

Noise Impact Assessment Stage-1.5

Synapse Real Estate Corporation
Olds Data Center
W-04-033-01 W5M
2026-03-24

REVISION 1

PREPARED FOR
Jason Van Gaal, Principal
Synapse Real Estate Corporation

PREPARED BY
OpenCycle Technologies Inc.



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AUTHENTICATING ENGINEER	VALIDATING RESPONSIBLE MEMBER
Company: OpenCycle Technologies Inc.	Permit Holder: OpenCycle Technologies Inc.
Name: Burak Caglayan, P.Eng.	Name: Neil Morozumi, P.Eng.

Prepared by:

Technical Lead: Burak Caglayan, M.Sc., P.Eng.
Project Engineer in Training: Mackenzie Kunz, B.Sc., E.I.T.
Account Manager: Justin Caskey, P.Eng.



Version Control

Version	Version Description	Revised By	Date
0	<ul style="list-style-type: none">Initial model and results with available preliminary data	BC	February 6, 2026
1	<ul style="list-style-type: none">Updated report with additional worst-case operational scenario and incorporating feedback received from multiple parties on the Stage-1 study (OpenCycle ID #: 007700-NIA-000)	BC	March 24, 2026



Executive Summary

Synapse Real Estate Corporation (Synapse) retained OpenCycle Technologies Inc. (OpenCycle) to conduct a Preliminary Noise Impact Assessment (NIA) for the purposes of risk planning & screening for Olds Data Center facility located at W-04-033-01 W5M (the subject facility). This NIA was conducted in accordance with the requirements of Alberta Utilities Commission (AUC) Rule 012: Noise Control (the Rule).

This is a proposed facility that Synapse plans to build ten (10) blocks with data halls and natural gas plants each having:

- One (1) 100 MW Data Center Building with eighty (80) Chillers and sixty (60) Emergency/Back-up Generators
- One (1) 140 MW Natural Gas Plant with auxiliary equipment. Detailed design and equipment data are not currently available, and assumptions are based on a similar NIA found on AUC's E-filing website (Beacon AI Centers – Indus Project NIA, Stantec, Project/File ID: 145400058)

Synapse and OpenCycle have agreed on a four-stage progressive Noise Management Program designed to reduce uncertainty and manage risk. OpenCycle deems the project being in Stage-1.5 below:

- 1- **Risk Planning & Screening:** Early due diligence using assumptions to identify risk and guide detailed design.
- **1.5 - Risk Planning & Screening Update:** Report update to include a worst-case operational scenario and incorporate Olds Town Council and AUC's feedback for the preliminary study (OpenCycle ID #: 007700-NIA-000).
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- 3- **Mitigation:** Detailed mitigation design.
- 4- **Validation:** Empirical measurements of a similar data center or shop measurements of actual/similar equipment to validate assumptions.

The purpose of Stage-1 assessment was to predict the proposed facility's noise impact on surrounding residences including town of Olds and support detailed design and next steps. Stage 1.5 assumes the same preliminary equipment design and adds a worst-case operational scenario with extended noise control recommendations.

Reconnaissance conducted by OpenCycle staff using publicly available data in March 2026 confirms that there is no adjacent energy facility in the study area that is emitting significant noise. OpenCycle has not performed a site visit to confirm existence of potential noise emitting adjacent facilities at this stage.

There are hundreds of receivers located within 1500 m of the subject facility. Twenty-eight (28) receivers were modeled to assess compliance, and labeled as R01 to R28 in the NIA. For residents having secondary stories, additional receivers (i.e., R01-2nd Story) are modeled at 4.5 m from ground level to assess the noise levels at secondary stories. R22-R28 were randomly selected to represent high dwelling density receivers in the town of Olds for practicality reasons. OpenCycle may provide a full receptor list and SPLs or SPLs at specific receptor locations once requested.



An analysis of three operating scenarios was considered in this study:

- **Nighttime Operation:** representing normal maximum operation, all chillers and natural gas plants are operating; back-up generators are not operating
- **Daytime Operation:** representing normal maximum operation and testing one back-up generator at a time
- **Worst-Case Operational Scenario:** representing an event of a natural gas supply interruption at nighttime and lose of full natural gas supply for natural gas plants operation. Full load removal from the turbines is expected to take no longer than 30 minutes, and all back-up generators operate simultaneously at 80% load during the full removal of load.

The tables below summarize the overall Sound Pressure Levels (SPL) predictions from the model for each receiver in the study area for nighttime and daytime operation and possible worst-case scenario. The Facility SPL is the overall SPL from all the facilities in the study area. The Cumulative SPL includes the contribution of the Facility SPL and the Ambient Sound Levels (ASL).



Overall Sound Pressure Levels - As Proposed/After Noise Control - Nighttime

Receiver	Approximate Distance & Direction from the Center of the Subject Facility	PSL (dBA)	ASL (dBA)	As Proposed				After Noise Control				
				Facility SPL (dBA)	Cumulative SPL (dBA)	Meet the PSL	dBc-dBA	Facility SPL (dBA)	Cumulative SPL (dBA)	Noise Reduction (dBA)	Meet the PSL	dBc-dBA
R01	650 m SSW	53.0	48.0	70.8	70.8	No	4.0	45.8	50.0	25.0	Yes	10.3
R01-2nd Story	650 m SSW	53.0	48.0	72.4	72.4	No	3.8	47.3	50.7	25.1	Yes	9.2
R02	400 m W	53.0	48.0	70.0	70.0	No	4.1	45.2	49.8	24.8	Yes	11.8
R03	1190 m NNW	45.0	40.0	63.8	63.8	No	4.3	39.1	42.6	24.7	Yes	12.6
R03-2nd Story	1190 m NNW	45.0	40.0	64.0	64.0	No	4.3	39.2	42.6	24.8	Yes	12.7
R04	750 m SSW	48.0	43.0	69.0	69.0	No	4.8	44.3	46.7	24.7	Yes	12.0
R04-2nd Story	750 m SSW	48.0	43.0	70.6	70.6	No	4.4	45.8	47.6	24.8	Yes	10.9
R05	920 m SSW	48.0	43.0	65.7	65.7	No	4.5	41.5	45.3	24.2	Yes	13.3
R05-2nd Story	920 m SSW	48.0	43.0	66.3	66.3	No	4.4	42.0	45.5	24.3	Yes	13.0
R06	2280 m N	40.0	35.0	55.4	55.4	No	5.5	31.1	36.5	24.3	Yes	15.6
R06-2nd Story	2280 m N	40.0	35.0	55.6	55.6	No	5.4	31.3	36.5	24.3	Yes	15.4
R07	2200 m N	40.0	35.0	56.0	56.0	No	5.4	31.7	36.7	24.3	Yes	15.3
R08	2020 m NNE	45.0	40.0	57.6	57.7	No	5.2	33.3	40.8	24.3	Yes	14.6
R08-2nd Story	2020 m NNE	45.0	40.0	57.8	57.9	No	5.1	33.4	40.9	24.4	Yes	14.6
R09	1500 m NNE	45.0	40.0	61.9	61.9	No	4.6	37.3	41.9	24.6	Yes	13.4
R10	1880 m NNW	40.0	35.0	58.0	58.0	No	5.1	33.6	37.4	24.4	Yes	14.5
R11	1760 m N	40.0	35.0	59.4	59.4	No	4.9	34.9	38.0	24.5	Yes	14.1
R12	2100 m SE	40.0	35.0	55.7	55.7	No	5.4	31.9	36.7	23.8	Yes	16.4
R13	2150 m SE	40.0	35.0	55.4	55.4	No	5.4	31.6	36.6	23.8	Yes	16.4
R13-2nd Story	2150 m SE	40.0	35.0	55.4	55.4	No	5.4	31.7	36.7	23.7	Yes	16.3
R14	1410 m ESE	45.0	40.0	60.5	60.5	No	4.7	36.9	41.7	23.6	Yes	15.8
R15	1240 m E	40.0	35.0	61.9	61.9	No	4.6	38.3	40.0	23.6	Yes	15.7
R16	1430 m ENE	40.0	35.0	60.9	60.9	No	4.7	37.0	39.1	23.9	Yes	15.2
R17	1500 m NE	40.0	35.0	61.3	61.3	No	4.6	37.0	39.1	24.3	Yes	14.1
R18	590 m NW	45.0	40.0	69.3	69.3	No	4.0	43.3	45.0	26.0	Yes	13.0
R19	660 m NNW	45.0	40.0	68.9	68.9	No	4.0	42.8	44.6	26.1	Yes	12.9
R20	1010 m NNW	45.0	40.0	64.7	64.7	No	4.3	39.7	42.9	25.0	Yes	12.8
R21	290 m W	53.0	48.0	72.3	72.3	No	4.0	47.4	50.7	24.9	Yes	11.2
R22	1260 m SSW	51.0	46.0	61.7	61.8	No	4.6	37.3	46.5	24.4	Yes	13.6
R23	1510 m SW	51.0	46.0	59.2	59.3	No	4.9	34.7	46.3	24.5	Yes	14.1
R23-2nd Story	1510 m SW	51.0	46.0	59.3	59.4	No	4.9	34.9	46.3	24.4	Yes	14.1
R24	1120 m WSW	51.0	46.0	62.1	62.1	No	4.7	37.5	46.6	24.6	Yes	13.2
R25	760 m WSW	51.0	46.0	65.4	65.4	No	4.5	40.7	47.1	24.7	Yes	12.5
R26	1640 m WSW	51.0	46.0	57.2	57.5	No	5.3	32.6	46.2	24.6	Yes	14.9
R27	1870 m WSW	51.0	46.0	55.9	56.3	No	5.3	31.5	46.2	24.4	Yes	15.0
R27-2nd Story	1870 m WSW	51.0	46.0	56.7	57.1	No	5.3	32.3	46.2	24.4	Yes	14.7
R28	1340 m W	46.0	41.0	60.1	60.2	No	4.9	35.6	42.1	24.5	Yes	13.9
R28-2nd Story	1340 m W	46.0	41.0	60.3	60.4	No	5.0	35.7	42.1	24.6	Yes	13.8



Overall Sound Pressure Levels - As Proposed & Nighttime Compliance Achieved - Daytime

Receiver	Approximate Distance & Direction from the Center of the Subject Facility	PSL (dBA)	ASL (dBA)	As Proposed & Nighttime Compliance Achieved			
				Facility SPL (dBA)	Cumulative SPL (dBA)	Meet the PSL	dBC-dBA
R01	650 m SSW	63.0	58.0	45.9	58.3	Yes	10.5
R01-2nd Story	650 m SSW	63.0	58.0	47.4	58.4	Yes	9.5
R02	400 m W	63.0	58.0	45.4	58.2	Yes	11.8
R03	1190 m NNW	55.0	50.0	39.4	50.4	Yes	12.5
R03 -2nd Story	1190 m NNW	55.0	50.0	39.5	50.4	Yes	12.5
R04	750 m SSW	58.0	53.0	44.4	53.6	Yes	12.2
R04 -2nd Story	750 m SSW	58.0	53.0	45.9	53.8	Yes	11.1
R05	920 m SSW	58.0	53.0	41.8	53.3	Yes	13.4
R05 -2nd Story	920 m SSW	58.0	53.0	42.4	53.4	Yes	13.0
R06	2280 m N	50.0	45.0	31.4	45.2	Yes	15.5
R06-2nd Story	2280 m N	50.0	45.0	31.5	45.2	Yes	15.5
R07	2200 m N	50.0	45.0	31.9	45.2	Yes	15.3
R08	2020 m NNE	55.0	50.0	33.6	50.1	Yes	14.6
R08-2nd Story	2020 m NNE	55.0	50.0	33.8	50.1	Yes	14.6
R09	1500 m NNE	55.0	50.0	37.6	50.2	Yes	13.4
R10	1880 m NNW	50.0	45.0	34.0	45.3	Yes	14.3
R11	1760 m N	50.0	45.0	35.1	45.4	Yes	14.1
R12	2100 m SE	50.0	45.0	32.9	45.3	Yes	15.9
R13	2150 m SE	50.0	45.0	32.5	45.2	Yes	16.0
R13-2nd Story	2150 m SE	50.0	45.0	32.6	45.2	Yes	15.9
R14	1410 m ESE	55.0	50.0	38.1	50.3	Yes	15.2
R15	1240 m E	50.0	45.0	39.0	46.0	Yes	15.7
R16	1430 m ENE	50.0	45.0	37.3	45.7	Yes	15.2
R17	1500 m NE	50.0	45.0	37.4	45.7	Yes	14.0
R18	590 m NW	55.0	50.0	43.5	50.9	Yes	13.0
R19	660 m NNW	55.0	50.0	43.0	50.8	Yes	12.8
R20	1010 m NNW	55.0	50.0	40.0	50.4	Yes	12.6
R21	290 m W	63.0	58.0	47.5	58.4	Yes	11.3
R22	1260 m SSW	61.0	56.0	37.8	56.1	Yes	13.6
R23	1510 m SW	61.0	56.0	35.3	56.0	Yes	14.0
R23-2nd Story	1510 m SW	61.0	56.0	35.4	56.0	Yes	14.1
R24	1120 m WSW	61.0	56.0	38.0	56.1	Yes	13.2
R25	760 m WSW	61.0	56.0	41.2	56.1	Yes	12.5
R26	1640 m WSW	61.0	56.0	33.2	56.0	Yes	14.8
R27	1870 m WSW	61.0	56.0	32.2	56.0	Yes	14.8
R27-2nd Story	1870 m WSW	61.0	56.0	32.9	56.0	Yes	14.6
R28	1340 m W	56.0	51.0	36.0	51.1	Yes	13.9
R28-2nd Story	1340 m W	56.0	51.0	36.1	51.1	Yes	13.9



**Overall Sound Pressure Levels – As Proposed - Nighttime Compliance Achieved & Worst-Case -
Extended Noise Mitigation Applied - Nighttime**

Receiver	Approximate Distance & Direction from the Center of the Subject Facility	PSL (dBA)	ASL (dBA)	As Proposed - Nighttime Compliance Achieved - Extended Noise Mitigation Applied - Nighttime			
				Facility SPL (dBA)	Cumulative SPL (dBA)	Meet the PSL	dBC-dBA
R01	650 m SSW	53.0	48.0	46.9	50.5	Yes	9.2
R01-2nd Story	650 m SSW	53.0	48.0	48.4	51.2	Yes	8.6
R02	400 m W	53.0	48.0	45.3	49.9	Yes	9.4
R03	1190 m NNW	45.0	40.0	39.7	42.9	Yes	9.7
R03-2nd Story	1190 m NNW	45.0	40.0	39.9	43.0	Yes	9.6
R04	750 m SSW	48.0	43.0	43.1	46.1	Yes	11.4
R04-2nd Story	750 m SSW	48.0	43.0	44.8	47.0	Yes	10.5
R05	920 m SSW	48.0	43.0	41.2	45.2	Yes	10.2
R05-2nd Story	920 m SSW	48.0	43.0	41.8	45.5	Yes	9.9
R06	2280 m N	40.0	35.0	32.2	36.8	Yes	11.7
R06-2nd Story	2280 m N	40.0	35.0	32.3	36.9	Yes	11.7
R07	2200 m N	40.0	35.0	32.7	37.0	Yes	11.5
R08	2020 m NNE	45.0	40.0	34.4	41.1	Yes	11.0
R08-2nd Story	2020 m NNE	45.0	40.0	34.5	41.1	Yes	11.1
R09	1500 m NNE	45.0	40.0	38.5	42.3	Yes	10.4
R10	1880 m NNW	40.0	35.0	34.5	37.8	Yes	10.8
R11	1760 m N	40.0	35.0	35.6	38.3	Yes	10.8
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R13-2nd Story	2150 m SE	40.0	35.0	32.0	36.8	Yes	11.3
R14	1410 m ESE	45.0	40.0	36.9	41.7	Yes	10.6
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R16	1430 m ENE	40.0	35.0	37.1	39.2	Yes	10.6
R17	1500 m NE	40.0	35.0	37.1	39.2	Yes	10.1
R18	590 m NW	45.0	40.0	43.2	44.9	Yes	9.9
R19	660 m NNW	45.0	40.0	42.8	44.6	Yes	9.9
R20	1010 m NNW	45.0	40.0	40.1	43.1	Yes	9.6
R21	290 m W	53.0	48.0	46.2	50.2	Yes	9.8
R22	1260 m SSW	51.0	46.0	37.6	46.6	Yes	9.8
R23	1510 m SW	51.0	46.0	35.4	46.4	Yes	10.3
R23-2nd Story	1510 m SW	51.0	46.0	35.6	46.4	Yes	10.2
R24	1120 m WSW	51.0	46.0	38.5	46.7	Yes	10.2
R25	760 m WSW	51.0	46.0	41.6	47.3	Yes	9.9
R26	1640 m WSW	51.0	46.0	33.7	46.2	Yes	11.4
R27	1870 m WSW	51.0	46.0	32.2	46.2	Yes	11.2
R27-2nd Story	1870 m WSW	51.0	46.0	33.3	46.2	Yes	10.9
R28	1340 m W	46.0	41.0	36.6	42.3	Yes	10.7
R28-2nd Story	1340 m W	46.0	41.0	36.8	42.4	Yes	10.7



The results of this assessment indicate that, for nighttime operations, the Cumulative SPL is expected to exceed the PSL at all receivers in the study area. The most impacted receiver is R01, located 650 m SSW from the subject facility center. Additional noise control is required for the subject facility to comply with the AUC Rule 012: Noise Control.

