acoustic barriers is provided in **Figure 3**. The barrier adjacent to the combustion turbine generator is 53.5 m in length and 18.3 m in height and includes improved acoustic absorption on the side facing the combustion turbine generator (absorption coefficient of 0.6, or 4 dB reflection loss). The

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[4] *A temperature inversion occurs when a layer of warm air sits over a layer of cool air at the surface and typically occurs at night or in the early morning under calm meteorological conditions. Regarding noise, the warm layer causes sound waves that would otherwise disperse into the atmosphere to bend back down toward the surface and thereby propagate further than would otherwise occur. This might cause a noise source at a great distance to be audible at a given location when it would otherwise not be under normal meteorological conditions.*

[5] *Concawe is a European environmental research organisation.*

barrier adjacent to the air-cooled heat exchanger is 38.0 m in length and 11.0 m in height and also has improved acoustic absorption on the side facing the heat exchanger (absorption coefficient of 0.6, or 4 dB reflection loss). The barrier adjacent to the enhanced cooling air cooler is 9.0 m in length and 3.1 m in height.

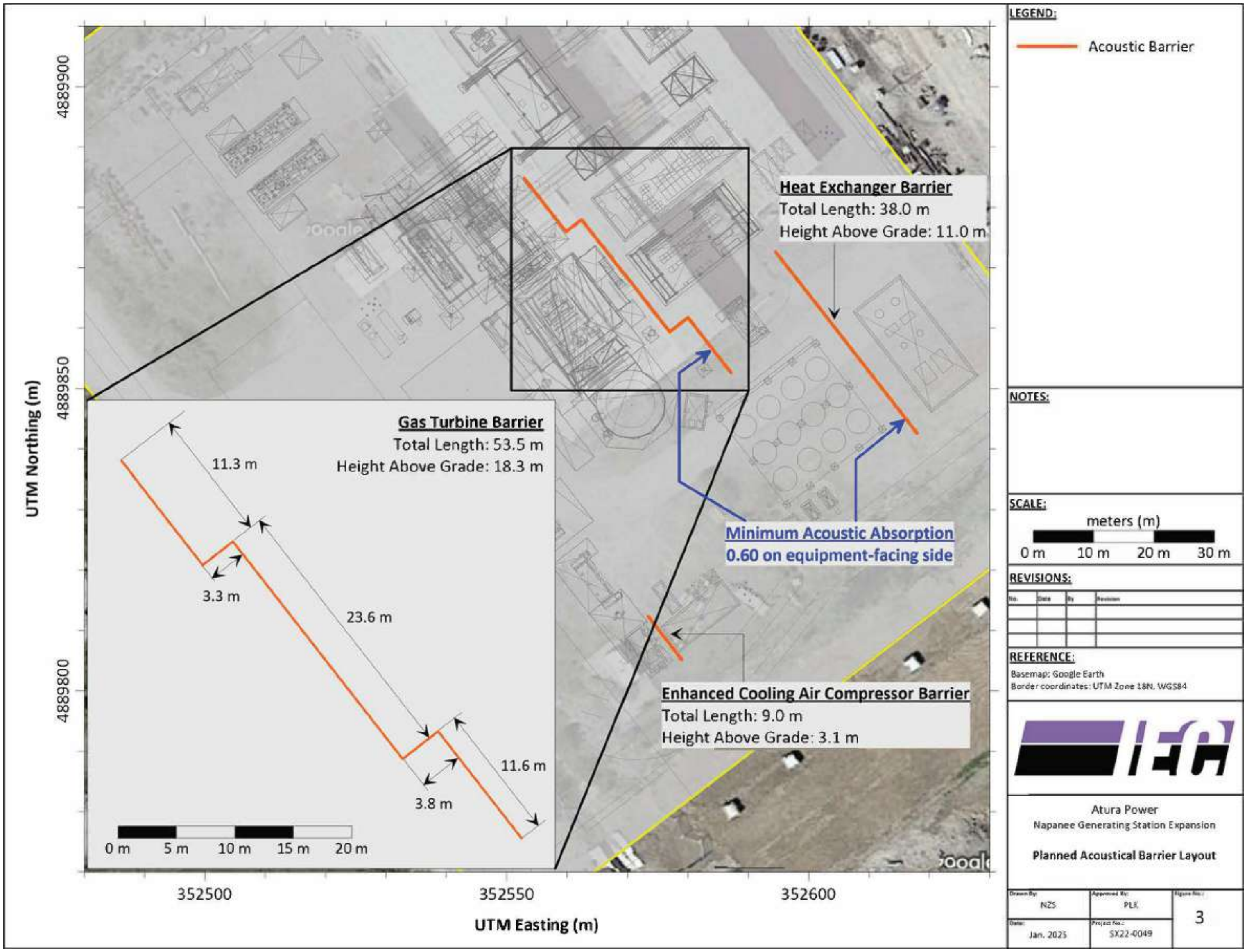

Figure 3: Acoustic Barrier Layout

2.4 Analytical Methods (Construction)

Construction of the NGS Expansion will utilise regular construction methods typical of large-scale construction projects. As noted in **Section 2.1.1.2**, the MECP does not regulate construction noise for regulatory purposes. Construction noise is instead governed by the local municipal by-law, which does not contain any quantitative assessment criteria. As such, best practices for controlling noise from construction have been summarised in **Section 4.2.2** and will be implemented for the construction phase.

The presence of the construction workforce in a rural environment may cause noticeable increases in road traffic noise in the area outside of the construction site itself during shift changes. The projected traffic noise levels have been modelled as part of this assessment to better understand the potential increase. The sound levels associated with the construction workforce have been estimated using the MECP traffic noise model STAMSON, which is based on the Ontario Road Noise Analysis Method for Environment and Transportation (ORNAMENT) [15]. The sound levels due to road noise account for three classes of vehicles, as follows:

- **Automobiles**: all vehicles having two axles and four wheels designed primarily for the transportation of nine or fewer passengers or the transportation of cargo (e.g., vans and light trucks). Generally, the gross vehicle weight is less than 4,500 kilograms (kg).
- **Medium Trucks**: all vehicles having two axles and six wheels designed for the transportation of cargo. Generally, the gross vehicle weight is greater than 4,500 kg but less than 12,000 kg.
- **Heavy Trucks**: All vehicles having three or more axles designed for the transportation of cargo. Generally, the gross vehicle weight is greater than 12,000 kg.

Key parameters utilised by STAMSON in the calculation of road noise include vehicle speed, road surface, topography gradient, ground surface conditions (absorptive or reflective), angle of exposure, and the presence or absence of sound barriers. The results of the construction traffic noise assessment are provided in **Section 4.1.2**.

3. Existing Conditions

Background sound levels were measured prior to the construction of the existing NGS at the four closest sensitive receptor locations (POR1 to POR4) to the NGS site in 2012 and 2013, in support of the 2014 NGS ERR. These background sound levels were representative of contributions from local traffic (e.g., Highway 33, County Road 21), existing industry (e.g., Lennox GS, Lafarge Bath Cement Plant), and sounds of nature (e.g., wave noise from Lake Ontario). The natural sounds and sound levels from industry that existed prior to the NGS commencing operation are not expected to have changed significantly since the monitoring was completed, while the sound level contribution from local traffic to the ambient conditions is expected to have increased. As a conservative measure, the ambient conditions established in 2012 and 2013 have been carried forward for this assessment. The details of the monitoring program and the results of the monitoring are summarised in the following sections.

3.1 Monitoring Program Details

Background sound levels were logged on a continuous 15-minute Leq basis using Larson Davis 831 Type 1 sound level meters over the following periods:

- November 8 to 14, 2012, at POR1 and POR3,
- July 20 to September 11, 2013, at POR1, POR2 and POR3, and
- November 1 to December 4, 2013, at POR4.

The sound level meters and the precision acoustic calibrator (Larson Davis Model CAL200) were each calibrated to National Institute of Standards and Technology (NIST) standards in a certified laboratory prior to use, and were each within the valid calibration period at the time of deployment. The sound level meters were field calibrated at the beginning and end of each measurement period using the CAL200 to ensure accuracy. The microphones were each mounted on tripods and covered with environmental enclosures (wind screens) to reduce wind noise over the microphone and to prevent damage from rain. The enclosures were also equipped with bird spikes to minimise interference from birds.

A Davis Vantage Vue weather station was commissioned at POR3 (November 2012 and July to September 2013) and POR4 (November 2013) to collect temperature, relative humidity, rainfall and wind speed data for further use in the data validation and analysis process. The weather station was configured to record these meteorological parameters on a 15-minute basis to align with the sound level measurement logging period for direct comparison. Meteorological data from the temporary weather station compared favourably with the nearby Environment Canada climate station located at Kingston Airport. The meteorological data was used to remove any sound level data collected under unrepresentative conditions from the data sets prior to summarising in accordance with MECP procedures and operating constraints from the equipment manufacturer. The meteorological parameters used to validate the data set are summarised in **Table 4**.

Table 4: Summary of Meteorological Boundary Conditions

Parameter	Lower Limit	Upper Limit
Temperature (1)	-40°C	+70°C
Relative Humidity (1)	25%	90%
Rainfall	No rainfall permissible (2)	
Wind Speed	N/A	25 km/hr (2)

Notes:
(1) Larson Davis 831 operator manual
(2) MECP Publication NPC-103

3.2 Ontario MECP Sound Level Limits

As noted in **Section 2.1.1**, ambient sound level monitoring data may be used to assist in determining the applicable sound level limit at a sensitive receptor location in accordance with NPC-300. If the minimum measured one-hour Leq is higher than the associated exclusionary limit shown in **Table 1**, then the measured level may be applied as the sound level limit instead of the exclusionary limit. A comparison of the minimum one-hour Leq values with the exclusionary limits completed in support of the 2014 NGS ERR, summarised in **Table 5**, indicated that the exclusionary limits apply at each receptor location.

