Attachment 7

Community Noise Impact Assessment

Hatch Ltd.

MAJOR PROJECTS CONTRACTOR DOCUMENT FRONT COVER SHEET

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- ☐ 02 REVIEWED – INCORPORATE COMMENTS, REVISE AND RESUBMIT
- ☐ 03 REVIEWED – NOT ACCEPTED
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Report

Community Noise Impact Assessment

H373979-0000-245-066-0001

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2024-09-24	0	Approved for Use			
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1. Introduction

Newfoundland and Labrador Hydro (NLH) have identified the need for 150 megawatts (MW) of additional on-island generation that provides continued cost-conscious, reliable service, and consideration load growth requirements for customers. The combustion turbine plant will provide peaking capacity and additional generation support to maintain system reliability. In this study the noise impact of the proposed Holyrood 150 MW gas turbine generator on the surrounding environment was assessed. The NL Hydro Noise Management Plan for the overall Thermal Generating Station Site will require future updates to account for any noise generated from the operation of the proposed CT.

2. Noise Guidelines

2.1 Health Canada – Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise

Given there are no regulations in the province of Newfoundland and Labrador regarding noise emission, the federal guideline from Health Canada – "*Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise*" (2017), was adopted. These guidelines are based on the estimated percentage of residents which will be highly annoyed (HA) expressed as change %HA from background noise level.

$$Change\ in\ \%HA = \%HA\ (Facility) - \%HA\ (Background)$$

When change in %HA exceeds 6.5 percent at any receptor location, Health Canada recommends noise mitigation measures should be considered [1]. Since baseline noise levels were not available, the overall %HA of the facility was used as a conservative limit for this criteria with the %HA of the background being assumed to be minimal.

2.2 Long-Term High Annoyance Limits

%HA is calculated using the dose-response function found in ISO 1996-1:2003 Acoustics - Description, measurement and assessment of environmental noise [2]. The dose-response relationship is also known as the Schultz curve.

The equation for the Schutlz curve is shown below. Figure 2-1 shows the plot with percentage of highly annoyed residents on the y-axis and the A-weighted day-night average sound level (Ldn) on the x-axis. The noise limits of 6.5 percent %HA correspond to a Ldn noise level between 58 dBA and 59 dBA.

$$HA\% = 100/[1 + \exp(10.4 - 0.132 * Ldn)]$$

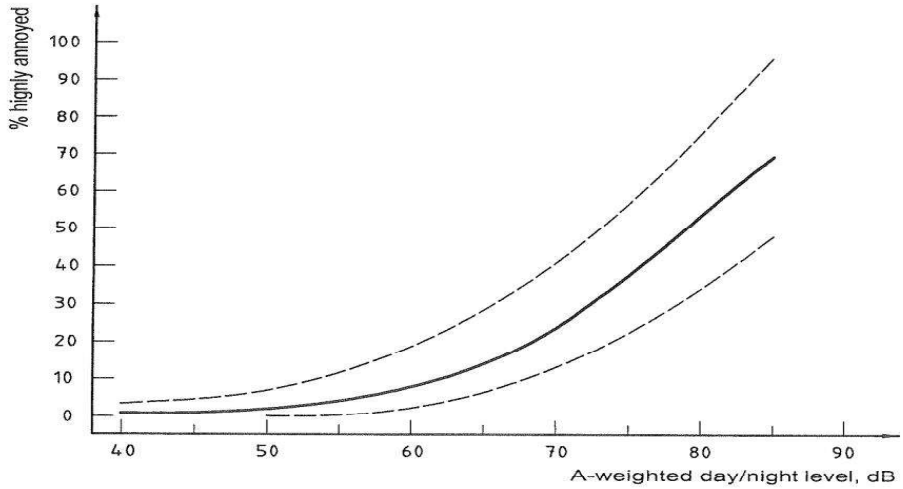

Figure 2-1: Percentage of Respondents Highly Annoyed by Noise as a Function of A-weighted Day/Night Level

3. Receptor Locations

The nearest receptors to the Holyrood site are identified as shown in Figure 3-1. All identified noise sensitive receptors are classified as residential with most being located to the north-east.

Figure 3-1: Holyrood Site Noise Sensitive Receptors

4. Noise Impact Assessment

4.1 Methodology

The noise assessment was completed using CADNA-A software developed by DataKustik. CADNA-A models atmospheric sound propagation following the ISO 9613-2 standard. The model considers geometrical dispersion, atmospheric decay, ground absorption and ground topography. The modeling was completed for the Holyrood site.

Noise source sound power data was estimated based on a repository of Hatch sound data and predictive calculations based on specifications in preliminary design. Drawings, dimensions and power ratings provided by the vendor were used to characterize the noise generated from each piece of equipment. All sound powers are prorated to the design capacity. A full noise source list is shown in Appendix A. Noise sources included in the noise model include the following:

- Exhaust stack
- Turbine air intake filter
- Transformers
- Fin Fan cooler.

4.2 Assumptions

The following are assumptions considered in the noise impact analysis:

1) Noise source sound power data was estimated based on a repository of Hatch sound data and predictive calculations using equipment dimensions and power ratings provided by the vendor.
2) A ground factor coefficient of G=0.7 was used representing mixed ground.
3) The assessment did not include the noise emissions from the existing activities at Holyrood site.
4) [redacted]
5) Units are inside a powerhouse with exhaust and intake modelled.
6) Blast walls around the transformers were considered.
7) Noise criteria are taken from federal guideline Health Canada – Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise (2017).
8) Baseline noise was not collected, and therefore an assumed level of existing community noise was assumed to be minimal for a conservative analysis. This assumption was made as the potential reduction in background noise from the phase out of the station is not known.