Noise control items are discussed in the [Noise Control Recommendations](#) section of this report for nighttime compliance.

Once the noise control items for nighttime operations and extended noise control recommendations for the worst-case scenario have been implemented, the Cumulative SPL is expected to meet the PSL at all receivers for daytime, nighttime and worst-case scenarios.

OpenCycle also recommends updating the model and results as design data become available and execute Stage-2 and Stage-4 of the four-stage analysis approach for a better understanding of the ambient sound levels in the study area and design details and apply in the subsequent revisions of this study.

For general technical details on sound levels and analysis, as well as for a best practices approach as recommended by the Rule, see [Appendix G](#).



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Acronyms

Acronym	Description
AADT	Average Annual Daily Traffic
AB	Alberta
AUC	Alberta Utilities Commission
ASL	Ambient Sound Level
BC	British Columbia
BSL	Basic Sound Level
dB	Decibel
dBA	A-Weighted Decibel
dBC	C-Weighted Decibel
dBZ	Z-Weighted Decibel or Linear Decibel
CSL	Comprehensive Sound Level
DIL	Dynamic Insertion Loss
ISO	International Organization for Standardization
L_{eq}	Energy Equivalent Sound Level
LFN	Low Frequency Noise
LSD	Legal Subdivision
NIA	Noise Impact Assessment
NC	Noise Control
NR	Noise Reduction
OGC	Oil & Gas Commission
PSL	Permissible Sound Level
PWL	Sound Power Level
SPL	Sound Pressure Level
TL	Transmission Loss
UTM	Universal Transverse Mercator



Introduction

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The purpose of Stage-1 assessment was to predict the proposed facility's noise impact on surrounding residences including town of Olds and support detailed design and next steps. Stage 1.5 assumes the same preliminary equipment design and adds a worst-case operational scenario.

Study Area

The subject facility is located at W-04-033-01 W5M, in the town of Olds, Alberta. The terrain cover in the study area is mainly urban and prairie grassland. Highway 2A and Highway 27, which are heavily traveled transportation corridors traverse through the study area. There is also a rail line passing through the study area which is the Canadian Pacific Kansas City (CPKC) line between Calgary and Edmonton.

Reconnaissance conducted by OpenCycle staff using publicly available data in March 2026 confirms that there is no adjacent energy facility in the study area that is emitting significant noise. OpenCycle has not performed a site visit to confirm existence of potential noise emitting adjacent facilities at this stage. A site visit is planned as part of the scope of work included in future phases.

There are hundreds of receivers located within 1500 m of the subject facility. Twenty-eight (28) receivers were modeled to assess compliance and labeled as R01 to R28 in the NIA. For residents having secondary stories,



additional receivers (i.e., R01-2nd Story) are modeled at 4.5 m from ground level to assess the noise levels at secondary stories. R22-R28 were randomly selected to represent high dwelling density receivers in the town of Olds for practicality reasons. OpenCycle may provide a full receptor list and SPLs or SPLs at specific receptor locations once requested.

Figure 1A shows a map of the study area. The 1500 m boundary from the subject facility fence line is shown in dotted white line. Due to the presence of residences within 1500 m boundary, the study area is extended to include all other energy facilities -if any- that are located within 1500 m of the residences modeled in the study area, as shown in solid black-white line. Figure 1B shows the 3D modeling of the subject facility.

Figure 1A: Study Area Map

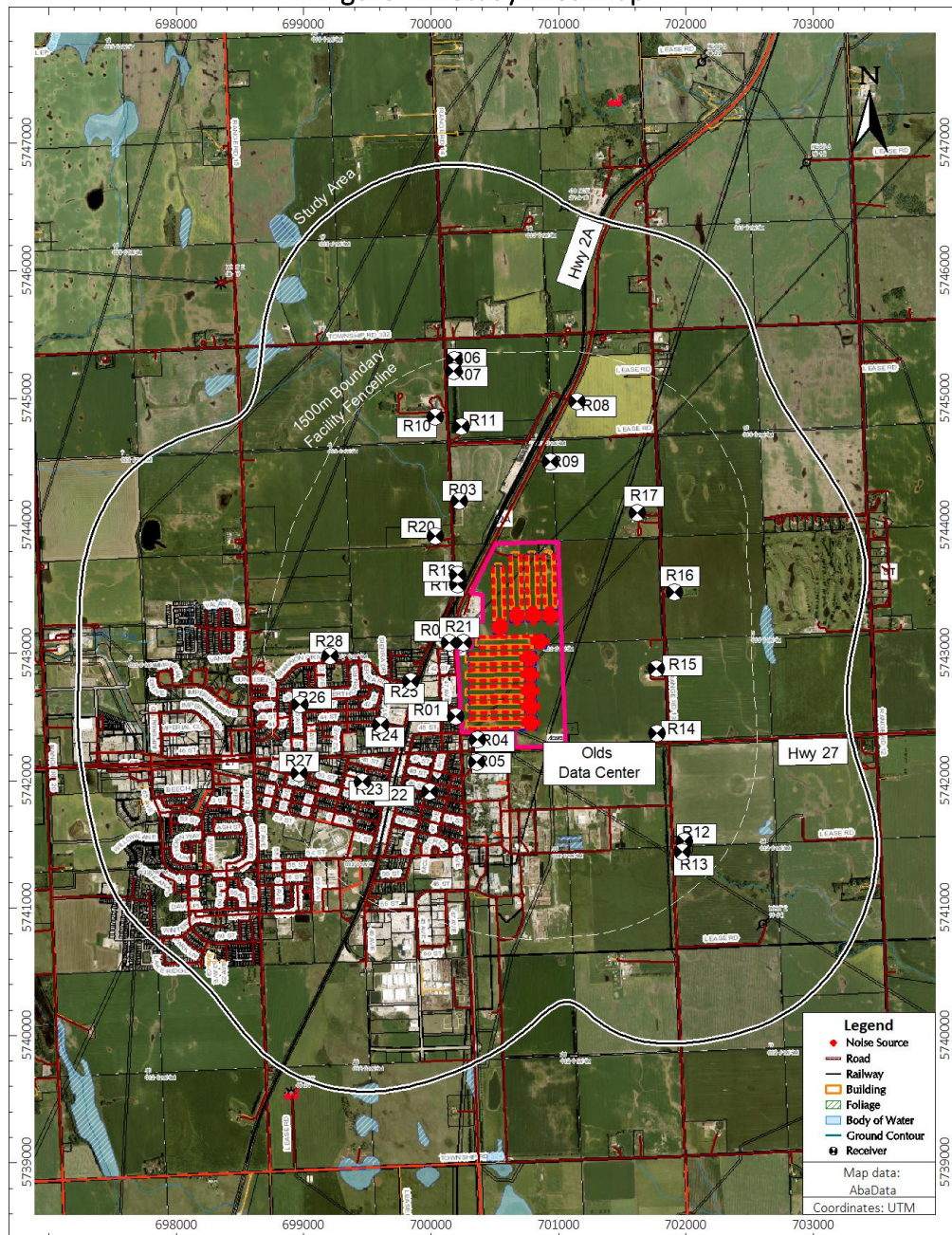
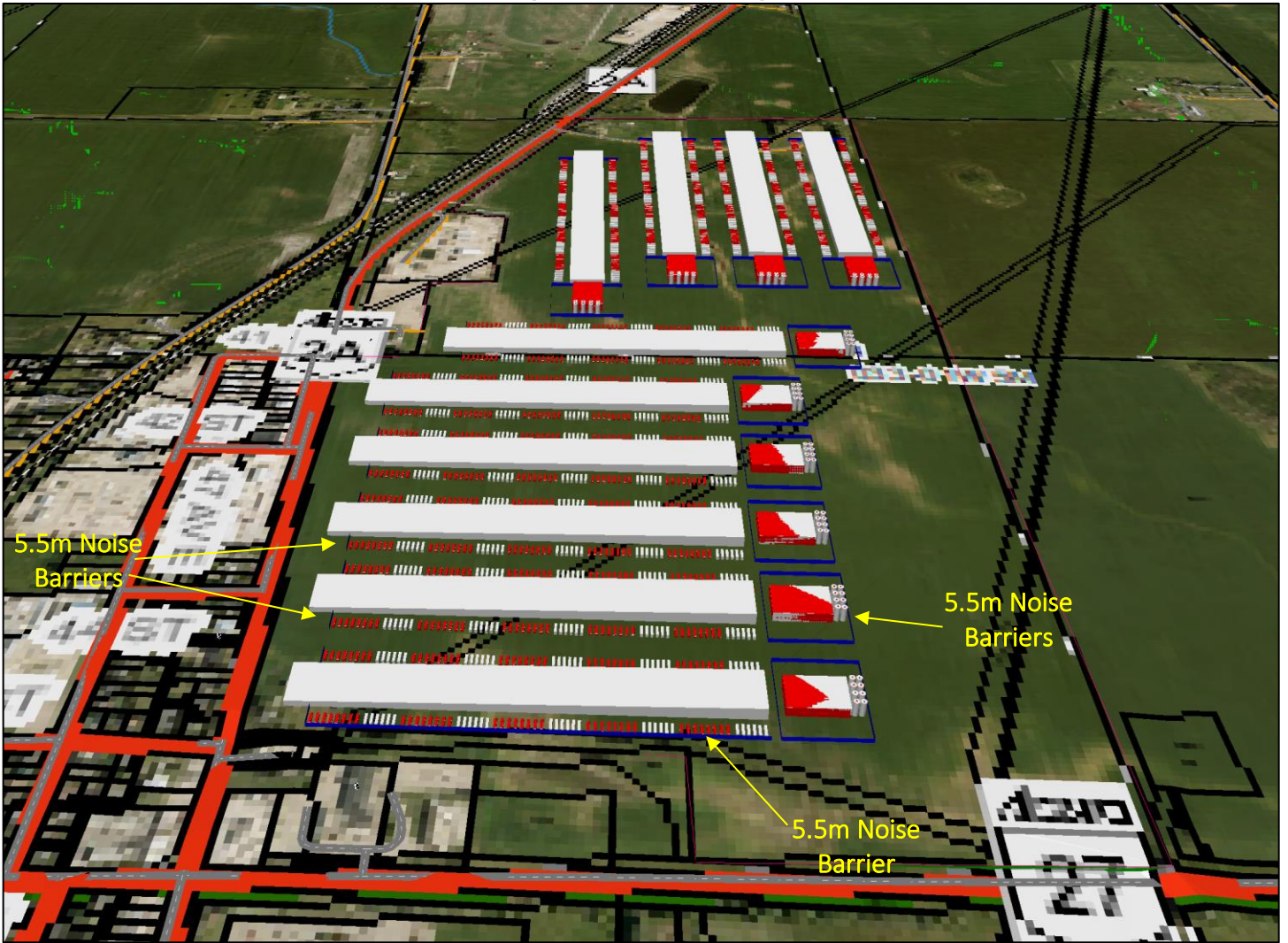


Figure 1B:3D Modeling



Noise Criteria

Primary Overall dBA Analysis

Noise for energy related facilities is regulated through the AUC Rule 012: Noise Control. The regulator sets the Permissible Sound Level (PSL), which is the limit that the Sound Pressure Level (SPL) emanating from the facilities in the study area plus the Ambient Sound Level (ASL) may not exceed over a specified period, as measured at specific locations of interest (the receivers). These allowable limits are dependent on the population density, proximity to heavily traveled transportation routes (motor vehicles, rail and aircraft) and other specified adjustments. The SPL is the sound level received at a specific location. The ASL is the average background sound level not attributable to energy industry facilities. The ASL is assumed to be 5 dBA below the PSL, as prescribed by the Rule. The receivers are located at the residences existing within 1500 m of the subject facility, or else at the study area boundary.

There are hundreds of receivers located within 1500 m of the subject facility fenceline. Twenty-eight (28) receivers were modeled to assess compliance and are labeled as R01 to R28 in the NIA. For residents having secondary stories, additional receivers (i.e., R01-2nd Story) are modeled at 4.5 m from ground level to assess the noise levels at secondary stories. Highway 2A and Highway 27, which are heavily traveled transportation corridors traverse through the study area.

Highway 2A, which is considered as a heavily traveled highway, traverses through the study area. The Weighted Average Annual Daily Traffic (WAADT) volume data, obtained from Alberta Transportation for the period of 2025 for the nearest road segments of Highway 2A crossing close to the study area are 2800 for north of 42 St., 4120 for the section between 42 St. and Highway 27 and 4470 for south of Highway 27. Based on the assumptions that 10% of the WAADT is used as an approximation of the nighttime period traffic, the nighttime traffic is more than 10 vehicles per hour, thereby meeting the Rule requirements for a heavily travelled road for all sections of the highway.

Highway 27, which is considered as a heavily traveled highway, traverses through the study area. The Weighted Average Annual Daily Traffic (WAADT) volume data, obtained from Alberta Transportation for the period of 2025 for the nearest road segments of Highway 27 crossing close to the study area are 8430 for east of Highway 2A and 11,970 for west of Highway 2A. Based on the assumptions that 10% of the WAADT is used as an approximation of the nighttime period traffic, the nighttime traffic is more than 10 vehicles per hour, thereby meeting the Rule requirements for a heavily travelled road for both sections of the highway.

There is also a rail line passing through the study area which is identified as the Canadian Pacific Kansas City (CPKC) line between Calgary and Edmonton that potentially impacts ambient sound levels within the study area.

OpenCycle recommends executing Stage-2 to accurately account for potential contribution from sources such as heavily traveled road segments, rail lines and energy-related facilities. This would result in greater precision in the reported ASLs and PSLs, which effectively serve as the most accurate calculation of noise level limits.

PSLs for each receiver were calculated as prescribed by the Rule.



Secondary Low Frequency Noise Analysis

The Rule outlines criteria for Low Frequency Noise (LFN) consideration. LFN considers noise that may be satisfactory on a dBA basis but contains a dominant low frequency that may increase annoyance at nearby residences. LFN analysis is considered a “second-stage” investigation by the Rule and is only to be conducted as a specific response to a LFN complaint. According to the Rule, an LFN component exists when:

- the dBC minus dBA sound level is equal to or greater than 20 dB, and
- there is a clear tonal component at a $1/3$ octave frequency of 250 Hz or below.

If an LFN component is identified as per the Rule, then a 5 dBA penalty is added to the measured or predicted SPL. In this analysis, there is no specific LFN complaint from any receiver in the area. Moreover, there is insufficient spectral data available to predict the existence of a tonal component at any of the receiver location. As such, this study evaluates potential LFN for information purposes only, by investigating the predicted dBC-dBA levels at all the receivers.

Major Equipment

Tables 1 gives details of the proposed major equipment at the subject facility. The details were obtained from the information provided by the client and similar NIA found on AUC’s E-filing website (Beacon AI Centers – Indus Project NIA, Stantec, Project/File ID: 145400058). OpenCycle deems Stage-4 to be critical to fully understand the design details of the equipment to be installed in the subject facility and for more accurate sound propagation modeling. See [Appendix C](#) for a plot plan showing the subject facility equipment layout.