Table 5: Minimum One-Hour Background Sound Levels

Receptor	Time of Day	Minimum One-Hour Leq (dBA)	MECP Exclusionary Limit (dBA)	Appropriate Sound Level Limit (dBA)
POR1	Day	36.3	45	45
	Evening/Night	31.2	40	40
POR2	Day	39.0	45	45
	Evening/Night	24.9	40	40
POR3	Day	39.6	45	45
	Evening/Night	26.6	40	40
POR4	Day	33.2	45	45
	Evening/Night	25.6	40	40

3.3 Statistical Analysis

The 2014 ERR for NGS included a statistical analysis of the monitoring data for purposes of establishing the existing conditions for comparison of incremental increases in sound level. The

Leq and sound level exceeded for 90% of a given time period (L90) measured at each of the receptors over the three monitoring campaigns were calculated and are presented in **Table 6**. These levels are presented as the period Leq and period L90, which provide a time-integrated “average” value across all the valid 15-minutes measurements taken during the monitoring period (i.e., 128 hours in November 2012; 889 hours in July-September 2013; 454 hours in November 2013). For the purpose of this assessment the lowest L90 sound level measured at each of the PORs was used to establish existing background conditions. The use of ambient conditions established in 2012 and 2013 (prior to construction of the NGS) is considered a conservative approach for the assessment.

Table 6: Summary of Existing Conditions

Receptor	Time of Day	Campaign	Period Leq (dBA)	Period L90 (dBA)	Existing Condition for Assessment (dBA)
POR1	Day	Nov. 2012	53.2	50.1	43.8
		Jul. to Sept. 2013	49.1	43.8	
	Evening/Night	Nov. 2012	48.5	45.7	43.6
		Jul. to Sept. 2013	46.9	43.6	
POR2	Day	Jul. to Sept. 2013	53.2	41.3	41.3
	Evening/Night	Jul. to Sept. 2013	46.8	43.6	43.6
POR3 (1)	Day	Nov. 2012	51.7	47.2	43.7
		Jul. to Sept. 2013	53.4	43.7	
	Evening/Night	Nov. 2012	46.0	41.4	41.4
		Jul. to Sept. 2013	50.0	43.6	
POR4 (2)	Day	Nov. to Dec. 2013	56.9	53.6	53.6
	Evening/Night	Nov. to Dec. 2013	56.4	54.1	54.1

Note:
(1) Value at POR3 assumed to apply at POR5 (adjacent property).
(2) Value at POR4 assumed to apply at POR6 and POR7 (similar waterfront setting).

4. Potential Effects, Mitigation Measures, Net Effects

4.1 Potential Effects

4.1.1 Operations

The following sections summarise the results of the noise modelling completed to predict the sound levels associated with the operation of the NGS Expansion. The results summarised in **Section 4.1.1.1** are for the full spectrum (broadband) sound output of the NGS Expansion sources operating simultaneously with the existing worst-case operations at the existing NGS. The results in **Section 4.1.1.2** are for the assessment of LFN as described in **Section 2.1.4** (i.e., focusing only on sounds less than 100 Hz and the potential for noise-induced vibrations).

4.1.1.1 Broadband Noise

The results of the predictive modelling for operations as summarised in **Section 2.3** are presented in **Table 7** and **Table 8**. The results in **Table 7** summarise the predicted sound levels with the expansion sources operating simultaneously with the existing NGS facility in both normal operations and in start-up conditions. The results in **Table 8** show the predicted sound levels at the receptor locations solely associated with the operation of the emergency generator. As noted in **Section 2.1.1.1**, emergency equipment is assessed in isolation from the non-emergency equipment at the site. An additional summary table (**Table 9**) has been provided to show the predicted impact of the NGS Expansion operating in isolation from the existing NGS facility; however, it is reiterated that this is not the worst-case scenario – it is provided for information purposes to demonstrate the predicted impact of the expansion when operating by itself. Compliance with the assessment criteria is evaluated using the results in **Table 7** and **Table 8**.

Table 7: Predicted Sound Levels at PORs – NGS Expansion with Existing NGS in Normal and Start-up Modes

POR ID	POR Description	Time of Day	Sound Level at POR (1-hr L_{eq}, dBA)		Performance Limit (1-hr L_{eq}, dBA)	Compliance with Limit (Y/N)
			Normal	Start-up		
Outdoor Points of Reception						
POR1a	House - Yard	All	40	40	40	Y
POR2a	House - Yard	All	34	34	40	Y
POR3a	House - Yard	All	40	40	40	Y
POR4a(1)	House - Yard	All	39	39	40	Y
POR6a(1)	House - Yard	All	29	29	40	Y

POR ID	POR Description	Time of Day	Sound Level at POR (1-hr L_{eq}, dBA)		Performance Limit (1-hr L_{eq}, dBA)	Compliance with Limit (Y/N)
			Normal	Start-up		
POR7a(1)	House - Yard	All	35	35	40	Y
Plane of Window Points of Reception						
POR1b	House - Façade	All	40	40	40	Y
POR2b	House - Façade	All	35	35	40	Y
POR3b	House - Façade	All	40	40	40	Y
POR4b(1)	House - Façade	All	37	38	40	Y
POR5	House - Façade	All	40	40	40	Y
POR6b(1)	House - Façade	All	30	31	40	Y
POR7b(1)	House - Façade	All	38	39	40	Y

Notes:
(1) sound level predictions at POR4, POR6 and POR7 include meteorological adjustments from Concawe [14] for a Category 6 condition, which is intended to account for elevated sound conditions due to a strong temperature inversion over the lake.

Table 8: Predicted Sound Levels at PORs – NGS Expansion Emergency Scenario

POR ID	POR Description	Time of Day	Sound Level at POR (1-hr Leq, dBA)	Performance Limit (1-hr Leq, dBA)	Compliance with Limit (Y/N)
Outdoor Points of Reception					
POR1a	House - Yard	All	3	45	Y
POR2a	House - Yard	All	0	45	Y
POR3a	House - Yard	All	15	45	Y
POR4a(1)	House - Yard	All	20	45	Y
POR6a(1)	House - Yard	All	4	45	Y
POR7a(1)	House - Yard	All	11	45	Y
Plane of Window Points of Reception					
POR1b	House - Façade	All	3	45	Y

POR ID	POR Description	Time of Day	Sound Level at POR (1-hr Leq, dBA)	Performance Limit (1-hr Leq, dBA)	Compliance with Limit (Y/N)
POR2b	House - Façade	All	0	45	Y
POR3b	House - Façade	All	14	45	Y
POR4b(1)	House - Façade	All	18	45	Y
POR5	House - Façade	All	12	45	Y
POR6b(1)	House - Façade	All	8	45	Y
POR7b(1)	House - Façade	All	16	45	Y

Notes:
(1) sound level predictions at POR4, POR6 and POR7 include meteorological adjustments from Concawe [14] for a Category 6 condition, which is intended to account for elevated sound conditions due to a strong temperature inversion over the lake.

Table 9: Predicted Sound Levels at PORs – NGS Expansion Alone

POR ID	POR Description	Time of Day	Sound Level at POR (1-hr Leq, dBA)	Performance Limit (1-hr Leq, dBA)	Compliance with Limit (Y/N)
Outdoor Points of Reception					
POR1a	House - Yard	All	37	40	Y
POR2a	House - Yard	All	31	40	Y
POR3a	House - Yard	All	30	40	Y
POR4a(1)	House - Yard	All	34	40	Y
POR6a(1)	House - Yard	All	26	40	Y
POR7a(1)	House - Yard	All	32	40	Y
Plane of Window Points of Reception					
POR1b	House - Façade	All	37	40	Y
POR2b	House - Façade	All	31	40	Y
POR3b	House - Façade	All	29	40	Y

POR ID	POR Description	Time of Day	Sound Level at POR (1-hr Leq, dBA)	Performance Limit (1-hr Leq, dBA)	Compliance with Limit (Y/N)
POR4b(1)	House - Façade	All	33	40	Y
POR5	House - Façade	All	30	40	Y
POR6b(1)	House - Façade	All	27	40	Y
POR7b(1)	House - Façade	All	35	40	Y

Notes:
(1) sound level predictions at POR4, POR6 and POR7 include meteorological adjustments from Concawe [14] for a Category 6 condition, which is intended to account for elevated sound conditions due to a strong temperature inversion over the lake.

In terms of incremental increases in sound level over background conditions, three scenarios were evaluated: 1) the NGS Expansion compared to measured background (i.e., from **Table 6**, without the existing NGS facility operating), 2) the NGS Expansion compared to background that is inclusive of the existing NGS, and 3) the NGS Expansion and existing NGS operating simultaneously compared to measured background from **Table 6**. Scenarios 1 and 2 demonstrate how the NGS Expansion alone influences existing background sound levels (i.e., with and without the existing NGS operating). Scenario 3 represents the worst-case scenario of both facilities operating simultaneously compared to neither facility operating. The results are summarised in **Table 10**, **Table 11** and **Table 12**.