4.3 Results

The day/night noise levels (Ldn) were calculated at each receptor location. Percentage of high annoyance was estimated based on these values and compared to the limit of 6.5 percent outlined by Health Canada.

Table 4-1 shows the noise levels at each of the receptors. Noise levels at all receptor locations meet the acceptance criteria. Given that the change in %HA from background noise levels would be lower than the overall calculated, this represents a conservative approach. The noise from the existing HTGS or other CT located at Holyrood was also not taken into account which further supports a conservative noise study.

Based on the current design no noise control measures are anticipated to be required for the facility. Figure 4-1 shows the Ldn noise contours around the site showing that the main noise impact will be to receptors to the north-east of the facility.

Table 4-1: Holyrood Site Receptor Noise Levels

Receptor	Noise Level		Limit
	Ldn	HA	HA
	(dBA)	(%)	(%)
Duffs Rd.	45	1.1	6.5
154 Indian Pond Dr.	54	3.7	6.5
137 Indian Pond Dr.	53	3.2	6.5
123 Indian Pond Dr.	51	2.5	6.5
110 Indian Pond Dr.	51	2.5	6.5
100 Indian Pond Dr.	49	1.9	6.5
90 Indian Pond Dr.	48	1.7	6.5

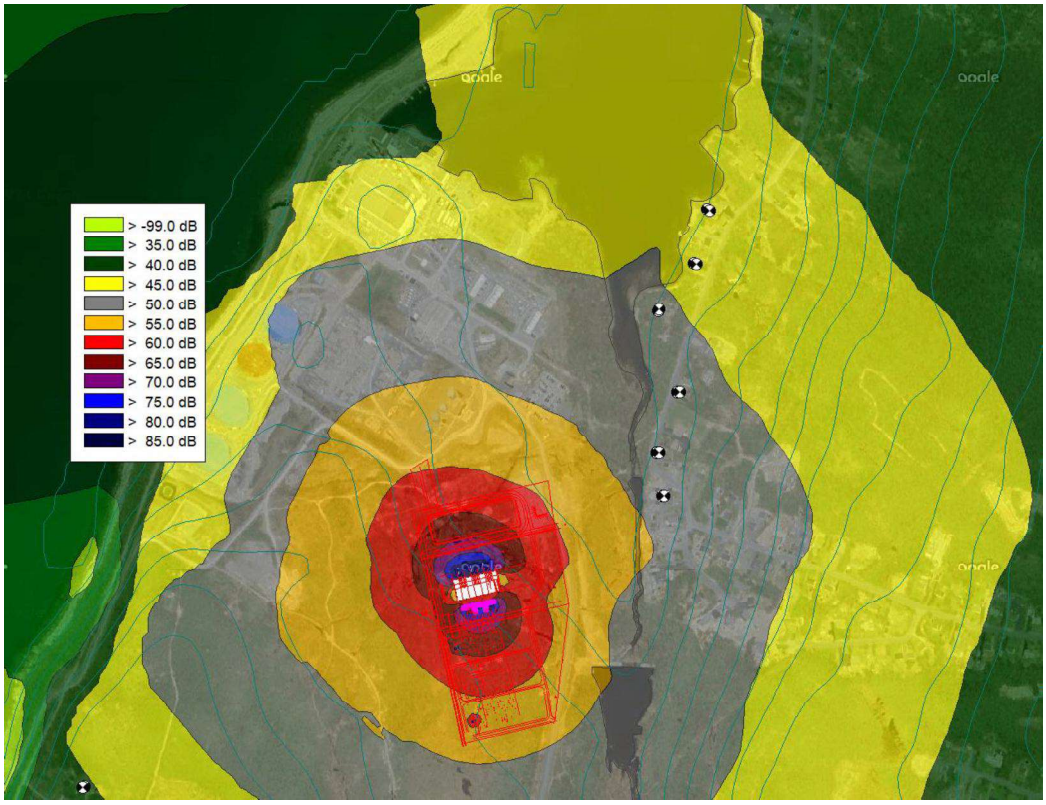

Figure 4-1: Holyrood Site Noise Contour Plot (Ldn)

5. Conclusion

The noise impact was evaluated for the proposed gas turbines on the surrounding environment at the Holyrood site. The noise levels at all sensitive receptor locations are predicted to be below the Health Canada high annoyance limit of 6.5 percent change. The overall high annoyance of the site was evaluated and directly compared to the limit for a conservative analysis. No noise mitigation measures are anticipated to be required for the Holyrood site. If stricter alternative noise criteria are required, then mitigation measures may be required. Noise barriers can be installed around the fin fan cooler and the transformers in the terminal station to reduce the noise impact to the north-east of the site even if predicted noise levels are below limits. The results of this assessment, as well as future confirmatory noise assessments or acoustic modeling, may inform required updates to the NL Hydro 'Noise Management Plan' for the HTGS site.

6. References

[1] Health Canada, “Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise,” Health Canada, Ottawa, ON, Canada, 2017.

[2] ISO, “ISO 1996-1:2003 - Acoustics — Description, measurement and assessment of environmental noise — Part 1: Basic quantities and assessment procedures,” 2nd ed., ISO, Geneva, Switzerland, 2003.

Appendix A
Noise Source List

Table 1: Noise Source List

Equipment	Quantity	Sound Power (dB)									OVL (dBA)
		31.5	63	125	250	500	1000	2000	4000	8000	
FinFan Cooler	3	-	112	109	107	102	99	91	88	84	104
Turbine Air Intake and Filter	3	-	115	104	104	100	96	95	92	93	104
Exhaust Stack	3	-	104	94	94	90	85	85	82	82	93
Transformer 100 MVA	3	99	105	107	102	102	96	91	86	79	102
Transformer 3 MVA	2	78	84	86	81	81	75	70	65	58	81