Table 1: Olds Data Center Equipment Details


Equipment Name and Tag No	Plot Plan Item #	Equipment Details																																																																																																																																																																																																																																																																																																																				
Chillers	N/A	<ul style="list-style-type: none"> • Located in mechanical yards of each block • Unknown Make & Model Chillers; Eighty (80) chillers per block, totaling eight hundred (800) in the plant, all operating year round • Each chiller is located outdoors and consists of several horizontal fans as depicted in the picture below • Each chiller PWL is initially assumed 110 dBA as per the manufacturer data obtained by the client; OpenCycle selected the highest fan speed and NTON data for maximum cooling and conservative assumptions as below: <table border="1" data-bbox="435 636 914 1050"> <thead> <tr> <th colspan="2"></th> <th colspan="8">sound power levels (dB, re: 1pW)</th> <th>overall</th> </tr> <tr> <th colspan="2"></th> <th colspan="8">Octave band center frequencies (Hz)</th> <th>A-wht</th> </tr> <tr> <th>NTON</th> <th>% Load</th> <th>63</th> <th>125</th> <th>250</th> <th>500</th> <th>1000</th> <th>2000</th> <th>4000</th> <th>8000</th> <th>dBA</th> </tr> </thead> <tbody> <tr> <td 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Back-up/ Emergency Generators	N/A	<ul style="list-style-type: none"> • Located in mechanical yards of each block • Sixty (60) generators per block, totaling six hundred (600) in the facility • Back-up/emergency equipment, not operating during nighttime; one (1) generator at a time tested individually at 100% load for up to 2 hours twice per year as part of regular maintenance and testing • Similar to Make & Model: Baudouin 16M55G2D2/6, diesel engine, 2640kW @ 1800 RPM sound characteristics; actual installed generators will be 3 MW/unit • The proposed enclosure is made from 1.6 mm corrugated plate from outside, 100mm Rockwool with a density of 120 kg/m3 and internal perforated plate. Expected noise reduction index (Rw) of 35 dB as per the acoustic study conducted by Khoueiry Design & Consultancy SAL • Each self-enclosed generator rated 85 dBA @ 7m; OpenCycle used similarly rated generator measurements from previous studies for modeling purposes 																																																																																																																																																																																																																																																																																																																				

Table 1: Olds Data Center Equipment Details

Equipment Name and Tag No	Plot Plan Item #	Equipment Details
NG Plants	N/A	<ul style="list-style-type: none"> • Located near the data halls of each block • One (1) 140 MW plant and auxiliary equipment per block, totaling ten (10) in the plant, operating year round • Design data is currently not available for the NG Plant; as suggested by the client, PWLs acquired from similar NIA found on AUC's E-filing website (Beacon AI Centers – Indus Project NIA, Stantec, Project/File ID: 145400058). Assumptions are as follows: <ul style="list-style-type: none"> ▪ The NG Plant that was studied in Beacon AI Centers NIA is a Siemens SCC-800 3x1 Combined Cycle Power Plant with 62 MW rating ▪ The number of sources associated with the plant are scaled down to estimate a SCC-800 2x1 Combined Cycle Power Plant with 50 MW rating to approximate 140 MW output. Assumptions include: <ul style="list-style-type: none"> ○ 5.5 m high absorbing noise barriers installed around each plant to shield all plant building openings; i.e. vents, louvers, air intakes, doors and windows etc. ○ Two (2) SGT-800 GT Units, Two (2) HRSG Units, One (1) ST and generator unit and ventilation systems ○ Eight (8) air intakes per plant building, PWL 88 dBA each ○ Twenty (20) ventilation inlets plant building, PWL 86 dBA each with mitigation if required ○ Twenty (20) ventilation outlets plant building, PWL 84 dBA each with mitigation if required ○ Twelve (12) step-up transformers per plant, PWL 92 dBA each ○ One (1) ACC Unit per plant building; assumed outdoor duct lagging installed, steam intake and outlets PWLs ≤85 dBA with mitigation if required ○ Exhaust Stack PWL ≤100 dBA each with mitigation if required

SIEMENS ENERGY

SCC-800 combined cycle power plant

SGT-800 based power plant		45 MW rating	50 MW rating	56 MW rating	57 MW rating	62 MW rating
SCC-800 1x1 Combined cycle power plant	Plant power output, gross	66.5 MW(e)	71.9 MW(e)	80.0 MW(e)	81.5 MW(e)	89 MW(e)
	Plant efficiency, gross	57.2%	57.7%	57.9%	58.5%	59.6%
SCC-800 2x1 Combined cycle power plant	Plant power output, gross	134.5 MW(e)	145.3 MW(e)	162.1 MW(e)	164.8 MW(e)	182 MW(e)
	Plant efficiency, gross	57.8%	58.3%	58.6%	59.1%	60.6%
SCC-800 3x1 Combined cycle power plant	Plant power output, gross	201.7 MW(e)	217.9 MW(e)	243.1 MW(e)	247.5 MW(e)	273 MW(e)
	Plant efficiency, gross	57.8%	58.3%	58.6%	59.1%	60.6%

NOTE: The combined cycle plant SCC-800 is available based on one or multiple SGT-800 gas turbines (up to CC 6-1 configuration). Combined cycle performance is based on three pressure non-retail (3PNR) bottoming cycle.

siemens-energy.com/gasturbines



Method

The method used in the NIA follows the requirements set forth in the Rule.

- The study area and facility physical layouts were determined from drawings obtained from client and satellite images.
- The Sound Power Levels (PWL) were determined for the major facility noise sources through theoretical calculations, manufacturer's data, previous study on similar units and previous NIA obtained from AUC E-filing website (Beacon AI Centers – Indus Project NIA, Stantec, Project/File ID: 145400058). See [Appendix D](#) for a list of all the calculated PWL.
- It is assumed that the normal facility operating conditions do not change significantly between the daytime and nighttime period. Normal facility operation is defined as all chillers and natural gas power plants operating simultaneously for daytime and nighttime periods. As such, the NIA analysis initially prioritizes nighttime compliance, as the PSL is more stringent during the nighttime than during the daytime.
- As part of daytime operations, a maintenance and testing program for the emergency/back-up generators was considered and included as part of the daytime operating scenario. The scenario includes testing of one (1) generator at a time at 100% load for up to two (2) hours per day to be conservative. The client has indicated that the individual units testing program will be for 15 mins per generator and they will be unloaded during the testing. As such, the NIA focuses on both nighttime and daytime conditions.
- A worst-case scenario has also been studied considering a natural gas supply interruption and full power loss for the natural gas plants. In such an event, all natural gas plants are expected to lose power completely in approximately 30 minutes. During this time, all emergency/back-up generators are considered running at 80% load simultaneously. The worst-case scenario is assumed to occur during nighttime.
- Sound propagation calculations were undertaken using the noise modeling software package CadnaA to determine the facility SPL at the receivers. All calculations were undertaken in linear octave bands.
- The resulting Cumulative SPLs were compared to the PSLs to determine if the subject facility is in compliance with the Rule.
- If the Cumulative SPL exceeds the PSL, then noise control recommendations are designed to bring the facility SPL down to meet the PSL for all the receivers in the study area.



Modeling Parameters

Table 2 lists the major parameters used in the noise model. These parameters meet the standard set forth in the Rule. The modeled conditions produce results representative of meteorological conditions favouring sound propagation (e.g., downwind or mild temperature inversion conditions) during the summer nighttime, as prescribed by the Rule. These conditions do not occur all the time at the receiver and the resulting SPL are expected to be lower than those predicted for most of the time. Therefore, the environmental conditions modeled represent “close-to-worst-case” sound propagation conditions.

Table 2: Modeling Parameters

Parameter	Value	Description
Modeling software	CadnaA by Datakustik Version 2026 MR1	An advanced noise propagation model that considers geometric spreading, atmospheric sound absorption, ground impedance effects, site topography and geometry, vegetation and environmental conditions. The CadnaA model calculates the contribution level of each noise source at the receiver location in octave bands as well as calculating the overall facility sound level.
Standard followed	ISO 9613	As recommended in the Rule guidelines. Specifies an engineering method for calculating the attenuation of sound during propagation outdoors in order to predict the levels of environmental noise at a distance from a variety of sources. The published accuracy for this standard is ± 3 dBA between 100 m to 1000 m. Accuracy levels beyond 1000 m are not published.
Wind Condition	1 – 5 m/s Downwind	ISO 9613 uses a slight downwind condition from each noise source to each receiver. Wind speed is measured at a height of 3 m to 11 m above ground and covers the acceptable range specified in the Rule.
Ground Factor	0.0 for water bodies and roads 0.3 within all facility limits 0.8 everywhere else	The ground factor G is a property of the ground material, with value ranging from 0 to 1. The typical values below were determined from several standards and guidelines, including ISO 9613, Commission Directive EU 2015/996, and Nord 2000. G = 0.0 is suitable for asphalt, concrete, pavement, water G = 0.3 is suitable for compacted dense ground, gravel road, hard soil G = 0.6 is suitable for sand, compacted field and gravel, roadside dirt G = 0.8 is suitable for cultivated land, such as farmland G = 1.0 is suitable for uncultivated land, such as forest floor and loose ground For residential properties, the ground factor was determined from the proportion of the above typical values, based on satellite images.
Order of Reflection	2	The model calculates reflection effects from the reflective surfaces included in the model.
Foliage	Excluded	Not included based on conservative considerations due to the presence of human dwelling residences in the study area.
Temperature	10°C	Represents typical summer nighttime temperature.
Relative Humidity	80%	Represents typical summer nighttime relative humidity.
Topography	1 m Resolution	Topographical data obtained from Natural Resources Canada. No berms have been incorporated in the models at this time.



Results

Overall Sound Pressure Levels – Nighttime

Table 3 summarizes the overall Sound Pressure Levels (SPL) predictions for the receivers in the study area for nighttime. The Facility SPL is the overall SPL from all the facilities in the study area. The Cumulative SPL includes the contribution of the Facility SPL and the Ambient Sound Levels (ASL).

Table 3: Overall Sound Pressure Levels - As Proposed - Nighttime

Receiver	Approximate Distance & Direction from the Center of the Subject Facility	PSL (dBA)	ASL (dBA)	As Proposed			
				Facility SPL (dBA)	Cumulative SPL (dBA)	Meet the PSL	dBC-dBA
R01	650 m SSW	53.0	48.0	70.8	70.8	No	4.0
R01-2nd Story	650 m SSW	53.0	48.0	72.4	72.4	No	3.8
R02	400 m W	53.0	48.0	70.0	70.0	No	4.1
R03	1190 m NNW	45.0	40.0	63.8	63.8	No	4.3
R03 - 2nd Story	1190 m NNW	45.0	40.0	64.0	64.0	No	4.3
R04	750 m SSW	48.0	43.0	69.0	69.0	No	4.8
R04 - 2nd Story	750 m SSW	48.0	43.0	70.6	70.6	No	4.4
R05	920 m SSW	48.0	43.0	65.7	65.7	No	4.5
R05 - 2nd Story	920 m SSW	48.0	43.0	66.3	66.3	No	4.4
R06	2280 m N	40.0	35.0	55.4	55.4	No	5.5
R06-2nd Story	2280 m N	40.0	35.0	55.6	55.6	No	5.4
R07	2200 m N	40.0	35.0	56.0	56.0	No	5.4
R08	2020 m NNE	45.0	40.0	57.6	57.7	No	5.2
R08-2nd Story	2020 m NNE	45.0	40.0	57.8	57.9	No	5.1
R09	1500 m NNE	45.0	40.0	61.9	61.9	No	4.6
R10	1880 m NNW	40.0	35.0	58.0	58.0	No	5.1
R11	1760 m N	40.0	35.0	59.4	59.4	No	4.9
R12	2100 m SE	40.0	35.0	55.7	55.7	No	5.4
R13	2150 m SE	40.0	35.0	55.4	55.4	No	5.4
R13-2nd Story	2150 m SE	40.0	35.0	55.4	55.4	No	5.4
R14	1410 m ESE	45.0	40.0	60.5	60.5	No	4.7
R15	1240 m E	40.0	35.0	61.9	61.9	No	4.6
R16	1430 m ENE	40.0	35.0	60.9	60.9	No	4.7
R17	1500 m NE	40.0	35.0	61.3	61.3	No	4.6
R18	590 m NW	45.0	40.0	69.3	69.3	No	4.0
R19	660 m NNW	45.0	40.0	68.9	68.9	No	4.0
R20	1010 m NNW	45.0	40.0	64.7	64.7	No	4.3
R21	290 m W	53.0	48.0	72.3	72.3	No	4.0
R22	1260 m SSW	51.0	46.0	61.7	61.8	No	4.6
R23	1510 m SW	51.0	46.0	59.2	59.4	No	4.9
R23-2nd Story	1510 m SW	51.0	46.0	59.3	59.5	No	4.9
R24	1120 m WSW	51.0	46.0	62.1	62.2	No	4.7
R25	760 m WSW	51.0	46.0	65.4	65.4	No	4.5
R26	1640 m WSW	51.0	46.0	57.2	57.5	No	5.3



Table 3: Overall Sound Pressure Levels - As Proposed - Nighttime

R27	1870 m	WSW	51.0	46.0	55.9	56.3	No	5.3
R27-2nd Story	1870 m	WSW	51.0	46.0	56.7	57.1	No	5.3
R28	1340 m	W	46.0	41.0	60.1	60.2	No	4.9
R28-2nd Story	1340 m	W	46.0	41.0	60.3	60.4	No	5.0

The results of this assessment indicate that, the Cumulative SPL is expected to exceed the PSL at all of the receivers in the study area for nighttime operations. The most impacted receiver is R01-2nd Story, located 650 m SSW from the subject facility center, with a Cumulative SPL of 72.4 dBA, and a PSL of 53.0 dBA. Additional noise control is required for the subject facility to comply with the Rule.

The above results also indicate that the dBC-dBA values are expected to meet the 20 dB limit at all of the receivers in the study area. However, the secondary assessment of LFN is inconclusive at this stage because there are insufficient 1/3 octave band data at the receivers to determine tonality. As such, the predicted dBC-dBA values in the above table are provided for information purposes only. OpenCycle recommends executing Stage-4 for to fully understand the design details and study the likelihood of LFN occurrence.

Figure 2A shows the noise map of the area with the expanded Facility SPL contours, that is, the facility noise emissions contours excluding the ASL. Figure 2B shows the noise map of the area with Cumulative SPL contours, that is, the facility noise emissions contours including the ASL. The Cumulative SPL map is the one that can be compared to the PSL at the receivers. The calculation area has been constrained to just outside the study area radius to save calculation time.