Table 10: Incremental Analysis Scenario 1 (NGS Expansion vs. Measured Background)

POR ID	POR Description	Background Sound Level (L90, dBA)		Predicted NGS Expansion (Leq, dBA)		Total Predicted Sound Level (dBA)		Increment	
		Day	Night	Day	Night	Day	Night	Day	Night
Outdoor Points of Reception									
POR1a	House - Yard	43.8	43.6	37.4	37.4	44.7	44.5	0.9	0.9
POR2a	House - Yard	41.3	43.6	30.7	30.7	41.7	43.8	0.4	0.2
POR3a	House - Yard	47.2	41.4	29.5	29.5	47.3	41.7	0.1	0.3
POR4a(1)	House - Yard	53.6	54.1	34.1	34.1	53.6	54.1	0.0	0.0
POR6a(1)	House - Yard	53.6	54.1	25.8	25.8	53.6	54.1	0.0	0.0

POR ID	POR Description	Background Sound Level (L90, dBA)		Predicted NGS Expansion (Leq, dBA)		Total Predicted Sound Level (dBA)		Increment	
		Day	Night	Day	Night	Day	Night	Day	Night
POR7a(1)	House - Yard	53.6	54.1	32.4	32.4	53.6	54.1	0.0	0.0
Plane of Window Points of Reception									
POR1b	House - Façade	43.8	43.6	37.3	37.3	44.7	44.5	0.9	0.9
POR2b	House - Façade	41.3	43.6	31.2	31.2	41.7	43.8	0.4	0.2
POR3b	House - Façade	47.2	41.4	29.2	29.2	47.3	41.7	0.1	0.3
POR4b(1)	House - Façade	53.6	54.1	32.6	32.6	53.6	54.1	0.0	0.0
POR5	House - Façade	47.2	41.4	29.7	29.7	47.3	41.7	0.1	0.3
POR6b(1)	House - Façade	53.6	54.1	27.1	27.1	53.6	54.1	0.0	0.0
POR7b(1)	House - Façade	53.6	54.1	35.5	35.5	53.7	54.2	0.1	0.1

Notes:
(1) sound level predictions at POR4, POR6 and POR7 include meteorological adjustments from Concawe [14] for a Category 6 condition, which is intended to account for elevated sound conditions due to a strong temperature inversion over the lake.

Table 11: Incremental Analysis Scenario 2 (NGS Expansion vs. Measured Background + Existing NGS)

POR ID	POR Description	Background Sound Level (dBA)(1)		Predicted NGS Expansion (L_{eq}, dBA)		Total Predicted Sound Level (dBA)		Increment	
		Day	Night	Day	Night	Day	Night	Day	Night
Outdoor Points of Reception									
POR1a	House - Yard	44.5	44.3	37.4	37.4	45.2	45.1	0.8	0.8
POR2a	House - Yard	41.7	43.8	30.7	30.7	42.0	44.0	0.3	0.2
POR3a	House - Yard	47.8	43.4	29.5	29.5	47.9	43.6	0.1	0.2
POR4a(2)	House - Yard	53.7	54.2	34.1	34.1	53.8	54.2	0.0	0.0
POR6a(2)	House - Yard	53.6	54.1	25.8	25.8	53.6	54.1	0.0	0.0
POR7a(2)	House - Yard	53.6	54.1	32.4	32.4	53.7	54.2	0.0	0.0
Plane of Window Points of Reception									
POR1b	House - Façade	44.5	44.3	37.3	37.3	45.2	45.1	0.8	0.8

POR ID	POR Description	Background Sound Level (dBA)[1]		Predicted NGS Expansion (L_{eq}, dBA)		Total Predicted Sound Level (dBA)		Increment	
		Day	Night	Day	Night	Day	Night	Day	Night
POR2b	House - Façade	41.8	43.9	31.2	31.2	42.2	44.2	0.4	0.2
POR3b	House - Façade	47.8	43.4	29.2	29.2	47.9	43.6	0.1	0.2
POR4b[2]	House - Façade	53.7	54.2	32.6	32.6	53.7	54.2	0.0	0.0
POR5	House - Façade	47.9	43.7	29.7	29.7	48.0	43.9	0.1	0.2
POR6b[2]	House - Façade	53.6	54.1	27.1	27.1	53.6	54.1	0.0	0.0
POR7b[2]	House - Façade	53.7	54.2	35.5	35.5	53.7	54.2	0.1	0.1

Notes:
(1) Inclusive of the measured background (L90) and the predicted sound level from the existing NGS facility under start-up conditions.
(2) sound level predictions at POR4, POR6 and POR7 include meteorological adjustments from Concawe [14] for a Category 6 condition, which is intended to account for elevated sound conditions due to a strong temperature inversion over the lake.

Table 12: Incremental Analysis Scenario 3 (NGS Expansion and Existing NGS vs. Measured Background)

POR ID	POR Description	Background Sound Level (L90, dBA)		Prediction NGS (Start-up) + Expansion (Leq, dBA)		Total Predicted Sound Level (dBA)		Increment	
		Day	Night	Day	Night	Day	Night	Day	Night
Outdoor Points of Reception									
POR1a	House - Yard	43.8	43.6	39.8	39.8	45.3	45.1	1.5	1.5
POR2a	House - Yard	41.3	43.6	33.9	33.9	42.0	44.0	0.7	0.4
POR3a	House - Yard	47.2	41.4	39.7	39.7	47.9	43.6	0.7	2.2
POR4a[1]	House - Yard	53.6	54.1	39.4	39.4	53.8	54.2	0.2	0.1
POR6a[1]	House - Yard	53.6	54.1	29.2	29.2	53.6	54.1	0.0	0.0
POR7a[1]	House - Yard	53.6	54.1	35.3	35.3	53.7	54.2	0.1	0.1
Plane of Window Points of Reception									
POR1b	House - Façade	43.8	43.6	39.7	39.7	45.2	45.1	1.4	1.5
POR2b	House - Façade	41.3	43.6	35.0	35.0	42.2	44.2	0.9	0.6
POR3b	House - Façade	47.2	41.4	39.5	39.5	47.9	43.6	0.7	2.2

POR ID	POR Description	Background Sound Level (L90, dBA)		Prediction NGS (Start-up) + Expansion (Leq, dBA)		Total Predicted Sound Level (dBA)		Increment	
		Day	Night	Day	Night	Day	Night	Day	Night
POR4b[1]	House - Façade	53.6	54.1	37.7	37.7	53.7	54.2	0.1	0.1
POR5	House - Façade	47.2	41.4	40.2	40.2	48.0	43.9	0.8	2.5
POR6b(1)	House - Façade	53.6	54.1	30.7	30.7	53.6	54.1	0.0	0.0
POR7b(1)	House - Façade	53.6	54.1	38.6	38.6	53.7	54.2	0.1	0.1

Notes:
(1) sound level predictions at POR4, POR6 and POR7 include meteorological adjustments from Concawe [14] for a Category 6 condition, which is intended to account for elevated sound conditions due to a strong temperature inversion over the lake.

The results in **Table 10** indicate that if the NGS Expansion were operating in the absence of the existing NGS, the sound levels at the receptors would increase over the measured background condition by less than 1 dBA. The maximum predicted increase was +0.9 dBA at POR1. The results in **Table 11** describe a scenario in which the background sound level is inclusive of the existing NGS operations and shows how these sound levels change with the activation of the NGS Expansion sources. The results indicate that the expansion would result in an incremental increase of less than 1 dBA, with the maximum predicted increase being +0.8 dBA at POR1. For the worst-case condition of both the existing NGS and NGS Expansion being compared to the measured background conditions, summarised in **Table 12**, the incremental increase was less than 3 dBA at all receptors. The maximum predicted increment was +2.5 dBA at POR5. Based in the increments shown in **Table 3**, this is expected to be an imperceptible increase.

It should be noted that there will be hourly periods where the background sound levels will be less than the measured L90 for the monitoring period. **Table 5** indicates that hourly sound levels may be as low as 33 dBA in the daytime and 26 dBA at night. The frequency of these periods is relatively low; however, during these lower background noise periods, the facilities operating simultaneously will be more likely to be audible.

To show the acoustic footprint of the NGS Expansion, a receptor grid was established in the prediction software and predictions across the grid were used to develop sound level contour plots, which are provided in **Figure 4** to **Figure 6**. Note that the Concawe adjustments for a strong temperature inversion over the water were added to the receptor predictions outside of the model and so could not be accounted for within the contour plots. The contour plots therefore depict the sound levels as calculated strictly in accordance with ISO 9613-2. The overall predicted levels at the receptor locations should be referenced from **Table 7** and **Table 8**.