Figure 2A: Noise Contour Map – Facility SPL - Nighttime

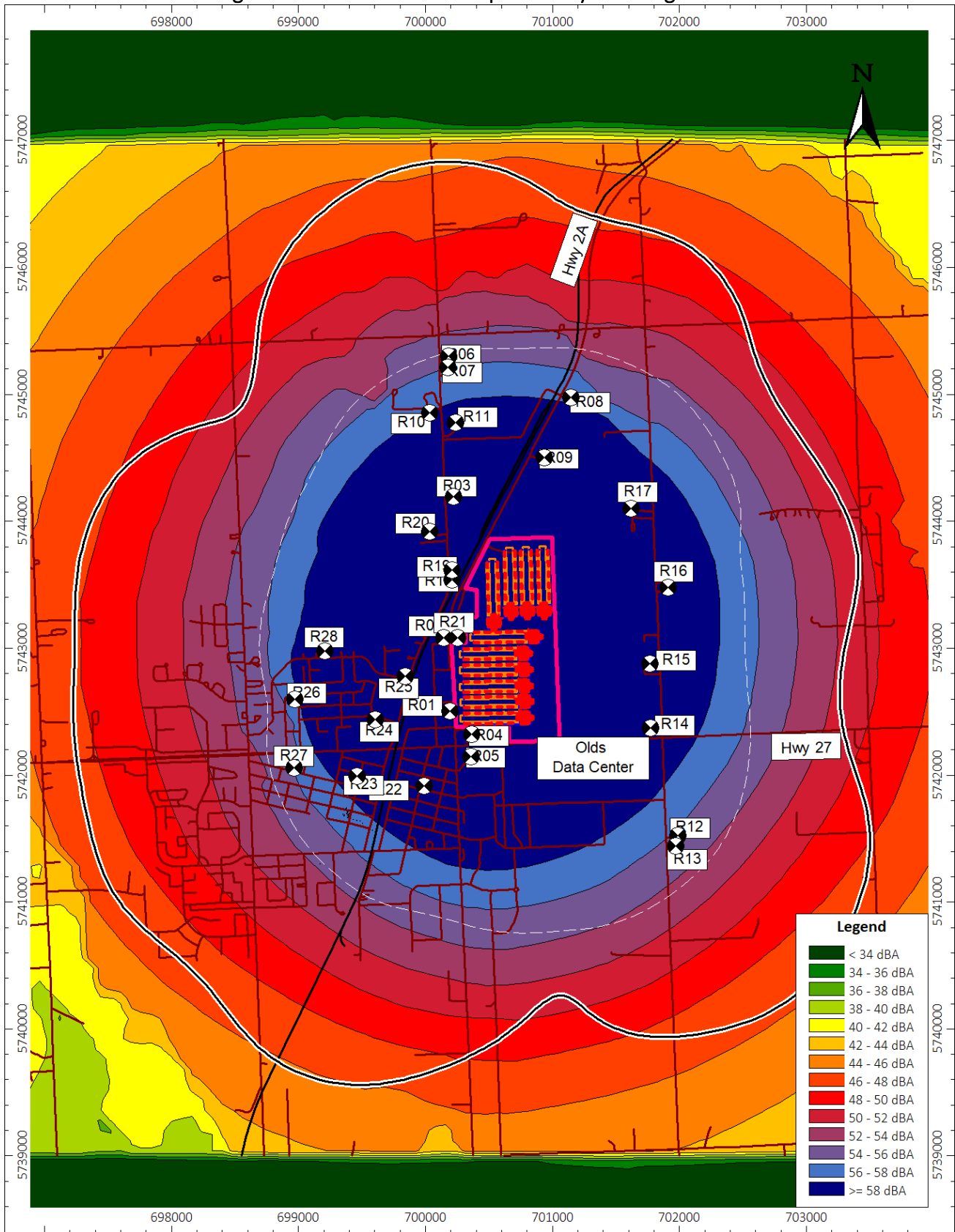
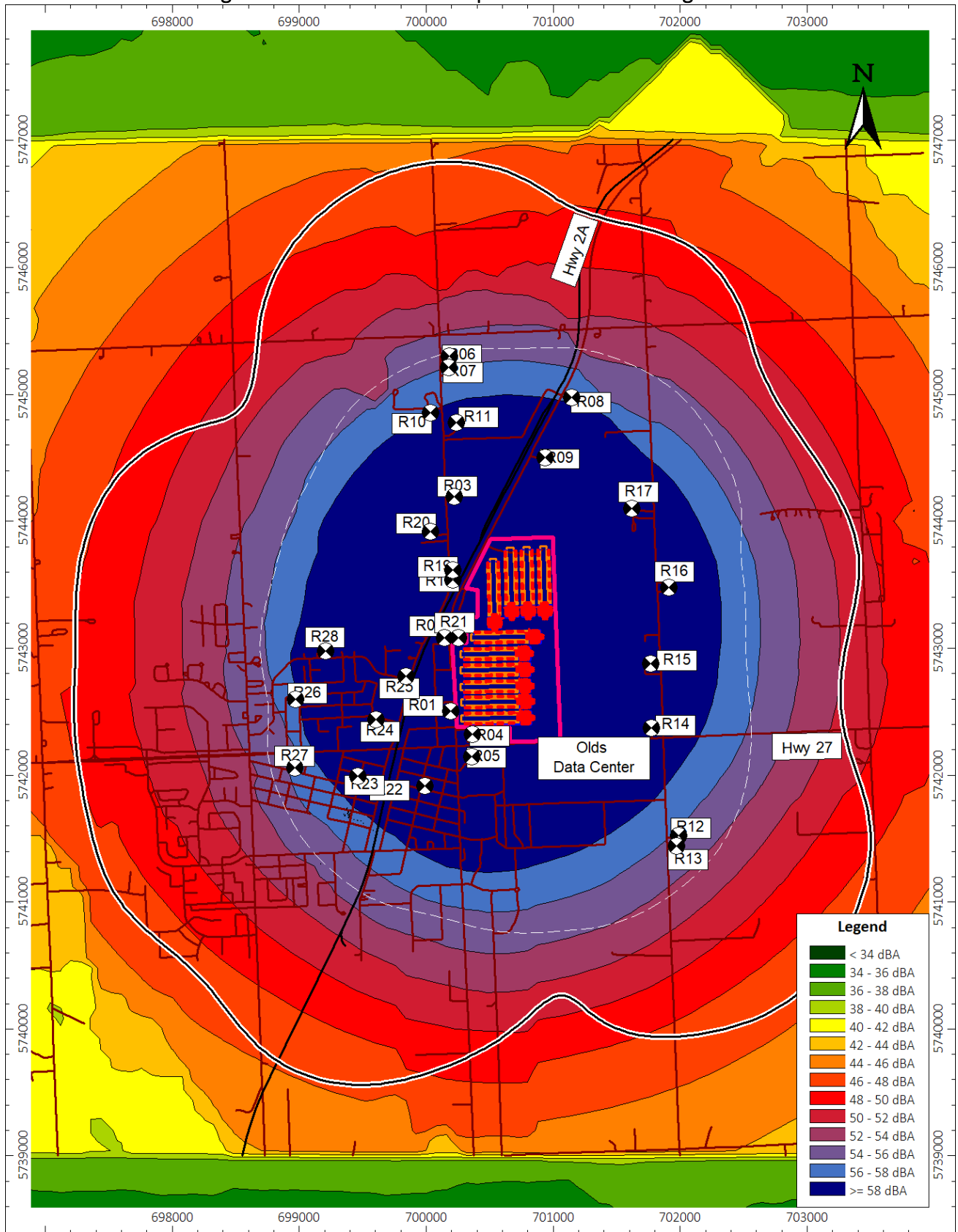


Figure 2B: Noise Contour Map –Cumulative SPL -Nighttime



Source Order Ranking – Nighttime

Table 4 lists the top ten dominant noise sources received at the most impacted receiver R01, located 650 m SSW from the subject facility center. See [Appendix E](#) for the complete source order ranking table.

Table 4: Source Order Ranking – Nighttime – R01 – Second Story

Rank	Noise Source	SPL (dBA)	dBC-dBA
001	Chiller Top	56.5	3.5
002	Chiller Top	56.2	3.4
003	Chiller Top	55.7	3.7
004	Chiller Top	55.3	3.6
005	Chiller Top	55.3	3.6
006	Chiller Top	55.2	3.7
007	Chiller Top	54.2	4.1
008	Chiller Top	53.9	4.3
009	Chiller Top	53.8	2.9
010	Chiller Top	53.7	4.3
011+	Cumulative Remaining 1748 Noise Sources	71.5	4.0
	Facility SPL	72.4	3.8
	ASL	48.0	-
	Cumulative SPL	72.4	-
	PSL	53.0	-

The above results indicate that the dominant noise comes from chillers. If any noise control is desired, it should aim at attenuating the dominant noise sources.

For general technical details on sound levels and analysis, as well as for a best practices approach as recommended by the Rule, see [Appendix G](#).

Noise Control Recommendations – Nighttime

Noise control recommendations are designed to bring the facility SPL down to meet the PSL for all the receivers in the study area. Table 5 lists the noise control items to reduce the SPL at all of the receivers for nighttime operations.



Table 5: Noise Control Recommendations – Nighttime

Item	Noise Source	Noise Control
1	Chillers	Install chillers with ≤ 85 dBA PWL per unit
2	NG Plant Step-up Transformers	Install transformers with ≤ 80 dBA PWL per unit
3	NG Plant Bldg Air Inlet Filter House	Install air inlet silencers to achieve ≤ 85 dBA PWL per unit
4	Noise barriers	Install ≥ 7.5 m high, highly absorbing (both sides assumed absorption coefficient 0.84) noise barrier on the NW corner of the data center as depicted on Figure 3, see Appendix F for available industrial noise barrier specifications

Figure 3: Proposed Noise Barrier Locations



Implementing Noise Control Items 1-4 is required to meet the PSL at all receivers in the study area. OpenCycle recommends careful consideration of specific noise mitigation measures during detailed design, and to also consider potential LFN considerations. Table 6 summarizes the overall SPL predictions from the model for each receiver in the study area once the recommended Noise Control Items 1-4 have been implemented.

Table 6: Overall Sound Pressure Levels - As Proposed/After Noise Control - Nighttime

Receiver	Approximate Distance & Direction from the Center of the Subject Facility	PSL (dBA)	ASL (dBA)	As Proposed				After Noise Control				
				Facility SPL (dBA)	Cumulative SPL (dBA)	Meet the PSL	dBC-dBA	Facility SPL (dBA)	Cumulative SPL (dBA)	Noise Reduction (dBA)	Meet the PSL	dBC-dBA
R01	650 m SSW	53.0	48.0	70.8	70.8	No	4.0	45.8	50.0	25.0	Yes	10.3
R01-2nd Story	650 m SSW	53.0	48.0	72.4	72.4	No	3.8	47.3	50.7	25.1	Yes	9.2
R02	400 m W	53.0	48.0	70.0	70.0	No	4.1	45.2	49.8	24.8	Yes	11.8
R03	1190 m NNW	45.0	40.0	63.8	63.8	No	4.3	39.1	42.6	24.7	Yes	12.6
R03-2nd Story	1190 m NNW	45.0	40.0	64.0	64.0	No	4.3	39.2	42.6	24.8	Yes	12.7
R04	750 m SSW	48.0	43.0	69.0	69.0	No	4.8	44.3	46.7	24.7	Yes	12.0
R04-2nd Story	750 m SSW	48.0	43.0	70.6	70.6	No	4.4	45.8	47.6	24.8	Yes	10.9
R05	920 m SSW	48.0	43.0	65.7	65.7	No	4.5	41.5	45.3	24.2	Yes	13.3
R05-2nd Story	920 m SSW	48.0	43.0	66.3	66.3	No	4.4	42.0	45.5	24.3	Yes	13.0
R06	2280 m N	40.0	35.0	55.4	55.4	No	5.5	31.1	36.5	24.3	Yes	15.6
R06-2nd Story	2280 m N	40.0	35.0	55.6	55.6	No	5.4	31.3	36.5	24.3	Yes	15.4
R07	2200 m N	40.0	35.0	56.0	56.0	No	5.4	31.7	36.7	24.3	Yes	15.3
R08	2020 m NNE	45.0	40.0	57.6	57.7	No	5.2	33.3	40.8	24.3	Yes	14.6
R08-2nd Story	2020 m NNE	45.0	40.0	57.8	57.9	No	5.1	33.4	40.9	24.4	Yes	14.6
R09	1500 m NNE	45.0	40.0	61.9	61.9	No	4.6	37.3	41.9	24.6	Yes	13.4
R10	1880 m NNW	40.0	35.0	58.0	58.0	No	5.1	33.6	37.4	24.4	Yes	14.5
R11	1760 m N	40.0	35.0	59.4	59.4	No	4.9	34.9	38.0	24.5	Yes	14.1
R12	2100 m SE	40.0	35.0	55.7	55.7	No	5.4	31.9	36.7	23.8	Yes	16.4
R13	2150 m SE	40.0	35.0	55.4	55.4	No	5.4	31.6	36.6	23.8	Yes	16.4
R13-2nd Story	2150 m SE	40.0	35.0	55.4	55.4	No	5.4	31.7	36.7	23.7	Yes	16.3
R14	1410 m ESE	45.0	40.0	60.5	60.5	No	4.7	36.9	41.7	23.6	Yes	15.8
R15	1240 m E	40.0	35.0	61.9	61.9	No	4.6	38.3	40.0	23.6	Yes	15.7
R16	1430 m ENE	40.0	35.0	60.9	60.9	No	4.7	37.0	39.1	23.9	Yes	15.2
R17	1500 m NE	40.0	35.0	61.3	61.3	No	4.6	37.0	39.1	24.3	Yes	14.1
R18	590 m NW	45.0	40.0	69.3	69.3	No	4.0	43.3	45.0	26.0	Yes	13.0
R19	660 m NNW	45.0	40.0	68.9	68.9	No	4.0	42.8	44.6	26.1	Yes	12.9
R20	1010 m NNW	45.0	40.0	64.7	64.7	No	4.3	39.7	42.9	25.0	Yes	12.8
R21	290 m W	53.0	48.0	72.3	72.3	No	4.0	47.4	50.7	24.9	Yes	11.2
R22	1260 m SSW	51.0	46.0	61.7	61.8	No	4.6	37.3	46.5	24.4	Yes	13.6
R23	1510 m SW	51.0	46.0	59.2	59.4	No	4.9	34.7	46.3	24.5	Yes	14.1
R23-2nd Story	1510 m SW	51.0	46.0	59.3	59.5	No	4.9	34.9	46.3	24.4	Yes	14.1
R24	1120 m WSW	51.0	46.0	62.1	62.2	No	4.7	37.5	46.6	24.6	Yes	13.2
R25	760 m WSW	51.0	46.0	65.4	65.4	No	4.5	40.7	47.1	24.7	Yes	12.5
R26	1640 m WSW	51.0	46.0	57.2	57.5	No	5.3	32.6	46.2	24.6	Yes	14.9
R27	1870 m WSW	51.0	46.0	55.9	56.3	No	5.3	31.5	46.2	24.4	Yes	15.0
R27-2nd Story	1870 m WSW	51.0	46.0	56.7	57.1	No	5.3	32.3	46.2	24.4	Yes	14.7
R28	1340 m W	46.0	41.0	60.1	60.2	No	4.9	35.6	42.1	24.5	Yes	13.9
R28-2nd Story	1340 m W	46.0	41.0	60.3	60.4	No	5.0	35.7	42.1	24.6	Yes	13.8



The above results indicate that, once the noise control items have been implemented, the Cumulative SPL is expected to bring the facility in compliance for all receivers in the study area. Figure 4A shows the noise map of the area with Facility SPL contours, that is, the facility noise emissions contours excluding the ASL, once the required noise control items have been implemented. Figure 4B shows the noise map of the area with Cumulative SPL contours, that is, the facility noise emissions contours including the ASL, once the required noise control items have been implemented. The Cumulative SPL map is the one that can be compared to the PSL at the receivers.

Figure 4A: Noise Contour Map – After Noise Control – Facility SPL – Nighttime

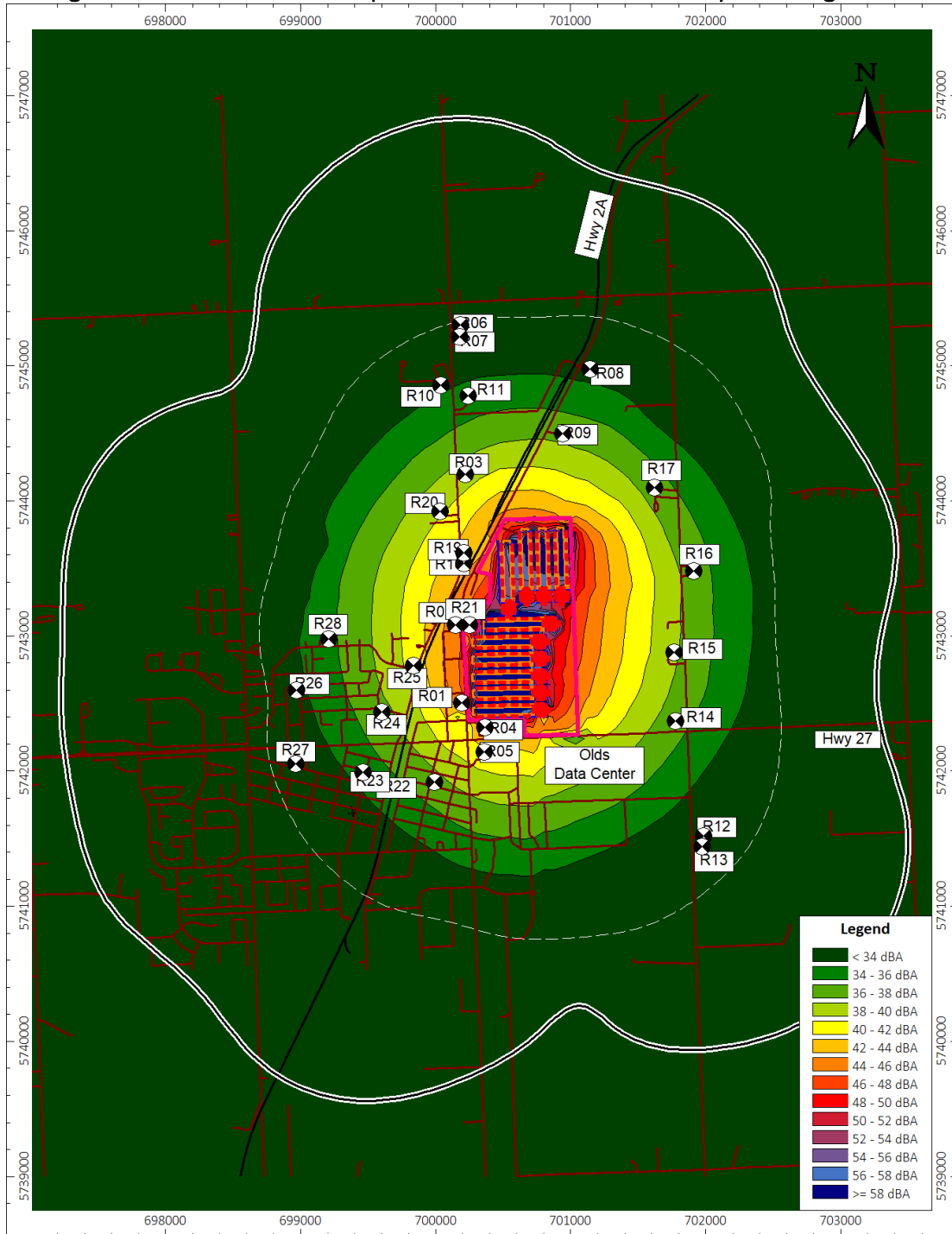
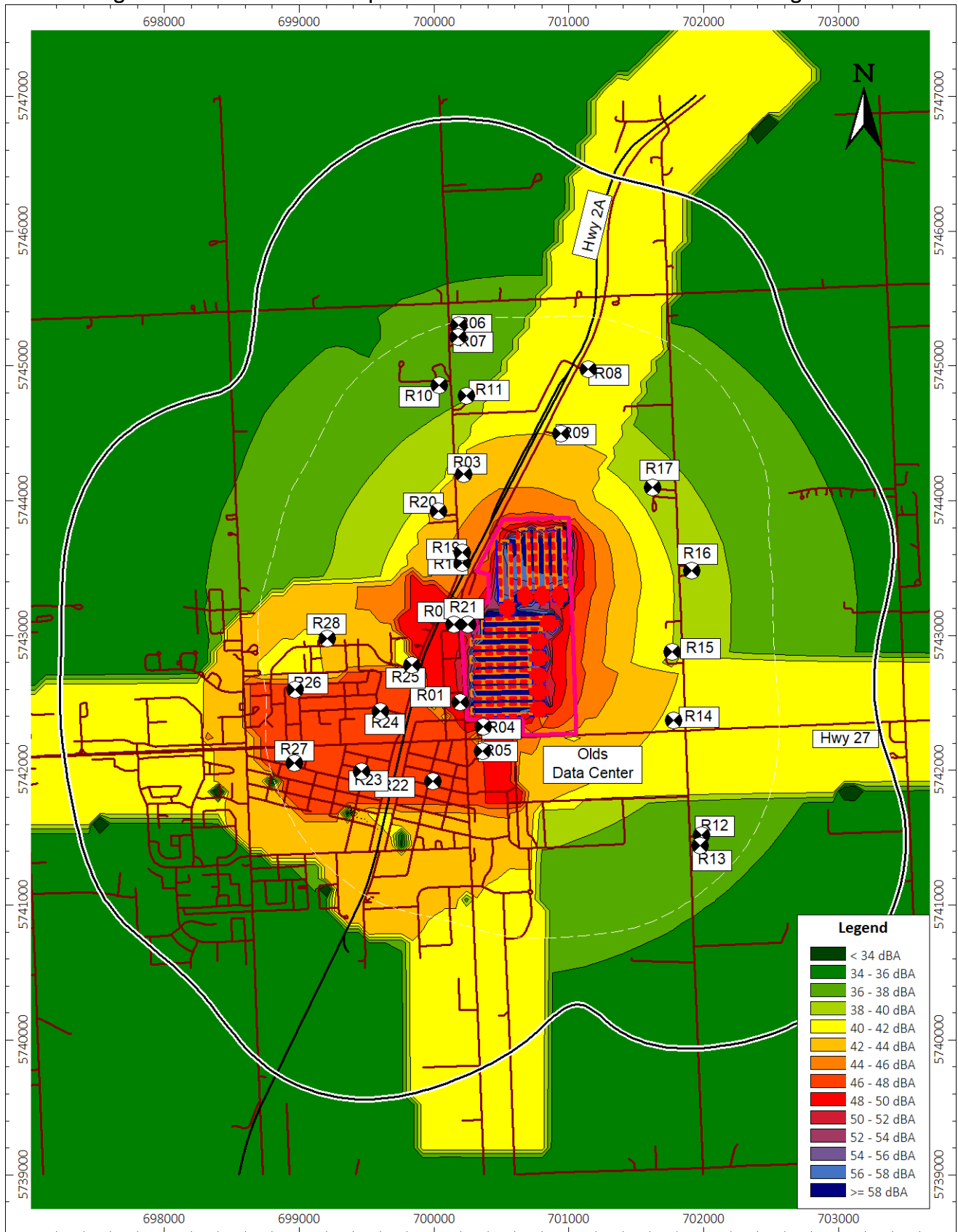


Figure 4B: Noise Contour Map – After Noise Control – Cumulative SPL – Nighttime



Overall Sound Pressure Levels – Daytime

Daytime operations include testing back-up generators in addition to normal operations. One (1) back-up generator at a time is planned to be tested individually at 100% load for up to 2 hours twice per year as part of regular maintenance and testing. Table 7 summarizes the overall Sound Pressure Levels (SPL) predictions for the receivers in the study area for a representative daytime operation with one back-up generator directly facing R15 operating, assuming nighttime compliance is achieved for all of the receivers with mitigation implemented as recommended above. R15 was selected to present daytime testing operation impact as this receiver’s predicted Cumulative SPL is 40.0 dBA with a PSL of 40 dBA for nighttime compliance achieved with recommended mitigation options as presented in Table 6, which was not deemed adjustable due to high dwelling density or heavily travelled roadways. It has been confirmed with modeling iterations that all other receiver SPLs are expected to be under their respective PSLs with daytime ambient sound levels applied as prescribed in the Rule. The Facility SPL is the overall SPL from all the facilities in the study area. The Cumulative SPL includes the contribution of the Facility SPL and the Ambient Sound Levels (ASL).

Table 7: Overall Sound Pressure Levels - As Proposed & Nighttime Compliance Achieved - Daytime

Receiver	Approximate Distance & Direction from the Center of the Subject Facility	PSL (dBA)	ASL (dBA)	As Proposed & Nighttime Compliance Achieved-Daytime			
				Facility SPL (dBA)	Cumulative SPL (dBA)	Meet the PSL	dBc-dBA
R01	650 m SSW	63.0	58.0	45.9	58.3	Yes	10.5
R01-2nd Story	650 m SSW	63.0	58.0	47.4	58.4	Yes	9.5
R02	400 m W	63.0	58.0	45.4	58.2	Yes	11.8
R03	1190 m NNW	55.0	50.0	39.4	50.4	Yes	12.5
R03 - 2nd Story	1190 m NNW	55.0	50.0	39.5	50.4	Yes	12.5
R04	750 m SSW	58.0	53.0	44.4	53.6	Yes	12.2
R04 - 2nd Story	750 m SSW	58.0	53.0	45.9	53.8	Yes	11.1
R05	920 m SSW	58.0	53.0	41.8	53.3	Yes	13.4
R05 - 2nd Story	920 m SSW	58.0	53.0	42.4	53.4	Yes	13.0
R06	2280 m N	50.0	45.0	31.4	45.2	Yes	15.5
R06-2nd Story	2280 m N	50.0	45.0	31.5	45.2	Yes	15.5
R07	2200 m N	50.0	45.0	31.9	45.2	Yes	15.3
R08	2020 m NNE	55.0	50.0	33.6	50.1	Yes	14.6
R08-2nd Story	2020 m NNE	55.0	50.0	33.8	50.1	Yes	14.6
R09	1500 m NNE	55.0	50.0	37.6	50.2	Yes	13.4
R10	1880 m NNW	50.0	45.0	34.0	45.3	Yes	14.3
R11	1760 m N	50.0	45.0	35.1	45.4	Yes	14.1
R12	2100 m SE	50.0	45.0	32.9	45.3	Yes	15.9
R13	2150 m SE	50.0	45.0	32.5	45.2	Yes	16.0
R13-2nd Story	2150 m SE	50.0	45.0	32.6	45.2	Yes	15.9
R14	1410 m ESE	55.0	50.0	38.1	50.3	Yes	15.2
R15	1240 m E	50.0	45.0	39.0	46.0	Yes	15.7
R16	1430 m ENE	50.0	45.0	37.3	45.7	Yes	15.2
R17	1500 m NE	50.0	45.0	37.4	45.7	Yes	14.0
R18	590 m NW	55.0	50.0	43.5	50.9	Yes	13.0
R19	660 m NNW	55.0	50.0	43.0	50.8	Yes	12.8



Table 7: Overall Sound Pressure Levels - As Proposed & Nighttime Compliance Achieved - Daytime

R20	1010 m	NNW	55.0	50.0	40.0	50.4	Yes	12.6
R21	290 m	W	63.0	58.0	47.5	58.4	Yes	11.3
R22	1260 m	SSW	61.0	56.0	37.8	56.1	Yes	13.6
R23	1510 m	SW	61.0	56.0	35.3	56.0	Yes	14.0
R23-2nd Story	1510 m	SW	61.0	56.0	35.4	56.0	Yes	14.1
R24	1120 m	WSW	61.0	56.0	38.0	56.1	Yes	13.2
R25	760 m	WSW	61.0	56.0	41.2	56.1	Yes	12.5
R26	1640 m	WSW	61.0	56.0	33.2	56.0	Yes	14.8
R27	1870 m	WSW	61.0	56.0	32.2	56.0	Yes	14.8
R27-2nd Story	1870 m	WSW	61.0	56.0	32.9	56.0	Yes	14.6
R28	1340 m	W	56.0	51.0	36.0	51.1	Yes	13.9
R28-2nd Story	1340 m	W	56.0	51.0	36.1	51.1	Yes	13.9

The results of this assessment indicate that, the Cumulative SPL is expected to meet the PSL at all receivers in the study area for daytime operations once nighttime compliance is achieved. The most impacted receiver is R01-2nd Story, located 650 m SSW from the subject facility center, with a Cumulative SPL of 58.4 dBA, and a PSL of 63.0 dBA. Additional noise control is not required for the subject facility to comply with the Rule.

The above results also indicate that the dBC-dBA values are expected to meet the 20 dB limit at all receivers in the study area. However, the secondary assessment of LFN is inconclusive at this stage because there are insufficient 1/3 octave band data at the receivers to determine tonality. As such, the predicted dBC-dBA values in the above table are provided for information purposes only. OpenCycle recommends executing Stage-4 for to fully understand the design details and study the likelihood of LFN occurrence.

Figure 5A shows the noise map of the area with the expanded Facility SPL contours, that is, the facility noise emissions contours excluding the ASL. Figure 5B shows the noise map of the area with Cumulative SPL contours, that is, the facility noise emissions contours including the ASL. The Cumulative SPL map is the one that can be compared to the PSL at the receivers.



Figure 5A: Noise Contour Map – Facility SPL –As Proposed & Nighttime Compliance Achieved Daytime

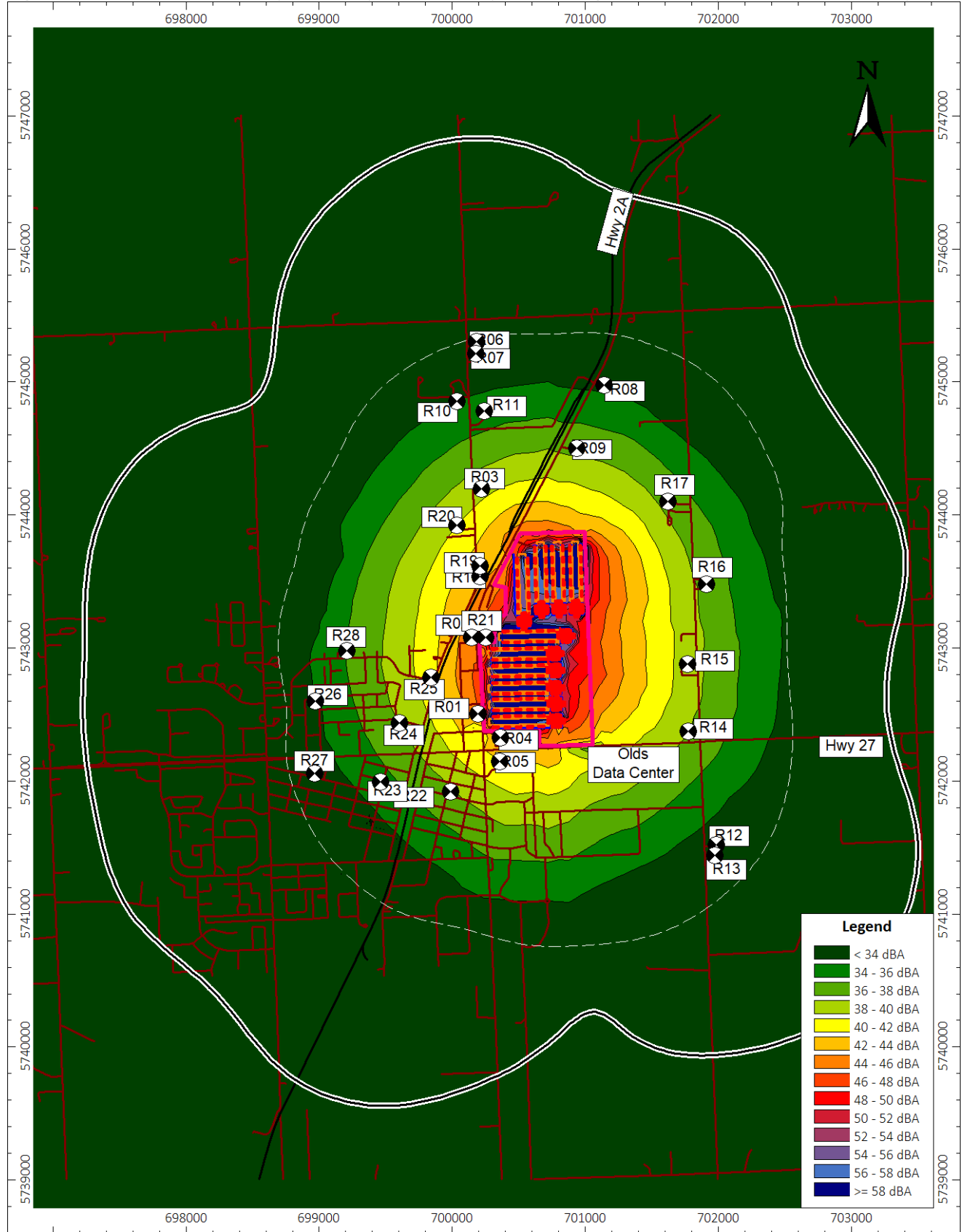


Figure 5B: Noise Contour Map –Cumulative SPL – As Proposed & Nighttime Compliance Achieved - Daytime

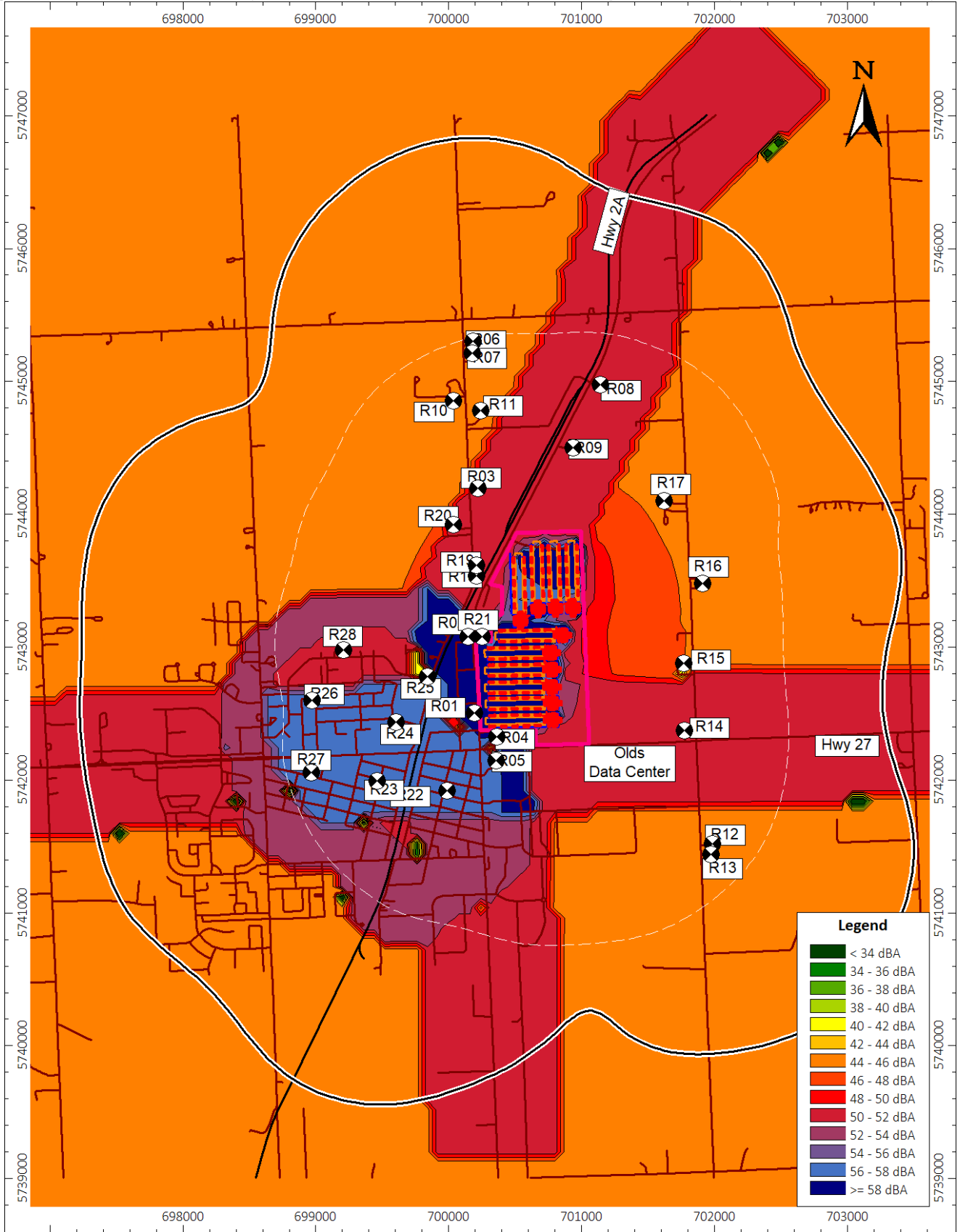


Table 8 lists the top ten dominant noise sources received at receiver R15, located 1240 m E from the subject facility center. R15 was selected to present daytime testing operation impact as this receiver’s predicted Cumulative SPL is 40.0 dBA with a PSL of 40 dBA for nighttime compliance achieved with recommended mitigation options as presented in Table 6, which was not deemed adjustable due to high dwelling density or heavily travelled roadways.