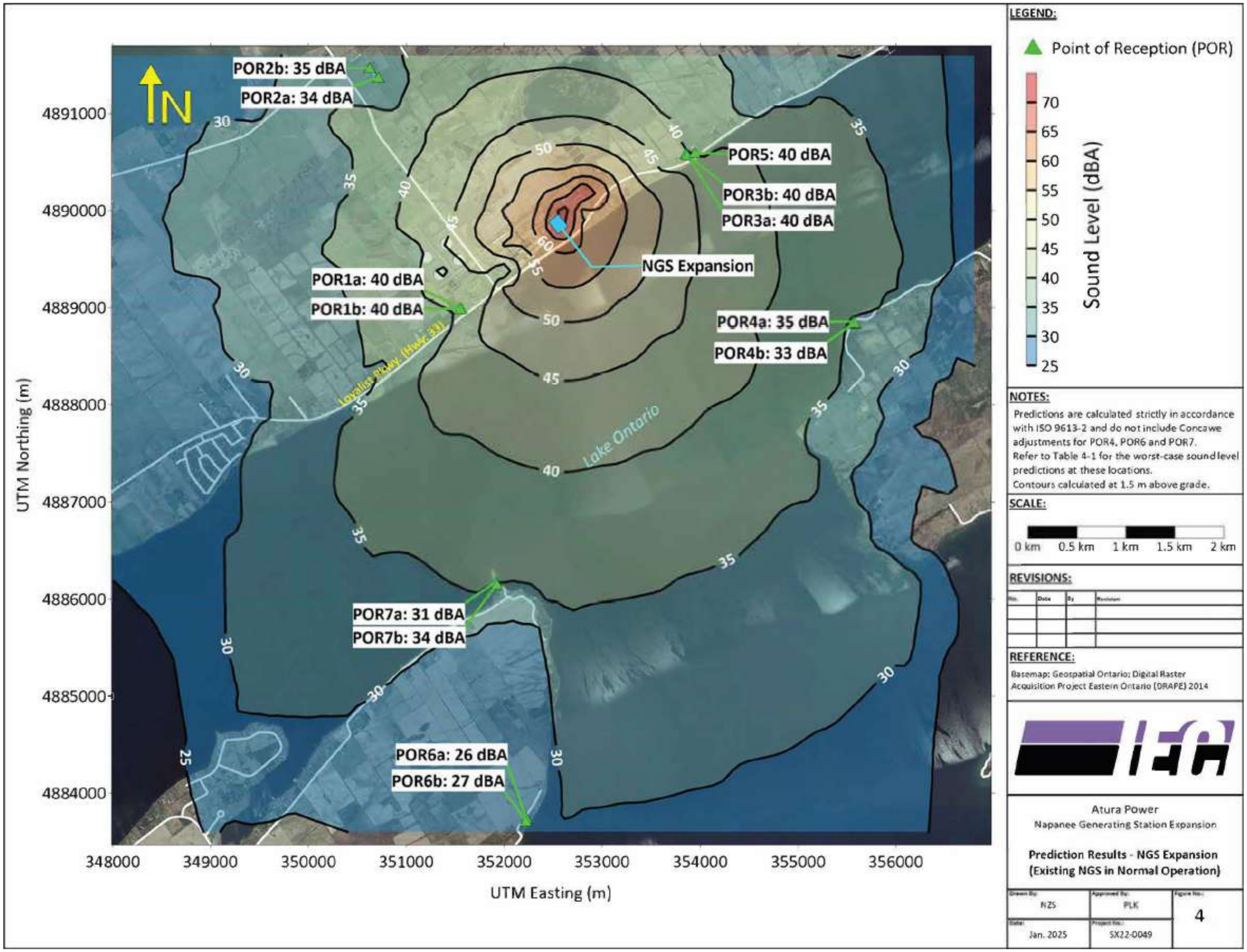

Figure 4: Prediction Results – NGS Expansion (Existing NGS in Normal Operations)

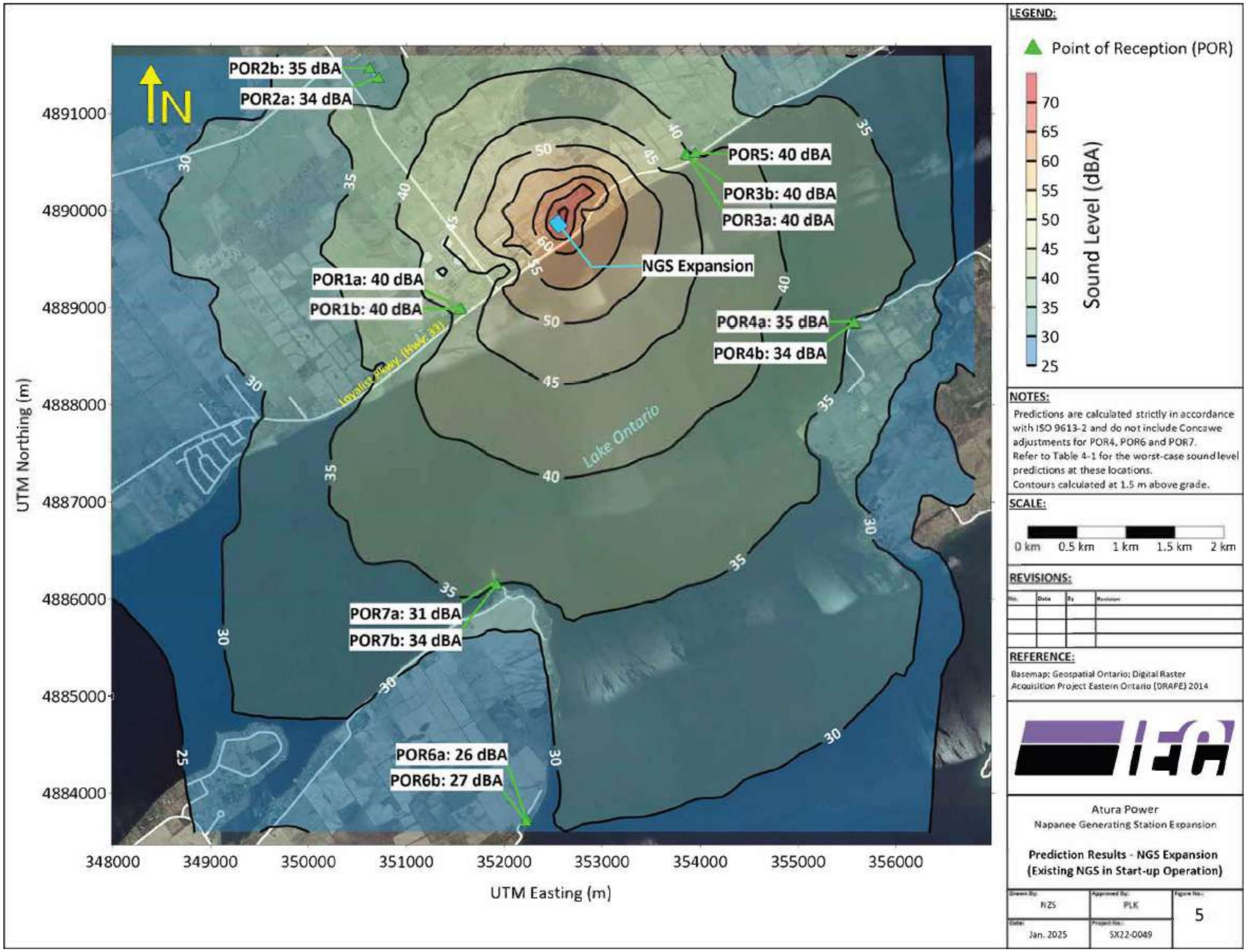

Figure 5: Prediction Results – NGS Expansion (Existing NGS in Start-up Operations)