Table 8: Source Order Ranking – As Proposed & Nighttime Compliance Achieved - Daytime – R15

Rank	Noise Source	SPL (dBA)	dBc-dBA
001	Genset Bldg Wall	29.6	15.5
002	Genset Air Intake	21.3	17.6
003	Genset Exhaust Pipe	18.1	12.4
004	Genset Cooler Discharge	17.3	11.6
005	Genset Exhaust Tip	17.2	13.8
006	Genset Bldg Door Closed	14.4	17.7
007	HRSO Stack Exit	12.7	19.7
008	Chiller Top	12.3	3.4
009	Chiller Top	11.8	3.2
010	Chiller Top	11.7	3.6
011+	Cumulative Remaining 1500 Noise Sources	38.1	15.7
	Facility SPL	39.0	15.7
	ASL	45.0	-
	Cumulative SPL	46.0	-
	PSL	50.0	-

The above results indicate that the dominant noise comes from the back-up generators. If any noise control is desired, it should aim at attenuating the dominant noise sources.

For general technical details on sound levels and analysis, as well as for a best practices approach as recommended by the Rule, see [Appendix G](#).



Worst-Case Scenario – Nighttime Compliance Achieved- Nighttime

The worst-case scenario for proposed facility operations is identified as an event that natural gas supply is fully interrupted due to a natural disaster, pipe rupture, supply/demand issues etc. Synapse identifies the likelihood of this event occurring is once in 5+ years. In such an event, all natural gas power plants are expected to completely lose power in approximately 30 minutes. In the meantime, all back up/emergency generators run simultaneously at 80% load. The event is assumed to occur during nighttime for a more conservative study. Power plant PWLs are estimated to account for nighttime (Leq-9 hours) and back up/emergency generator PWLs are estimated for generators operating at 80% load. OpenCycle initially assumed upgraded generators with 75 dBA @ 7m for the sake of worst-case scenario analysis. Table 9 summarizes the overall Sound Pressure Levels (SPL) predictions for the receivers in the study area assuming nighttime compliance is achieved for normal operations and all emergency/back up generators are upgraded to 75 dBA @ 7m.

Table 9: Overall Sound Pressure Levels - As Proposed & Nighttime Compliance Achieved – Worst-Case - Nighttime - 75 dBA @ 7m Generators

Receiver	Approximate Distance & Direction from the Center of the Subject Facility	PSL (dBA)	ASL (dBA)	Facility SPL (dBA)	Cumulative SPL (dBA)	Meet the PSL	dBc-dBA
R01	650 m SSW	53.0	48.0	55.1	55.9	No	12.8
R01-2nd Story	650 m SSW	53.0	48.0	56.5	57.1	No	12.2
R02	400 m W	53.0	48.0	54.3	55.2	No	12.6
R03	1190 m NNW	45.0	40.0	48.6	49.2	No	12.8
R03 - 2nd Story	1190 m NNW	45.0	40.0	48.8	49.3	No	12.6
R04	750 m SSW	48.0	43.0	54.9	55.2	No	13.2
R04 - 2nd Story	750 m SSW	48.0	43.0	56.1	56.3	No	12.6
R05	920 m SSW	48.0	43.0	51.1	51.7	No	12.8
R05 - 2nd Story	920 m SSW	48.0	43.0	51.6	52.2	No	12.5
R06	2280 m N	40.0	35.0	41.8	42.6	No	14.3
R06-2nd Story	2280 m N	40.0	35.0	42.0	42.8	No	14.2
R07	2200 m N	40.0	35.0	42.3	43.0	No	14.2
R08	2020 m NNE	45.0	40.0	43.8	45.3	No	13.7
R08-2nd Story	2020 m NNE	45.0	40.0	44.0	45.5	No	13.7
R09	1500 m NNE	45.0	40.0	47.5	48.2	No	13.3
R10	1880 m NNW	40.0	35.0	43.8	44.3	No	13.6
R11	1760 m N	40.0	35.0	45.0	45.4	No	13.6
R12	2100 m SE	40.0	35.0	41.6	42.5	No	13.9
R13	2150 m SE	40.0	35.0	41.4	42.3	No	13.9
R13-2nd Story	2150 m SE	40.0	35.0	41.5	42.4	No	13.9
R14	1410 m ESE	45.0	40.0	46.2	47.1	No	13.2
R15	1240 m E	40.0	35.0	47.8	48.0	No	13.3
R16	1430 m ENE	40.0	35.0	46.8	47.1	No	13.0
R17	1500 m NE	40.0	35.0	46.6	46.9	No	12.9
R18	590 m NW	45.0	40.0	52.8	53.0	No	12.7
R19	660 m NNW	45.0	40.0	52.3	52.5	No	12.7
R20	1010 m NNW	45.0	40.0	49.1	49.6	No	12.7
R21	290 m W	53.0	48.0	56.1	56.7	No	12.8



Table 9: Overall Sound Pressure Levels - As Proposed & Nighttime Compliance Achieved – Worst-Case - Nighttime - 75 dBA @ 7m Generators

R22	1260 m	SSW	51.0	46.0	46.5	49.3	Yes	12.7
R23	1510 m	SW	51.0	46.0	44.3	48.2	Yes	13.2
R23-2nd Story	1510 m	SW	51.0	46.0	44.5	48.3	Yes	13.1
R24	1120 m	WSW	51.0	46.0	47.3	49.7	Yes	13.3
R25	760 m	WSW	51.0	46.0	50.4	51.7	No	13.0
R26	1640 m	WSW	51.0	46.0	43.1	47.8	Yes	14.1
R27	1870 m	WSW	51.0	46.0	41.5	47.3	Yes	13.9
R27-2nd Story	1870 m	WSW	51.0	46.0	42.5	47.6	Yes	13.7
R28	1340 m	W	46.0	41.0	45.8	47.0	No	13.5
R28-2nd Story	1340 m	W	46.0	41.0	46.1	47.3	No	13.4

The results of this assessment indicate that, the Cumulative SPL is expected to exceed the PSL at most of the receivers in the study area for worst case nighttime operations with upgraded 75 dBA @ 7m generators assuming nighttime compliance is achieved via recommended noise control options discussed above. The most impacted receiver is R01-2nd Story, located 650 m SSW from the subject facility center, with a Cumulative SPL of 57.1 dBA, and a PSL of 53.0 dBA. Additional noise control is required for the subject facility to comply with the Rule.

The above results also indicate that the dBC-dBA values are expected to meet the 20 dB limit at all of the receivers in the study area. However, the secondary assessment of LFN is inconclusive at this stage because there are insufficient 1/3 octave band data at the receivers to determine tonality. As such, the predicted dBC-dBA values in the above table are provided for information purposes only. OpenCycle recommends executing Stage-4 to fully understand the design details and study the likelihood of LFN occurrence.

Figure 6A shows the noise map of the area with the expanded Facility SPL contours, that is, the facility noise emissions contours excluding the ASL. Figure 6B shows the noise map of the area with Cumulative SPL contours, that is, the facility noise emissions contours including the ASL. The Cumulative SPL map is the one that can be compared to the PSL at the receivers.



Figure 6A: Noise Contour Map –Facility SPL – As Proposed & Nighttime Compliance Achieved – Worst-Case -
 Nighttime - 75 dBA @ 7m Generators

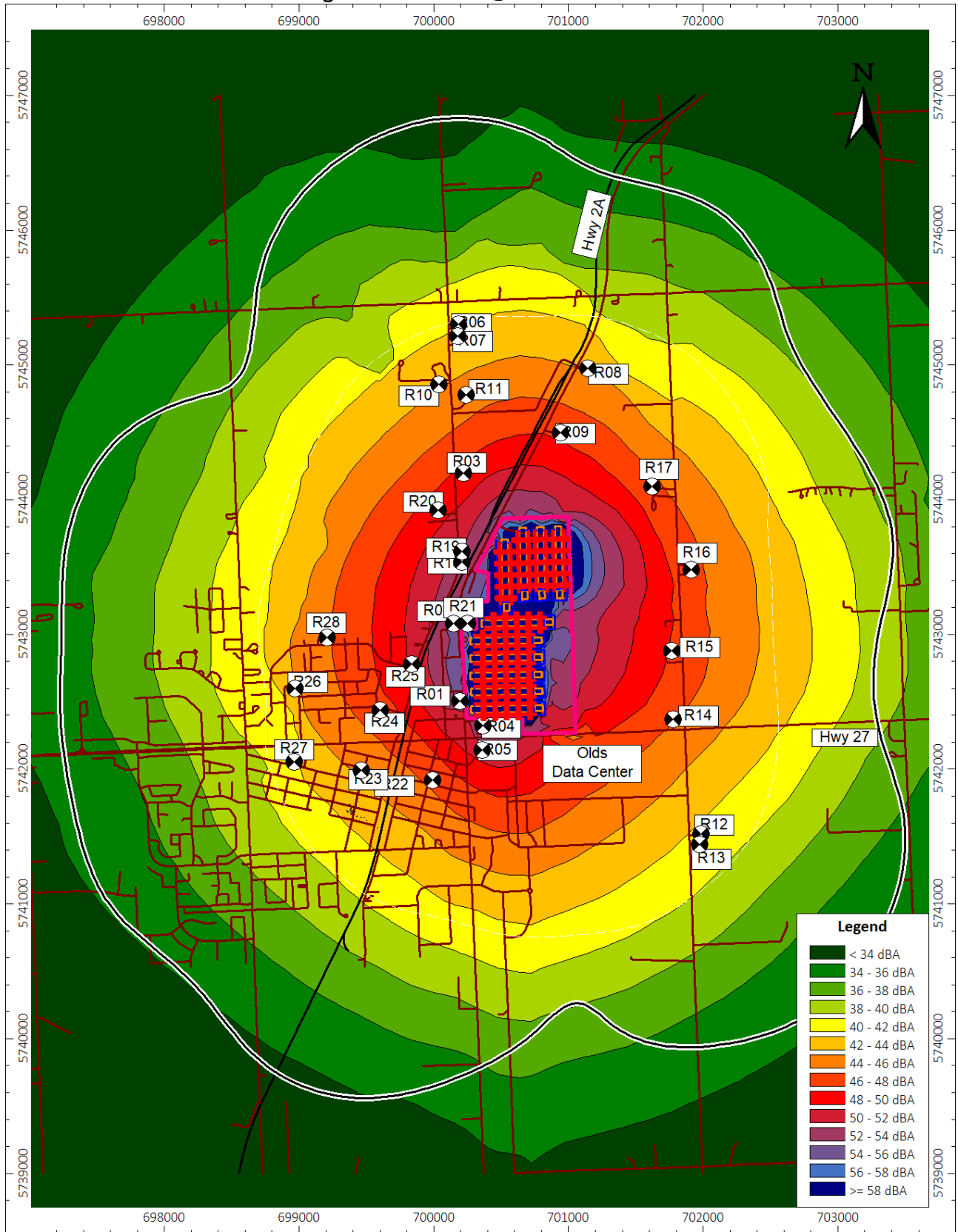
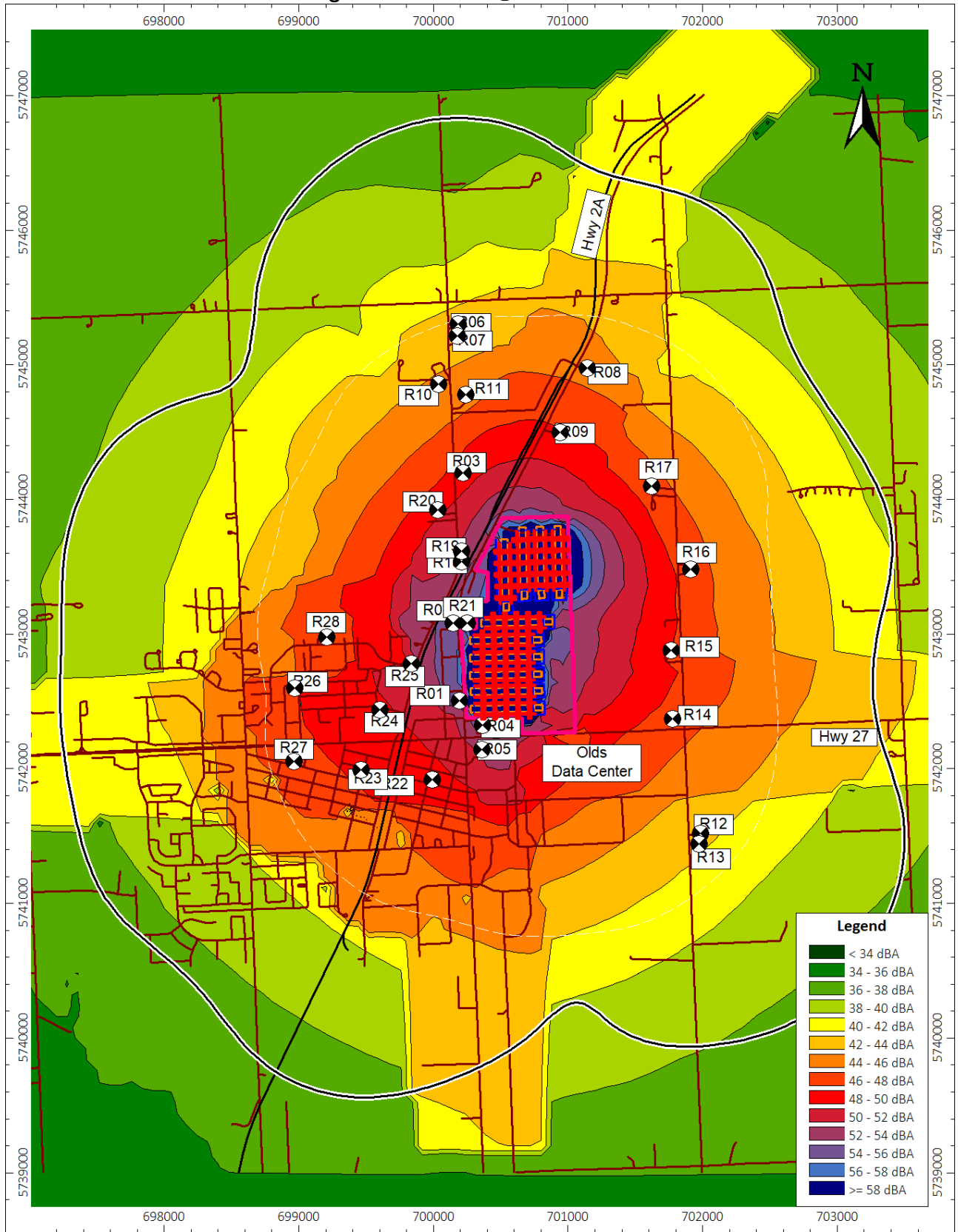


Figure 6B: Noise Contour Map –Cumulative SPL – As Proposed & Nighttime Compliance Achieved – Worst-Case - Nighttime - 75 dBA @ 7m Generators



Source Order Ranking – Nighttime Compliance Achieved – Worst- Case - Nighttime - 75 dBA @ 7m Generators

Table 10 lists the top ten dominant noise sources received at the most impacted receiver R01, located 650 m SSW from the subject facility center.