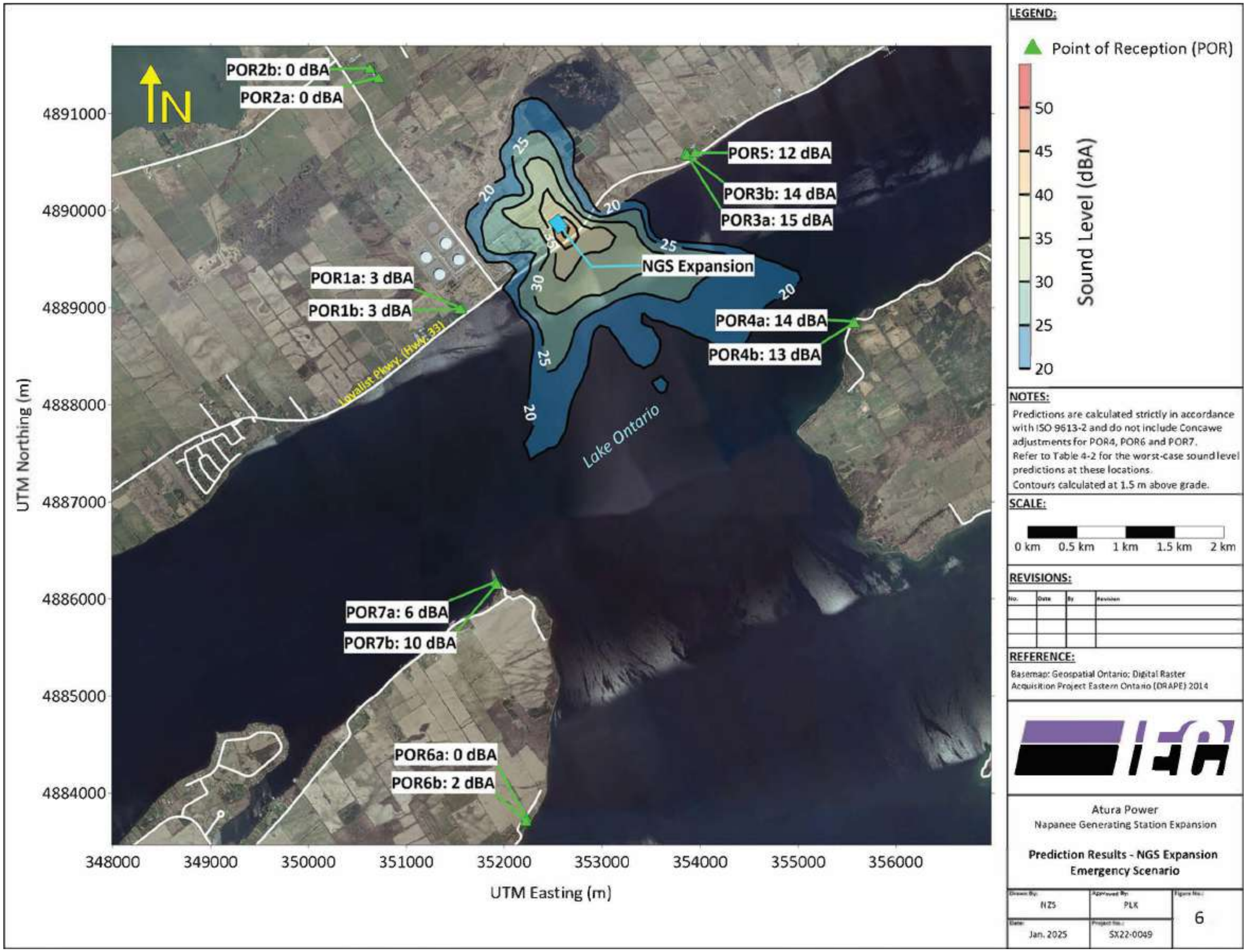

Figure 6: Prediction Results – NGS Expansion Emergency Scenario

4.1.1.2 Low Frequency Noise

It is standard practice to assess the environmental noise impacts to humans using the A-weighted decibel, which is calculated specifically to represent the perceived loudness of sound across all audible frequencies. The human ear generally does not perceive sound clearly at the low and high ends of the audible frequency spectrum and so these are de-emphasised in A-weighting. However, there may be impacts from sound outside the context of a human's ability to perceive it, making the A-weighted decibel of limited use in such instances. Examples of this include sound waves inducing vibrations in lighter building components (e.g., windows) or sound-induced vibrations in the body that can be felt while the sound remains inaudible. Noise-induced vibration is an effect typically associated with LFN. As noted in **Section 2.1.4**, a method from ANSI has been applied to predict the potential for LFN noise-induced vibration effects which involves comparing the energy sum of predicted sound pressure levels at the point of reception in the frequency bands less than 100 Hz and comparing the result to 70 dB (linear decibels, not A-weighted decibels) [7]. This approach is also recommended by Health Canada [16]. The results of the assessment are summarised in **Table 13**.

Table 13: Low Frequency Noise Assessment

Receptor ID	Predicted Sound Pressure Level <100 Hz (dB)		ANSI Criteria (dB)
	NGS Expansion with Existing NGS in Normal Operations	NGS Expansion with Existing NGS in Start-up Operations	
POR1a	65.7	65.7	70
POR1b	65.6	65.6	70
POR2a	62.3	62.2	70
POR2b	63.6	63.5	70
POR3a	64.7	64.6	70
POR3b	64.7	64.7	70
POR4a	60.7	60.7	70
POR4b	60.6	60.7	70
POR5	64.3	64.3	70
POR6a	56.4	56.4	70
POR6b	56.3	56.4	70
POR7a	60.1	60.1	70
POR7b	59.9	60.0	70

According to the above table, there are no predicted noise-induced vibration impacts from the project as all predicted values are less than the adopted ANSI criteria of 70 dB. The maximum predicted total sound pressure level for available frequency bands below 100 Hz was 65.7 dB at POR1a for both operating scenarios.

4.1.2 Construction

The site construction period is expected to extend for 26 months from Q3 2025 to Q4 2027, as outlined in **Table 14**. All work is expected to be completed using conventional construction methods. Construction activities are generally expected to occur during the daytime; however, there will be some specific construction activities that are completed at night or on a continuous basis, for example such as setting of critical and large equipment or concrete pouring of major foundations. In all cases, these activities will comply with the relevant municipal by-law restrictions (as appropriate).

Construction noise will be generated by activities such as general site grading, drilled shaft installation (including rock drilling), foundation and buried utility work, site servicing, and worker vehicular movements during site preparation, aboveground construction, and underground construction. It should be noted that there will be no blasting completed as part of the construction undertaking. Overall, it is expected that the construction noise will be less than the operational noise scenario.

Table 14: Timing of Construction Activities

Construction Activity	Timing of Activity
Site Preparation	Months 1 – 3
Underground Construction (foundations and utilities)	Months 2 – 8
Aboveground Construction	Months 8 – 21
Commissioning	Months 19 – 26

In terms of the workforce, the peak construction traffic demand is expected to run for about 12 months during 2026. The first day shift is assumed to run from 7:00 a.m. until 5:00 p.m. The second shift, which is generally only required during peak construction and commissioning or special activities (if required), is assumed to be from 4:00 p.m. until 1:00 a.m. Assuming workers arrive and depart in the hour proceeding and following their shift, the peak hour periods for forecasting background traffic will be from 6:00 a.m. to 8:00 a.m. to cover worker and administrative employees and from 3:00 p.m. until 5:00 p.m. to cover the afternoon shift change. The departing workers at 1:00 a.m. were not considered in the analyses because of the relatively low traffic volumes associated with that shift.

Summaries of the peak hourly and peak daily traffic volumes during construction are provided in **Table 15** and **Table 16**, respectively. Also included in these tables is the estimated baseline traffic and the predicted increase in sound level between the baseline and construction scenarios. The baseline traffic volumes on Highway 33 were derived by calculating an average annual growth rate from historic annual average daily traffic (AADT) data from the Ontario Ministry of Transportation

(MTO) [17] and applying it to data from the most recent year to predict totals for the construction year of 2026. The truck totals were derived using standard percentages from the MTO for highways (13%, comprised of 8% heavy trucks and 5% medium trucks) [18]. For County Road 21, the baseline traffic volumes from the 2014 Traffic Assessment were prorated to 2026 using the average annual growth rate calculated as noted above from Highway 33. Atura Power estimates that there will be a total of 250 vehicles accessing the site daily during construction. This total was divided proportionally onto the various roads using the construction workforce traffic totals from the 2014 TSD. The predicted increments during the maximum hour and day are considered to be imperceptible based on the criteria in **Table 3**.

Table 15: Construction Traffic Volumes and Predicted Incremental Sound Levels (Hourly)

Parameter	to/from East (Hwy. 33)				to/from North (County Rd. 21)				to/from West (Hwy. 33)			
	Cars	Med. Truck	Hvy. Truck	Total	Cars	Med. Truck	Hvy. Truck	Total	Cars	Med. Truck	Hvy. Truck	Total
Estimated Baseline Maximum Hourly Traffic (2026)	62	2	4	68	90	8	4	102	138	6	12	155
Estimated Construction Maximum Hourly Traffic (2026)	3	0	0	3	41	4	1	46	49	5	2	56
Total Baseline + Construction (2026)	65	2	4	71	131	12	5	148	187	11	14	211
% Change due to Construction	5%	0%	0%	4%	45%	47%	28%	45%	35%	84%	17%	36%
Predicted change in sound level due to construction traffic	+0.1 dBA				+1.4 dBA				+1.1 dBA			

Table 16: Construction Traffic Volumes and Predicted Incremental Sound Levels (Daily)

Parameter	to/from East (Hwy. 33)				to/from North (County Rd. 21)				to/from West (Hwy. 33)			
	Cars	Med. Truck	Hvy. Truck	Total	Cars	Med. Truck	Hvy. Truck	Total	Cars	Med. Truck	Hvy. Truck	Total
Estimated Baseline Daily Traffic (2026)	1,184	68	109	1,361	1,230	136	53	1,418	2,335	134	215	2,684
Estimated Construction Daily Traffic (2026)	7	1	0	8	89	15	6	110	107	18	7	132
Total Baseline + Construction (2026)	1,191	69	109	1,369	1,319	151	59	1,528	2,442	152	222	2,816
% Change due to Construction	1%	1%	0%	1%	7%	11%	11%	8%	5%	13%	3%	5%
Predicted change in sound level due to construction traffic	0 dBA				+0.4 dBA				+0.2 dBA			

4.2 Mitigation Measures

4.2.1 Operations

The results presented in **Section 4.1** do not contain any exceedances of the adopted criteria, as they already account for mitigation measures that were found to be required for the predictions to comply with the regulatory limits from MECP. As discussed in **Section 2.3.2.3**, the mitigation measures that have been accounted for in the analysis presented above include the following:

- One exhaust stack silencer and a noise barrier around the bottom portion of the stack cylinder,
- One inlet air duct silencer and noise mitigation for the duct and elbow
- One acoustic barrier on the east side of the combustion turbine generator (53.5 m length and 18.3 m height),
- One acoustic barrier on the east side of the air-cooled heat exchanger (38.0 m in length and 11.0 m in height), and
- One acoustic barrier on the east side of the enhanced cooling air cooler (9.0 m in length and 3.1 m in height).

A figure showing a plan view of the planned acoustic barriers is provided in **Figure 3**.

4.2.2 Construction

The NGS Expansion will be constructed using best management practices for construction projects, including observance of the relevant MECP model municipal by-law publications [3] [4] and the Town of Greater Napanee noise By-law [6]. In general, the following best practices will be considered to mitigate noise during the construction phase:

- Development of a community complaint and response procedure to address noise and vibration concerns that may arise during the construction phase, including identification of a designated contact person and clear response timelines,
- Use gas- or diesel-powered equipment outfitted with exhaust silencers (mufflers) meeting manufacturer recommendations, and intake silencers (as appropriate), and maintaining these devices in effective working order,
- Complete regular maintenance of all equipment, including lubrication and replacement of worn parts – especially exhaust systems – to minimise noise emissions,
- Select construction equipment and construction methods that produce the least noise for any given task whenever feasible,
- Establish on-site vehicle restrictions, including restrictions on tailgate banging during off-loading, posting and enforcing on-site speed limits of <25 km/hr, and limiting site traffic to established routes,
- Turn off idling equipment when not in use where feasible,

- Maintaining road surfaces to reduce noise from truck movement, including truck bed and tailgate banging,
- Minimising potential for excessive noise generation by staging equipment use and activities, where appropriate, and
- Utilising low-noise reverse alarms (e.g., broadband reverse alarms).