Table 10: Source Order Ranking – Nighttime Compliance Achieved – Worst-Case - Nighttime - 75 dBA @ 7m Generators

Rank	Noise Source	SPL (dBA)	dBC-dBA
001	Genset Bldg Wall	41.0	12.2
002	Genset Bldg Wall	40.5	12.7
003	Genset Bldg Wall	39.2	12.1
004	Genset Bldg Wall	39.0	12.2
005	Genset Bldg Wall	38.8	12.4
006	Genset Bldg Wall	38.6	12.3
007	Genset Bldg Wall	38.1	12.7
008	Genset Bldg Wall	37.9	11.6
009	Genset Bldg Wall	37.8	12.7
010	Genset Bldg Wall	37.8	12.6
011+	Cumulative Remaining 1982 Noise Sources	55.4	12.2
	Facility SPL	56.5	12.8
	ASL	48.0	-
	Cumulative SPL	57.1	-
	PSL	53.0	-

The above results indicate that the dominant noise comes from generator building walls. If any noise control is desired, it should aim at attenuating the dominant noise sources.

For general technical details on sound levels and analysis, as well as for a best practices approach as recommended by the Rule, see [Appendix G](#).

Extended Noise Control Recommendations – Nighttime Compliance Achieved – Worst-Case

Extended noise control recommendations are designed to bring the facility SPL down to meet the PSL for all the receivers in the study area. Table 11 lists the extended noise control recommendations that are designed to bring the facility SPL down to meet the PSL for all the receivers in the study area assuming nighttime compliance is achieved for normal operations with implementing the noise control items discussed above.

Table 11: Extended Noise Control Recommendations – Worst-Case - Nighttime

Item	Noise Source	Noise Control
1	Back-up/Emergency Generators Upgrade	Upgrade all back-up/emergency generators to achieve 65 dBA @ 7m for single unit
2	Noise barriers	Install/upgrade ≥8 m high, highly absorbing noise barriers (both sides assumed with absorption coefficient 0.84) as depicted on Figure 7 below, see Appendix F for available industrial noise barrier specifications



Figure 7: Proposed Noise Barrier Locations – Worst-Case Scenario



Implementing Extended Noise Control Items 1 and 2 is required to meet the PSL at all of the receivers in the study area for the worst-case scenario assuming nighttime compliance is achieved for normal operations. OpenCycle recommends careful consideration of specific noise mitigation measures during detailed design, and to also consider potential LFN considerations. **It is deemed critical to execute Stage-2 assessment to understand ambient sound levels in the study area for more accurate noise mitigation design.** Table 12 summarizes the overall SPL predictions from the model for each receiver in the study area once the recommended Extended Noise Control Items 1-2 have been implemented.

**Table 12: Overall Sound Pressure Levels - As Proposed & Nighttime Compliance Achieved – Worst-Case
Nighttime – After Extended Noise Control**

Receiver	Approximate Distance & Direction from the Center of the Subject Facility	PSL (dBA)	ASL (dBA)	Nighttime Compliance Achieved & After Extended NC			
				Facility SPL (dBA)	Cumulative SPL (dBA)	Meet the PSL	dBC-dBA
R01	650 m SSW	53.0	48.0	46.9	50.5	Yes	9.2
R01-2nd Story	650 m SSW	53.0	48.0	48.4	51.2	Yes	8.6
R02	400 m W	53.0	48.0	45.3	49.9	Yes	9.4
R03	1190 m NNW	45.0	40.0	39.7	42.9	Yes	9.7
R03 - 2nd Story	1190 m NNW	45.0	40.0	39.9	43.0	Yes	9.6
R04	750 m SSW	48.0	43.0	43.1	46.1	Yes	11.4
R04 - 2nd Story	750 m SSW	48.0	43.0	44.8	47.0	Yes	10.5
R05	920 m SSW	48.0	43.0	41.2	45.2	Yes	10.2
R05 - 2nd Story	920 m SSW	48.0	43.0	41.8	45.5	Yes	9.9
R06	2280 m N	40.0	35.0	32.2	36.8	Yes	11.7
R06-2nd Story	2280 m N	40.0	35.0	32.3	36.9	Yes	11.7
R07	2200 m N	40.0	35.0	32.7	37.0	Yes	11.5
R08	2020 m NNE	45.0	40.0	34.4	41.1	Yes	11.0
R08-2nd Story	2020 m NNE	45.0	40.0	34.5	41.1	Yes	11.1
R09	1500 m NNE	45.0	40.0	38.5	42.3	Yes	10.4
R10	1880 m NNW	40.0	35.0	34.5	37.8	Yes	10.8
R11	1760 m N	40.0	35.0	35.6	38.3	Yes	10.8
R12	2100 m SE	40.0	35.0	32.2	36.8	Yes	11.3
R13	2150 m SE	40.0	35.0	31.9	36.7	Yes	11.4
R13-2nd Story	2150 m SE	40.0	35.0	32.0	36.8	Yes	11.3
R14	1410 m ESE	45.0	40.0	36.9	41.7	Yes	10.6
R15	1240 m E	40.0	35.0	38.3	40.0	Yes	10.7
R16	1430 m ENE	40.0	35.0	37.1	39.2	Yes	10.6
R17	1500 m NE	40.0	35.0	37.1	39.2	Yes	10.1
R18	590 m NW	45.0	40.0	43.2	44.9	Yes	9.9
R19	660 m NNW	45.0	40.0	42.8	44.6	Yes	9.9
R20	1010 m NNW	45.0	40.0	40.1	43.1	Yes	9.6
R21	290 m W	53.0	48.0	46.2	50.2	Yes	9.8
R22	1260 m SSW	51.0	46.0	37.6	46.6	Yes	9.8
R23	1510 m SW	51.0	46.0	35.4	46.4	Yes	10.3
R23-2nd Story	1510 m SW	51.0	46.0	35.6	46.4	Yes	10.2
R24	1120 m WSW	51.0	46.0	38.5	46.7	Yes	10.2
R25	760 m WSW	51.0	46.0	41.6	47.3	Yes	9.9
R26	1640 m WSW	51.0	46.0	33.7	46.2	Yes	11.4
R27	1870 m WSW	51.0	46.0	32.2	46.2	Yes	11.2
R27-2nd Story	1870 m WSW	51.0	46.0	33.3	46.2	Yes	10.9
R28	1340 m W	46.0	41.0	36.6	42.3	Yes	10.7
R28-2nd Story	1340 m W	46.0	41.0	36.8	42.4	Yes	10.7

The above results indicate that, once the extended noise control items have been implemented for the worst-case scenario, the Cumulative SPL is expected to bring the facility in compliance for all receivers in the study area. Figure 8A shows the noise map of the area with Facility SPL contours, that is, the facility noise emissions contours



excluding the ASL, once the required noise control items have been implemented. Figure 8B shows the noise map of the area with Cumulative SPL contours, that is, the facility noise emissions contours including the ASL, once the required noise control items have been implemented. The Cumulative SPL map is the one that can be compared to the PSL at the receivers.

Figure 8A: Noise Contour Map – After Extended Noise Control – Facility SPL – Worst-Case - Nighttime

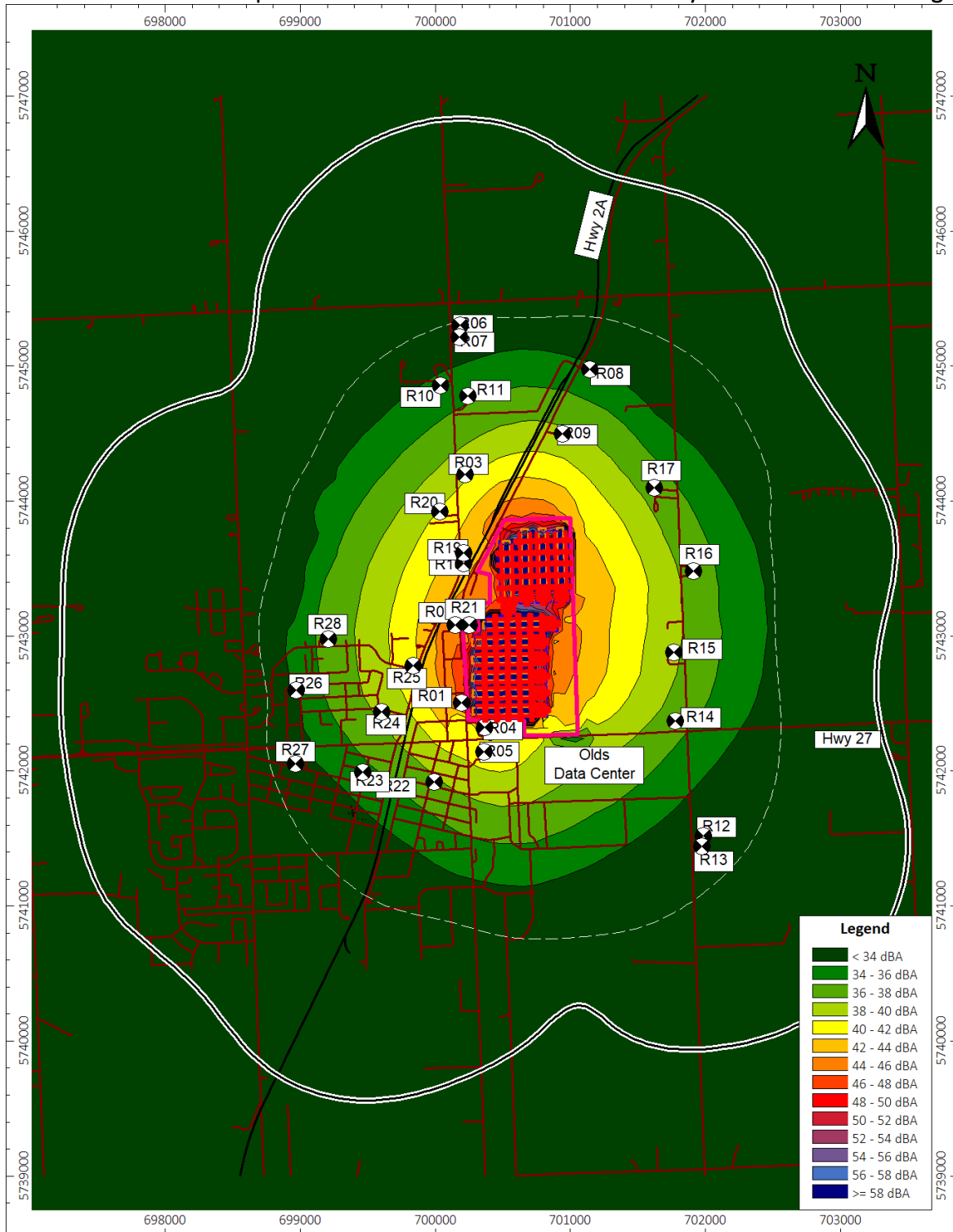
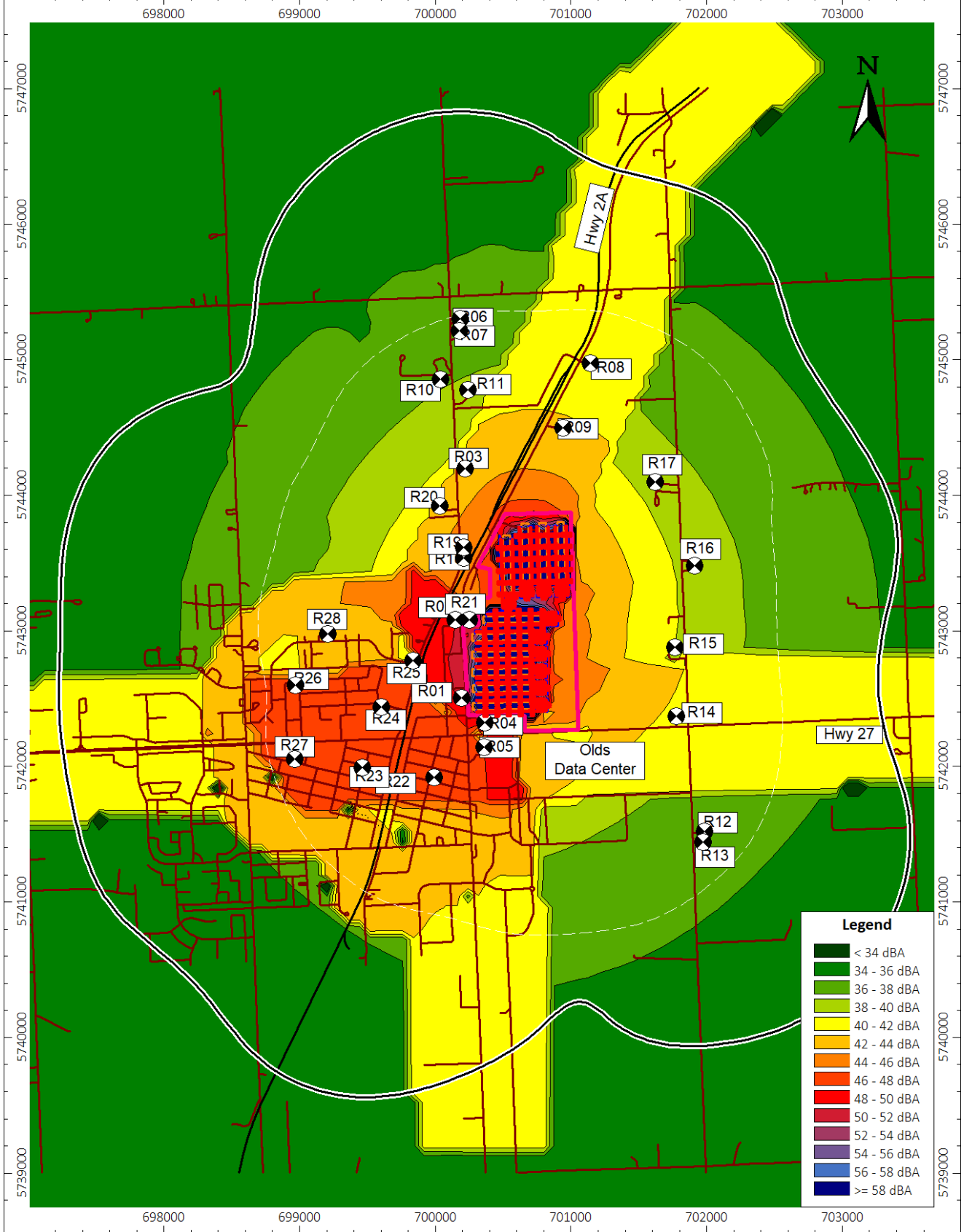


Figure 8B: Noise Contour Map – After Extended Noise Control – Cumulative SPL – Worst-Case - Nighttime



Conclusion

Synapse Real Estate Corporation (Synapse) retained OpenCycle Technologies Inc. (OpenCycle) to conduct a Preliminary Noise Impact Assessment (NIA) for the purposes of risk planning & screening for Olds Data Center facility located at W-04-033-01 W5M (the subject facility). This NIA was conducted in accordance with the requirements of Alberta Utilities Commission (AUC) Rule 012: Noise Control (the Rule).

This is a proposed facility that Synapse plans to build ten (10) blocks with data halls and natural gas plants each having:

- One (1) 100 MW Data Center Building with eighty (80) Chillers and sixty (60) Emergency/Back-up Generators
- One (1) 140 MW Natural Gas Plant with auxiliary equipment. Detailed design and equipment data are not currently available, and assumptions are based on a similar NIA found on AUC's E-filing website (Beacon AI Centers – Indus Project NIA, Stantec, Project/File ID: 145400058)

Synapse and OpenCycle have agreed on a four-stage progressive Noise Management Program designed to reduce uncertainty and manage risk. OpenCycle deems the project being in Stage-1.5 below:

- 1- **Risk Planning & Screening:** Early due diligence using assumptions to identify risk and guide detailed design.
- **1.5 - Risk Planning & Screening Update:** Report update to include a worst-case operational scenario and incorporate Olds Town Council and AUC's feedback for the preliminary study (OpenCycle ID #: 007700-NIA-000).
- 2- **Detailed Design:** Ambient noise monitoring and refined/detailed data and modeling to support a full NIA.
- 3- **Mitigation:** Detailed mitigation design.
- 4- **Validation:** Empirical measurements of a similar data center or shop measurements of actual/similar equipment to validate assumptions.

The purpose of Stage-1 assessment was to predict the proposed facility's noise impact on surrounding residences including town of Olds and support detailed design and next steps. Stage 1.5 assumes the same preliminary equipment design and adds a worst-case operational scenario with extended noise control recommendations.