4.3 Net Effects

Following the implementation of best practices and mitigation measures, the effects from noise are anticipated to be negligible.

5. Conclusion

Atura Power is proposing to expand capacity at its NGS through the addition of a natural gas-fuelled simple cycle power generating unit at the existing NGS in Greater Napanee, Ont. The project will be capable of generating a net electrical output of approximately 408.6 MW with the evaporative coolers in operation. The expected net output is derived from the gross output from the combustion turbine generator unit (at reference conditions of 15°C ambient temperature, 60% relative humidity, and 100.3 kPa barometric pressure) minus the auxiliary loads used by the project of approximately 11.2 MW. This report has been developed to support to ERR to identify the potential for noise and vibration effects of the expanded operation using the most up-to-date information on the planned facility.

The assessment framework was largely based on the provincial regulatory regime for the assessment of noise impacts as outlined in MECP Publication NPC-300 "*Environmental Noise Guideline*" [1]. This approach requires the assessment of industrial noise through prediction using software consistent with the ISO 9613-2 calculation method [13]. In order to provide a more conservative assessment, the results of the ISO 9613-2 modelling were further adjusted specifically for sensitive locations that are located across Lake Ontario, in order to account for meteorological conditions that are outside the scope of the ISO 9613-2 standard but may result in higher sound levels at such locations due to strong temperature inversions that can occur over water in calm meteorological conditions. The adjustments were referenced from Concawe [14]. In addition, the assessment included an analysis of potential low frequency noise, which is outside of the assessment scope of NPC-300 but may be associated with combustion turbine generators. Lastly, construction noise has been considered within the context of the municipal noise By-law [6].

Representative PORs were selected as being the most impacted by the facility operations based on the local zoning information, previous work completed in support of noise assessment at the NGS site, and feedback during regulatory and community reviews. Sound level limits were then established at these locations in accordance with Publication NPC-300.

Significant noise sources were identified by the design engineering team, Burns & McDonnell, so that they could complete noise modelling in parallel with the facility design, and include noise controls in the facility design as necessary. The identified sources were characterised using either manufacturer data or engineering calculation methods. The final model of the NGS Expansion was then imported to the existing model of the existing NGS operation, which had already been reviewed and approved by the MECP for regulatory purposes, such that both sites could be assessed under conditions of simultaneous operation.

Sound level calculations due to the worst-case one-hour of planned and predictable operations were modelled using software consistent with the ISO 9613-2 standard, with adjustments as noted above. These results were also used to estimate the potential LFN impacts. The results indicated that the facility is predicted to be in compliance with the established NPC-300 sound level limits and LFN limits at all receptors. The construction workforce is not anticipated to increase local traffic noise levels by a perceptible amount, and a series of construction best practices will be implemented to maintain construction noise as low as feasible.

6. References

[1] Ontario Ministry of the Environment, Conservation and Parks (MECP), Publication NPC-300 Environmental Noise Guideline - Stationary and Transportation Sources - Approval and Planning, Toronto: Ontario MECP, 2013.

[2] Ontario Ministry of the Environment, Conservation and Parks (MECP), Model Municipal Noise Control By-Law: NPC-104 Sound Level Adjustments, Toronto: Government of Ontario, 1978.

[3] Ontario Ministry of the Environment, Conservation and Parks (MECP), "Model Municipal Noise Control By-Law: NPC-115 Construction Equipment," Ontario MECP, Toronto, 1978.

[4] Ontario Ministry of the Environment, Conservation and Parks (MECP), "Model Municipal Noise Control By-Law: NPC-118 Motorized Conveyances," Ontario MECP, Toronto, 1978.

[5] Ontario Ministry of the Environment, Conservation and Parks (MECP), "Model Municipal Noise Control By-Law: NPC-103 Procedures," Ontario MECP, Toronto, 1978.

[6] Town of Greater Napanee, "By-Law No. 2023-0043 A by-law to regulate noise within the Town of Greater Napanee," Town of Greater Napanee, Napanee, 2023.

[7] American National Standards Institute, Inc. (ANSI), "Quantities and procedures for description and measurement of environmental sound - Part 4: Noise assessment and prediction of long-term community response," ANSI, 2005.

[8] Town of Greater Napanee, "By-Law 02-22 The Zoning By-law of the Town of Greater Napanee," Town of Greater Napanee, Town of Greater Napanee, 2020.

[9] Loyalist Township, "By-Law 2001-38 The Zoning By-Law of Loyalist Township," Loyalist Township, Loyalist Township, 2015.

[10] County of Prince Edward, "Comprehensive Zoning By-Law 1816-2006," County of Prince Edward, Picton, 2022.

[11] D. H. C. Bies, Engineering Noise Control Theory and Practice, New York: CRC Press, 2009.

[12] DataKustik GmbH, *Cadna-A Version 2023 MR 2,* 2023.

[13] International Organization for Standardization (ISO), *International Standard 9613-2 Acoustics - Attenuation of sound during propagation outdoors - Part 2: general method of calculation,* Geneva: ISO, 1996.

[14] CONAWE, "the propagation of noise from petroleum and petrochemical complexes to neighbouring communities," CONCAWE, Den Haag, 1981.

[15] Ontario Ministry of the Environment, Conservation and Parks (MECP), "ORNAMENT: Ontario Road Noise Analysis Method for Environment and Transportation Technical Document," Ontario MECP, Toronto, October 1989.

[16] Health Canada, "Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise," Health Canada, Ottawa, 2017.

[17] Ontario Ministry of Transportation (MTO), "Provincial Highways Traffic Volumes 1988-2019, 2022," MTO, 2022.

[18] Ontario Ministry of Transportation (MTO), "Environmental Guide for Noise," MTO, St. Catharines, 2022.

Attachment A

Natural Heritage Impact Assessment Noise Analysis

Atura Power

A.1 Scope

Additional modelling was completed in support of the Natural Heritage Impact Assessment, for locations summarised in **Table A.1**. The noise modelling completed in support of this assessment pertains only to the operations phase of the project, as the construction phase will utilise standard construction methods and noise will be mitigated through the use of best management practices. It is of particular note that construction at the project site will not utilise blasting. For a quantitative assessment during the construction phase, sound levels were estimated for the loudest projected operation, being the rock breaking that is to be completed in lieu of blasting. The results are introduced and summarised in the following sections.

Table A.1: Natural Heritage Receptor Locations

Receptor Name	Receptor Coordinates (UTM 18N, WGS84)	
	X	Y
Terrestrial: Heronry	352661	4890929
Terrestrial: Thicket 1	353024	4890357
Terrestrial: Thicket 2	352828	4890380
Terrestrial: Lakeshore 1	352286	4889341
Terrestrial: Lakeshore 2	353342	4890099

A.2 Construction

The construction activity with the greatest potential noise output is considered to be the rock breaking activity that will be used in place of blasting. Characterisation of this source was based on British Standards Institution (BSI) Standard 5228-1:2009 "*Code of practice for noise and vibration control on construction and open sites – Part 1: Noise*" Table C.5 [1], using line item 6 for a hand-held pneumatic breaker, which has the highest sound level of similar activities in the table. The reference sound pressure level at 10 m and the calculated sound power level for this source is summarised in **Table A.2**. This source was placed in a central location of the project site in the predictive model and was adjusted to account for an acoustic usage of 20% to account for the typical duty cycle. The acoustic usage was referenced from the United States Federal Highway Administration (FHWA) "*Highway Construction Noise Handbook*" [2] for jackhammer and rock drills. The predicted sound levels at the identified locations are summarised in **Table A.3**.

Table A.2: Pneumatic Rock Breaking Sound Level Data

Parameter	Octave Band Centre Frequency (Hz); Sound Level (dB)								Overall	
	63	125	250	500	1000	2000	4000	8000	dB	dBA
Lp at 10 m(1)	90	79	75	78	78	83	91	92	96	95
Lw(2)	118	107	103	106	106	111	119	120	124	123

Notes:
(1) Lp = sound pressure level, in dB re: 20 μPa
(2) Lw = sound power level, in dB re: 10^{-12} W

Table A.3: Construction Prediction Results

Receptor	Octave Band Centre Frequency (Hz); Sound Pressure Level (dB)								Overall	
	63	125	250	500	1000	2000	4000	8000	dB	dBA
Heronry	40.3	23.2	18.2	20.6	20.0	19.3	2.7	-79.2	40.5	24.9
Thicket 1	35.7	15.6	7.8	7.5	7.2	8.4	0.5	-55.7	35.8	14.6
Thicket 2	42.5	23.5	16.4	16.3	14.5	13.8	5.4	-43.4	42.6	21.4
Lakeshore 1	50.0	37.5	33.1	35.5	34.5	36.3	30.1	-18.9	50.8	40.8
Lakeshore 2	37.3	21.4	14.0	13.3	9.7	8.2	-3.8	-71.8	37.5	16.9

A.3 Operations

The receptor locations from Table A.1 were input to the predictive noise model for operations and were run for each scenario presented in the main report (see **Section 4.1.1**). The results are summarised in **Table A.4**, **Table A.5** and **Table A.6**.

Table A.4: Operations – NGS Expansion with Existing NGS in Normal Operations

Receptor	Octave Band Centre Frequency (Hz); Sound Pressure Level (dB)									Overall	
	31.5	63	125	250	500	1000	2000	4000	8000	dB	dBA
Heronry	71.6	63.6	52.7	42.1	40.6	41.3	36.7	16.1	-49.3	72.3	45.9
Thicket 1	72.9	66.1	57.5	47.3	45.7	48.1	47.4	40.0	22.4	73.9	53.0
Thicket 2	75.7	69.2	61.7	50.8	50.4	53.5	53.3	48.0	32.0	76.8	58.6
Lakeshore 1	74.1	69.0	62.6	54.0	49.9	50.5	43.4	29.2	-29.2	75.6	54.6
Lakeshore 2	69.5	63.4	59.0	51.8	48.9	47.3	48.0	30.3	-10.9	70.9	53.5

Table A.5: Operations – NGS Expansion with Existing NGS in Start-up Operations

Receptor	Octave Band Centre Frequency (Hz); Sound Pressure Level (dB)									Overall	
	31.5	63	125	250	500	1000	2000	4000	8000	dB	dBA
Heronry	71.5	63.7	52.7	42.3	40.5	40.9	36.2	15.9	-49.4	72.2	45.7
Thicket 1	72.8	66.1	57.2	47.2	45.6	48.0	47.0	39.8	22.3	73.8	52.8
Thicket 2	75.4	69.1	61.3	50.5	50.1	53.2	52.8	47.8	32.0	76.5	58.2
Lakeshore 1	74.1	69.2	62.8	54.6	50.0	50.5	43.4	29.1	-29.2	75.6	54.7
Lakeshore 2	69.4	63.6	59.0	52.1	48.7	47.1	47.8	30.2	-10.9	70.8	53.4

Table A.6: Operations – NGS Expansion Alone

Receptor	Octave Band Centre Frequency (Hz); Sound Pressure Level (dB)									Overall	
	31.5	63	125	250	500	1000	2000	4000	8000	dB	dBA
Heronry	68.2	59.6	48.1	35.1	31.0	31.4	21.8	-3.5	-80.1	68.8	38.5
Thicket 1	69.2	59.5	46.6	38.0	35.1	38.5	31.1	13.7	-50.0	69.7	41.9
Thicket 2	71.1	61.5	50.5	39.1	35.7	39.1	32.1	17.8	-37.0	71.6	43.2
Lakeshore 1	71.2	67.7	61.3	52.3	48.6	50.1	43.0	29.1	-29.2	73.2	53.7
Lakeshore 2	61.7	55.0	47.1	40.1	34.8	39.6	31.2	12.0	-63.3	62.7	42.0

A.4 References

[1] British Standards Institution (BSI), "Standard 5228-1:2009 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise", BSI, 2009.

[2] United Station Federal Highway Administration (FHWA), "Highway Construction Noise Handbook", FHWA, 2006.

Attachment B

Noise Source Summary Table

Atura Power

Attachment B: Source Summary Table

Name	ID	Lw (dBA)	Sound Character	Lw ID	Spectra Type	Octave Band Centre Frequency (Hz); Sound Power Level (dB re: 10^{-12} W)									Overall		Height (m)		Coordinates		
						31.5	63	125	250	500	1000	2000	4000	8000	dB	dBA			X (m)	Y (m)	Z (m)
Point Sources																					
Expansion: Gas Turbine Enclosure Air Discharge	NGE_001_EAD1	105	S	GT_Enclosure_Air_Discharge	Lw	111	112	106	104	103	100	98	86	80	116	105	3.2	g	352559	4889857.5	99.6
Expansion: Gas Turbine Enclosure Air Discharge	NGE_001_EAD2	105	S	GT_Enclosure_Air_Discharge	Lw	111	112	106	104	103	100	98	86	80	116	105	3.2	g	352561	4889859.1	99.6
Expansion: Gas Turbine Enclosure Air Intake	NGE_001_EAI1	104	S	GT_Enclosure_Air_Inlets	Lw	104	107	110	105	101	98	95	94	82	114	104	0.9	g	352551	4889864.2	97.3
Expansion: Gas Turbine Enclosure Air Intake	NGE_001_EAI2	104	S	GT_Enclosure_Air_Inlets	Lw	104	107	110	105	101	98	95	94	82	114	104	0.9	g	352559	4889870.1	97.3
Expansion: Gas Turbine Stack Exit	NGE_002_EXH	110	S,T	GT_Stack_Exit	Lw	89	98	82	62	66	71	94	103	94	105	105	47.2	r	352571	4889847.3	133.7
Expansion: Closed Cooling Water Pump	NGE_013	98	S	CWP_1	Lw	87	88	89	91	91	94	91	87	81	99	98	1.1	r	352603	4889832.3	87.6
Expansion: Gas Turbine Lube Oil Mist Separator	NGE_014	105	S	Lube_Oil_Mist_Separator	Lw	109	102	100	96	101	102	97	91	84	112	105	1.5	r	352547	4889868.2	88.0
Expansion: Gas Turbine Casing Cooling Fan	NGE_025_1	97	S	GT_CCF	Lw	97	100	100	97	94	90	87	84	76	106	97	1.5	r	352574	4889859.2	88.0
Expansion: Gas Turbine Casing Cooling Fan	NGE_025_2	97	S	GT_CCF	Lw	97	100	100	97	94	90	87	84	76	106	97	1.5	r	352557	4889850.9	88.0
Expansion: Fuel Gas Valve	NGE_043	95	S	FG_Valve	Lw	89	81	74	69	78	83	89	91	91	96	95	1.0	r	352586	4889815.7	87.5
Expansion: Dew Point Heater Stack	NGE_105_Stk	103	S	DPH_Stk	Lw	105	101	107	105	100	99	94	86	79	112	103	7.3	r	352500	4889896.2	93.8
Horizontal Area Sources																					
Expansion: Gas Turbine Exhaust Duct (Top)	NGE_001_ED_Top	114	S	GT_Exhaust_Duct_Top	Lw	129	129	122	108	96	97	104	110	85	132	114	8.2	r	352565	4889854.9	94.7
Expansion: Gas Turbine Generator (Top)	NGE_001_GEN_Top	104	S	GT_Gen_Area	Lw"	95	88	104	75	74	76	64	63	51	104	88	7.1	r	352547	4889877.6	93.6
Expansion: Gas Turbine Enclosure (Top)	NGE_001_GTE_Top	110	S	GT_Encl_Area	Lw"	96	91	88	81	78	83	79	77	67	98	86	9.9	r	352559	4889866.5	96.4
Expansion: Gas Turbine Horizontal Duct (Top)	NGE_001_HD_Top	104	S	GT_HDuct_Area	Lw"	101	92	77	67	59	82	78	79	73	101	86	21.7	r	352547	4889877.2	108.2
Expansion: Gas Turbine Inlet Filter House (Top)	NGE_001_IFH_Top	89	S	GT_IFHouse_Area	Lw"	93	78	61	43	35	49	51	63	62	93	66	28.6	r	352543	4889882.9	115.1
Expansion: Gas Turbine Stack Transition Enclosure (Top)	NGE_001_ST_Top	66	S	GT_Exh_Trans_Area	Lw"	51	60	64	52	42	41	41	39	21	66	51	11.3	r	352567	4889852.2	97.8
Expansion: Gas Turbine Vertical Duct (Top)	NGE_001_VD_Top	113	S	GT_VDuct_Area	Lw"	102	97	84	75	67	89	85	85	78	103	92	21.7	r	352552	4889871.3	108.2
Expansion: Air-Cooled Heat Exchanger Fan 01	NGE_003_F01	98	S	ACHX_Fan	Lw		104	103	100	95	93	87	81	75	108	98	6.6	r	352589	4889843.7	93.1
Expansion: Air-Cooled Heat Exchanger Fan 02	NGE_003_F02	98	S	ACHX_Fan	Lw		104	103	100	95	93	87	81	75	108	98	6.6	r	352593	4889839.4	93.1
Expansion: Air-Cooled Heat Exchanger Fan 03	NGE_003_F03	98	S	ACHX_Fan	Lw		104	103	100	95	93	87	81	75	108	98	6.6	r	352596	4889835.1	93.1
Expansion: Air-Cooled Heat Exchanger Fan 04	NGE_003_F04	98	S	ACHX_Fan	Lw		104	103	100	95	93	87	81	75	108	98	6.6	r	352593	4889846.9	93.1
Expansion: Air-Cooled Heat Exchanger Fan 05	NGE_003_F05	98	S	ACHX_Fan	Lw		104	103	100	95	93	87	81	75	108	98	6.6	r	352597	4889842.6	93.1
Expansion: Air-Cooled Heat Exchanger Fan 06	NGE_003_F06	98	S	ACHX_Fan	Lw		104	103	100	95	93	87	81	75	108	98	6.6	r	352600	4889838.2	93.1
Expansion: Air-Cooled Heat Exchanger Fan 07	NGE_003_F07	98	S	ACHX_Fan	Lw		104	103	100	95	93	87	81	75	108	98	6.6	r	352597	4889850	93.1
Expansion: Air-Cooled Heat Exchanger Fan 08	NGE_003_F08	98	S	ACHX_Fan	Lw		104	103	100	95	93	87	81	75	108	98	6.6	r	352601	4889845.7	93.1
Expansion: Air-Cooled Heat Exchanger Fan 09	NGE_003_F09	98	S	ACHX_Fan	Lw		104	103	100	95	93	87	81	75	108	98	6.6	r	352604	4889841.4	93.1
Expansion: Air-Cooled Heat Exchanger Fan 10	NGE_003_F10	98	S	ACHX_Fan	Lw		104	103	100	95	93	87	81	75	108	98	6.6	r	352601	4889853.2	93.1
Expansion: Air-Cooled Heat Exchanger Fan 11	NGE_003_F11	98	S	ACHX_Fan	Lw		104	103	100	95	93	87	81	75	108	98	6.6	r	352605	4889848.9	93.1
Expansion: Air-Cooled Heat Exchanger Fan 12	NGE_003_F12	98	S	ACHX_Fan	Lw		104	103	100	95	93	87	81	75	108	98	6.6	r	352608	4889844.5	93.1
Expansion: Gas Turbine Enhanced Cooling Air Compressor (Top)	NGE_004_Top	95	S	ECAComp_Area	Lw"	81	81	86	87	82	75	58	52	46	91	83	3.2	r	352573	4889807	89.7
Expansion: Gas Turbine Enhanced Cooling Air Cooler	NGE_006	101	S	Enhanced_Cooling_Air_Cooler	Lw	104	101	98	95	89	88	94	98	84	108	101	3.9	r	352564	4889818	90.4
Expansion: Gas Turbine Cooling Air Cooler	NGE_007	104	S	GT_TCA_Cooler	Lw	111	111	110	105	102	99	91	87	83	116	104	3.4	r	352554	4889830	89.9
Expansion: Gas Turbine Auxiliary Package (Top)	NGE_015_Top	97	S	GT_Aux_Area	Lw"	82	74	79	79	75	74	68	58	46	86	78	6.3	r	352538	4889871.2	92.8
Expansion: Emergency Generator (Top)	EG_NGE_017_Top	99	S	NGE_EG	Lw"	80	83	84	84	84	82	80	77	72	91	87	2.0	r	352594	4889885.8	88.5
Expansion: Gas Turbine 4S Cooler	NGE_028	106	S	Cooler_4S	Lw	109	106	103	100	94	93	99	103	89	113	106	3.9	r	352589	4889861	90.4
Expansion: Fuel Gas Compressor 1 (Top)	NGE_102-1_Top	84	S	FG_Comp	Lw	74	70	75	74	72	75	80	77	70	85	84	6.2	r	352509	4889891.4	92.7
Expansion: Fuel Gas Compressor 2 (Top)	NGE_102-2_Top	84	S	FG_Comp	Lw	74	70	75	74	72	75	80	77	70	85	84	6.2	r	352514	4889885.5	92.7
Expansion: Fuel Gas Compressor Cooler 1	NGE_102_C1	101	S	FG_Comp_Cooler	Lw	102	105	105	102	99	95	92	89	81	111	101	1.9	r	352514	4889879.3	88.4
Expansion: Fuel Gas Compressor Cooler 2	NGE_102_C2	101	S	FG_Comp_Cooler	Lw	102	105	105	102	99	95	92	89	81	111	101	1.9	r	352504	4889892.3	88.4

Attachment B: Source Summary Table

Name	ID	Lw (dBA)	Sound Character	Lw ID	Spectra Type	Octave Band Centre Frequency (Hz); Sound Power Level (dB re: 10^{-12} W)									Overall		Height (m)		Coordinates		
						31.5	63	125	250	500	1000	2000	4000	8000	dB	dBA			X (m)	Y (m)	Z (m)
Expansion: Dew Point Heater Enclosure (Top)	NGE_105_Top	101	S	DPH_Encl	Lw"	88	88	87	85	82	79	76	73	70	94	85	3.9	r	352501	4889900.7	90.4
Vertical Area Sources																					
Expansion: Gas Turbine Inlet Filter	NGE_001_IF	104	S	GT_Inlet_Filter	Lw	135	125	113	93	83	93	83	94	93	135	104	28.6	r	352538	4889888.9	115.1
Expansion: Gas Turbine Inlet Filter House (Side)	NGE_001_IFH_Side1	89	S	GT_IFHouse_Area	Lw"	93	78	61	43	35	49	51	63	62	93	66	28.6	r	352538	4889878.8	115.1
Expansion: Gas Turbine Inlet Filter House (Side)	NGE_001_IFH_Side2	89	S	GT_IFHouse_Area	Lw"	93	78	61	43	35	49	51	63	62	93	66	28.6	r	352548	4889887	115.1
Expansion: Gas Turbine Inlet Filter House (Side)	NGE_001_IFH_Side3	84	S	GT_IFHouse_Area	Lw"	93	78	61	43	35	49	51	63	62	93	66	28.6	r	352545	4889880.4	115.1
Expansion: Gas Turbine Exhaust Duct (Side)	NGE_001_ED_Side1	102	S	GT_ExhDuct_Side_Area	Lw"	97	95	94	84	79	79	79	75	70	101	86	9.3	r	352560	4889851.6	95.8
Expansion: Gas Turbine Exhaust Duct (Side)	NGE_001_ED_Side2	102	S	GT_ExhDuct_Side_Area	Lw"	97	95	94	84	79	79	79	75	70	101	86	9.3	r	352569	4889858.2	95.8
Expansion: Gas Turbine Generator	NGE_001_GEN_Sides	108	S	GT_Gen_Area	Lw"	95	88	104	75	74	76	64	63	51	104	88	7.1	r	352547	4889877.9	93.6
Expansion: Gas Turbine Enclosure (Sides)	NGE_001_GTE_Sides	114	S	GT_Encl_Area	Lw"	96	91	88	81	78	83	79	77	67	98	86	9.9	r	352560	4889865.8	96.4
Expansion: Gas Turbine Horizontal Duct (Side)	NGE_001_HD_Side1	103	S	GT_HDuct_Area	Lw"	101	92	77	67	59	82	78	79	73	101	86	21.7	r	352544	4889874.6	108.2
Expansion: Gas Turbine Horizontal Duct (Side)	NGE_001_HD_Side2	103	S	GT_HDuct_Area	Lw"	101	92	77	67	59	82	78	79	73	101	86	21.7	r	352551	4889879.9	108.2
Expansion: Gas Turbine Stack Transition Enclosure (Side)	NGE_001_ST_Side1	66	S	GT_Exh_Trans_Area	Lw"	51	60	64	52	42	41	41	39	21	66	51	11.3	r	352563	4889849.2	97.8
Expansion: Gas Turbine Stack Transition Enclosure (Side)	NGE_001_ST_Side2	66	S	GT_Exh_Trans_Area	Lw"	51	60	64	52	42	41	41	39	21	66	51	11.3	r	352571	4889855.2	97.8
Expansion: Gas Turbine Vertical Duct (Side)	NGE_001_VD_Side1	109	S	GT_VDuct_Area	Lw"	102	97	84	75	67	89	85	85	78	103	92	21.7	r	352555	4889874	108.2
Expansion: Gas Turbine Vertical Duct (Side)	NGE_001_VD_Side2	109	S	GT_VDuct_Area	Lw"	102	97	84	75	67	89	85	85	78	103	92	21.7	r	352548	4889868.7	108.2
Expansion: Gas Turbine Stack Sound Enclosure	NGE_002_SSE	69	S	GT_Stack_Base	Lw	70	79	82	70	61	58	58	57	40	84	69	13.8	r	352571	4889846.8	100.3
Expansion: Gas Turbine Exhaust Stack Baffles	NGE_002_SB	103	S	GT_Exhaust_Stack_Baffles	Lw	82	92	94	88	87	92	98	98	74	103	103	28.1	r	352571	4889847.4	114.6
Expansion: Gas Turbine Exhaust Stack Above Baffles	NGE_002_SBA	71	S	GT_Exhaust_Stack_Upper	Lw	77	81	63	42	40	53	65	67	58	83	71	47.2	r	352571	4889847.4	133.7
Expansion: Gas Turbine Enhanced Cooling Air Compressor (Sides)	NGE_004_Sides	101	S	ECAComp_Area	Lw"	81	81	86	87	82	75	58	52	46	91	83	3.2	r	352572	4889807.3	89.7
Expansion: Gas Turbine Auxiliary Package (Side)	NGE_015_Side	102	S	GT_Aux_Area	Lw"	82	74	79	79	75	74	68	58	46	86	78	6.3	r	352540	4889870.5	92.8
Expansion: Generator Step-up Transformer	NGE_022	96	S	GSU_Trans	Lw		87	103	94	93	91	87	81	79	105	96	5.3	r	352562	4889927.1	91.8
Expansion: Auxiliary Transformer	NGE_033	92	S,T	Aux_Trans	Lw	83	89	91	86	86	80	75	70	63	95	87	1.9	r	352570	4889914.9	88.4
Expansion: Fuel Gas Compressor 1 (Sides)	NGE_102-1_Sides	84	S	FG_Comp	Lw	74	70	75	74	72	75	80	77	70	85	84	6.2	r	352508	4889890.8	92.7
Expansion: Fuel Gas Compressor 2 (Sides)	NGE_102-2_Sides	84	S	FG_Comp	Lw	74	70	75	74	72	75	80	77	70	85	84	6.2	r	352513	4889884.9	92.7
Expansion: Dew Point Heater Enclosure (Sides)	NGE_105_Sides	105	S	DPH_Encl	Lw"	88	88	87	85	82	79	76	73	70	94	85	3.9	r	352503	4889901.2	90.4
Expansion: Emergency Generator (Sides)	EG_NGE_017_Sides	103	S	NGE_EG	Lw"	80	83	84	84	84	82	80	77	72	91	87	2.0	r	352594	4889885.1	88.5