The results of this assessment indicate that, for nighttime operations, the Cumulative SPL is expected to exceed the PSL at all receivers in the study area. The most impacted receiver is R01, located 650 m SSW from the subject



facility center. Additional noise control is required for the subject facility to comply with the AUC Rule 012: Noise Control.

Noise control items are discussed in the [Noise Control Recommendations](#) section of this report for nighttime compliance.

Once the noise control items for nighttime operations and extended noise control recommendations for the worst-case scenario have been implemented, the Cumulative SPL is expected to meet the PSL at all receivers for daytime, nighttime and worst-case scenarios.

OpenCycle also recommends updating the model and results as design data become available and execute Stage-2 and Stage-4 of the four-stage analysis approach for a better understanding of the ambient sound levels in the study area and design details and apply in the subsequent revisions of this study.

For general technical details on sound levels and analysis, as well as for a best practices approach as recommended by the Rule, see [Appendix G](#).



References

Alberta Utilities Commission (AUC). 2024. *Rule 012: Noise Control*, June 5, 2024. Calgary, Alberta.

Alberta Transportation: www.transportation.alberta.ca/mapping

DataKustik GmbH (DataKustik). Version 2026 MR1. *Cadna/A Computer Aided Noise Abatement Model*, Munich, Germany.

International Organization for Standardization (ISO). 1993. *Standard 9613-1, Acoustics – Attenuation of Sound during Propagation Outdoors – Part 1: Calculation of Absorption of Sound by the Atmosphere*, Geneva Switzerland.

International Organization for Standardization (ISO) 1996. *Standard 9613-2, Acoustics – Attenuation of Sound During Propagation Outdoors – Part 2: General Method of Calculation*, Geneva Switzerland.

Google Earth Pro, licensed to OpenCycle Technologies Inc.

AbaData 2.0, licensed to OpenCycle Technologies Inc.

AUC's E-filing website (Beacon AI Centers – Indus Project NIA, Stantec, Project/File ID: 145400058).

Technical report for generator acoustical study by Khoueiry Design & Consultancy SAL; Ref: KDC-012-2025-R01



Appendix A: Glossary



Table A: Glossary

Term	Description
Average Annual Daily Traffic (AADT)	The total volume of vehicle traffic of a highway or road for a year divided by 365 days.
Alberta Energy Regulator (AER)	The Alberta Energy Regulator ensures the safe, efficient, orderly, and environmentally responsible development of hydrocarbon resources over their entire life cycle. This includes allocating and conserving water resources, managing public lands, and protecting the environment while providing economic benefits for all Albertans.
Ambient sound level (ASL)	The sound pressure level that is a composite of different airborne sounds from many sources far away from and near the point of measurement. The ASL does not include any energy-related industrial component and must be measured without it. The ASL is assumed to be 5 dBA below the determined PSL as per section 2.1 of Rule 012.
A-weighted sound level (dBA)	The sound level as measured on a sound level meter using a setting that emphasizes the middle frequency components similar to the frequency response of the human ear at levels typical of rural backgrounds in mid frequencies.
Alberta Utilities Commission (AUC)	The Alberta Utilities Commission regulates the utilities sector, natural gas and electricity markets to protect social, economic and environmental interests of Alberta where competitive market forces do not.
Bands (full octave or 1/3 octave)	A series of electronic filters separate sound into discrete frequency bands, making it possible to know how sound energy is distributed as a function of frequency. Each octave band has a centre frequency that is double the centre frequency of the octave band preceding it. The 1/3 octave band analysis provides a finer breakdown of sound distribution as a function of frequency.
Cumulative SPL	The cumulative sound pressure level from the facilities and the ambient sound level.
Comprehensive Sound Level (CSL)	The sound level that is a composite of different airborne sounds from many sources far away from and near the point of measurement. The CSL does include industrial components and must be measured with them, but it should exclude abnormal noise events. The CSL is used to determine whether a facility is in compliance with the Directive.
Cumulative noise level	The sound level that is the total contribution of all industrial noise sources (existing and proposed) from EUB-regulated facilities at the receptor.
C-weighted sound level (dBC)	The C-weighting approximates the sensitivity of human hearing at industrial noise levels (above about 85 dBA). The C-weighted sound level (i.e., measured with the C-weighting) is more sensitive to sounds at low frequencies than the A-weighted sound level and is sometimes used to assess the low-frequency content of complex sound environments.
Daytime	Defined as the hours from 07:00 to 22:00.
Deferred facility	Facilities constructed and in operation prior to October 1988. These facilities do not have to demonstrate compliance in the absence of a complaint. This does not exempt them from the requirements but does recognize that they were potentially designed without the same considerations for noise as facilities approved after the date when the first comprehensive noise control directive (ID 88-1) was published and put into effect.
Directive 038: Noise Control	Directive 038: Noise Control states the requirements for noise control as they apply to all operations and facilities under the jurisdiction of the Alberta Energy and Utilities Board (EUB). The directive also provides background information and describes an approach to deal with noise problems. This directive is the fifth edition, superseding Interim Directive (ID) 99-8.
Energy equivalent sound level (Leq)	The average weighted sound level over a specified period of time. It is a single-number representation of the cumulative acoustical energy measured over a time interval. The time interval used should be specified in brackets following the Leq—e.g., Leq (9) is a 9-hour Leq. If a sound level is constant over the measurement period, the Leq will equal the constant sound level.
Emergency	An unplanned event requiring immediate action to prevent loss of life or property. Events occurring more than four times a year are not considered unplanned.
Facility SPL	The overall sound pressure level from all the facilities in the study area
Heavily Travelled Road	Includes highways and any other road where 90 or more vehicles travel during the nine-hour nighttime period consistently for any one-month period in a year.



Table A: Glossary

Term	Description
Low Frequency Noise (LFN)	Where a clear tone is present below and including 250Hz and the difference between the overall C-weighted sound level and the overall A-weighted sound level exceeds 20 dB.
Nighttime	Defined as the hours from 22:00 to 07:00.
Noise	Generally associated with the unwanted portion of sound.
Noise Impact Assessment (NIA)	An NIA identifies the expected sound level emanating from a facility as measured 15 m from the nearest or most impacted permanently or seasonally occupied dwelling. It also identifies what the permissible sound level is and how it was calculated.
Permanent facility	A facility that is in operation for more than two months.
Permissible Sound Level (PSL)	The maximum SPL that a facility must not exceed at receivers located within 1500 m from the subject facility fence line. The PSL for each receiver is determined as per section 2.1 of Rule 012.
Receiver	The location of the residences existing in the NIA study area for which the SPL is determined. In the event that there are no residences existing in the study area, then hypothetical receivers are included at 1500 m from the subject facility fence line.
Representative conditions	Those conditions typical for an area and/or the nature of a complaint. For ASLs, these are conditions that portray the typical activities for the area, not the quietest time. For CSLs, these do not constitute absolute worst-case conditions or the exact conditions the complainant has highlighted if those conditions are not easily duplicated. Sound levels must be taken only when representative conditions exist; this may necessitate a survey of extensive duration (two or more consecutive nights).
Sound Power Level (PWL)	The sound level emitted. The decibel equivalent of the rate of energy (or power) emitted in the form of noise. The sound power level is given by: $PWL = 10 \times LOG_{10} \left(\frac{\text{Sound as Power}}{W_0} \right)$ Where $W_0 = 10^{-12}$ watts (or 1 pW)
Sound Pressure Level (SPL)	The sound level received. The decibel equivalent of the pressure of sound waves at a specific location, which is measured with a microphone. The sound pressure level is given by: $SPL = 10 \times LOG_{10} \left(\frac{\text{Sound as Pressure}}{P_0} \right)$ Where $P_0 = 2 \times 10^{-5}$ Pa (or 20 μ Pa)
Subject facility	The energy industry facility which is the object of the NIA.
Temporary facility	Any facility that will be in operation less than 60 days.
Tonal component	A pronounced peak clearly obvious within the sound level spectrum.



Appendix B: Permissible Sound Level Determination



**AUC Rule 012, Section 2.1: Sample Permissible Sound Level Determination
Synapse Olds Data Center at W-04-033-01 W5
Receiver R03 in the Study Area**

Basic Nighttime Sound Level

Proximity to Transportation	Dwelling Unit Density per ¼ Section of Land		
	1 - 8 Dwellings	9 - 160 Dwellings	>160 Dwellings
Category 1	40	43	46
Category 2	45	48	51
Category 3	50	53	56

**Daytime Adjustment
Basic Sound Levels**

Nighttime	Daytime
45	45
N/A	10
45	55

Class A Adjustments

Class	Reason for Adjustment	Value (dBA L _{eq})
A1	Seasonal Adjustment (Wintertime Operation)	+5
A2	Ambient Monitoring Adjustment	-10 to +10
Class Adjustment = Sum of A1 and A2 (as applicable), but not to exceed a maximum of 10 dBA L _{eq}		

Total Class A Adjustments

0	0
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Class B Adjustments

Class	Duration of Activity	Value (dBA L _{eq})
B1	1 day	+15
B2	7 days	+10
B3	< or = to 60 days	+5
B4	> 60 days	0
Class B Adjustment = one only of B1, B2, B3 or B4		

Class B Adjustment

0	0
0	0

PERMISSIBLE SOUND LEVEL (dBA)

45	55
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Category 1: Dwelling units more than 500 m from heavily travelled roads and/or rail lines and not subject to frequent aircraft flyovers.
 Category 2: Dwelling units more than 30 m but less than 500 m from heavily travelled roads and/or rail lines and not subject to frequent aircraft flyovers.
 Category 3: Dwelling units less than 30 m from heavily travelled roads and/or rail lines and/or subject to frequent aircraft flyovers.



Appendix C: Subject Facility Plot Plan



Appendix D: Sound Power Levels



The Sound Power Levels (PWL) were determined for all of the facility's major noise sources. The PWLs in linear octave band are presented on the table below.

- For each proposed noise source, the PWL was obtained from theoretical calculations, manufacturer's data, previous study on similar units, AUC's E-filing website (Beacon AI Centers – Indus Project NIA, Stantec, Project/File ID: 145400058) and technical report for generator acoustical study by Khoueiry Design & Consultancy SAL.

Table D: Source Octave Band Sound Power Levels

Noise Source	Data Source	Linear Octave Band Centre Frequency (dB)									Overall (dBA)	Overall (dBC)
		31.5	63	125	250	500	1000	2000	4000	8000		
Genset Bldg Wall	Previous Study	111	114	116	109	106	100	96	92	92	108	119
Chiller Sides	Manufacturer	90	92	105	100	108	101	98	89	82	107	111
Chiller Top	Manufacturer	90	92	105	100	108	101	98	89	82	107	111
GSU Transformers (12 for each block)	Previous Study	104	106	108	103	101	99	93	88	84	103	112
Genset Air Intake	Previous Study	102	106	109	99	94	90	87	84	85	98	111
Genset Exhaust Pipe	Previous Study	98	102	104	99	93	91	86	82	83	97	107
Genset Cooler Discharge	Previous Study	98	100	92	96	93	93	86	81	81	97	106
NG Plant Bldg ACC Steam Duct	Previous Study	95	97	90	85	81	78	94	75	64	96	100
Genset Exhaust Tip	Previous Study	104	101	104	99	92	88	85	81	78	96	108
Genset Cooler Inlet	Previous Study	100	103	109	99	95	89	85	84	86	93	106
Genset Bldg Door Closed	Previous Study	96	100	104	94	87	85	79	77	79	92	106
NG Plant Bldg HRSG Stack Exit	Previous Study	103	101	93	83	84	81	85	83	81	90	104
NG Plant Bldg Air Inlet Filter House	Previous Study	100	99	95	81	83	84	78	79	77	88	102
NG Plant Bldg Ventilation Inlet	Previous Study	88	90	91	79	74	73	80	80	76	86	94
NG Plant Bldg ACC Steam Intake	Previous Study	89	88	89	85	82	80	76	69	63	85	94
NG Plant Bldg ACC Steam Outlet	Previous Study	89	88	89	85	82	80	76	69	63	85	94
NG Plant Bldg Ventilation Outlet	Previous Study	100	92	95	87	77	70	75	70	67	84	100



Table D: Source Octave Band Sound Power Levels

NG Plant Bldg Roof	Previous Study	113	103	96	81	72	63	63	60	58	83	111
NG Plant Bldg Wall	Previous Study	113	103	96	81	72	63	63	60	58	83	111
NG Plant Generator Bldg Ventilation Outlet	Previous Study	92	86	77	68	67	68	69	74	75	79	91
NG Plant Generator Bldg Ventilation Inlet	Previous Study	92	86	77	68	67	68	69	74	75	79	91



Appendix E: Source Order Ranking – R01-Nighttime



Table E below shows the top 100 sources on the Source Order Ranking for R01 for nighttime operations. Full list is available upon request.

Table E: Source Order Ranking - Receiver R01-2nd Story

Rank	Noise Source	SPL (dBA)	dBC-dBA
001	Chiller Top	56.5	3.5
002	Chiller Top	56.2	3.4
003	Chiller Top	55.7	3.7
004	Chiller Top	55.3	3.6
005	Chiller Top	55.3	3.6
006	Chiller Top	55.2	3.7
007	Chiller Top	54.2	4.1
008	Chiller Top	53.9	4.3
009	Chiller Top	53.8	2.9
010	Chiller Top	53.7	4.3
011	Chiller Top	53.1	2.9
012	Chiller Top	52.7	3.0
013	Chiller Top	52.7	4.7
014	Chiller Top	52.6	3.1
015	Chiller Top	52.4	2.9
016	Chiller Top	52.4	3.1
017	Chiller Top	52.3	3.4
018	Chiller Top	52.2	3.8
019	Chiller Top	52.2	4.9
020	Chiller Top	52.1	3.3
021	Chiller Top	52.0	3.9
022	Chiller Top	51.9	3.6
023	Chiller Top	51.8	3.6
024	Chiller Top	51.7	3.6
025	Chiller Top	51.7	3.6
026	Chiller Top	51.6	5.1
027	Chiller Top	51.3	3.9
028	Chiller Top	51.1	3.9
029	Chiller Top	50.8	4.2
030	Chiller Top	50.7	2.9
031	Chiller Top	50.7	3.1
032	Chiller Top	50.4	3.7
033	Chiller Top	50.4	4.2
034	Chiller Top	50.3	4.2
035	Chiller Sides	50.2	3.5
036	Chiller Sides	50.0	3.5
037	Chiller Sides	49.9	3.6
038	Chiller Top	49.9	2.9
039	Chiller Top	49.8	3.0
040	Chiller Top	49.8	3.1
041	Chiller Top	49.8	4.1



Table E: Source Order Ranking - Receiver R01-2nd Story

042	Chiller Sides	49.7	3.6
043	Chiller Top	49.7	5.5
044	Chiller Top	49.6	3.2
045	Chiller Sides	49.5	3.7
046	Chiller Sides	49.5	3.6
047	Chiller Sides	49.5	3.6
048	Chiller Top	49.3	3.3
049	Chiller Top	49.3	5.6
050	Chiller Top	49.3	4.4
051	Chiller Sides	49.2	3.7
052	Chiller Top	49.1	3.4
053	Chiller Sides	49.0	3.7
054	Chiller Top	48.9	3.5
055	Chiller Top	48.7	3.6
056	Chiller Sides	48.6	3.9
057	Chiller Top	48.5	4.7
058	Chiller Sides	48.5	2.8
059	Chiller Top	48.4	3.1
060	Chiller Top	48.4	3.3
061	Chiller Top	48.2	3.9
062	Chiller Sides	48.1	3.8
063	Chiller Top	48.1	3.7
064	Chiller Top	47.9	5.0
065	Chiller Top	47.6	3.1
066	Chiller Sides	47.5	4.3
067	Chiller Top	47.5	3.1
068	Chiller Top	47.4	4.1
069	Chiller Top	47.4	3.3
070	Chiller Top	47.3	3.3
071	Chiller Sides	47.2	3.0
072	Chiller Top	47.1	3.4
073	Chiller Top	47.0	4.0
074	Chiller Top	46.9	4.2
075	Chiller Sides	46.9	3.2
076	Chiller Top	46.9	3.5
077	Chiller Top	46.8	4.0
078	Chiller Top	46.7	4.2
079	Chiller Top	46.7	3.8
080	Chiller Top	46.7	3.9
081	Chiller Top	46.7	3.6
082	Chiller Top	46.6	4.1
083	Chiller Top	46.6	3.5
084	Chiller Top	46.6	3.3
085	Chiller Top	46.5	3.9
086	Chiller Top	46.5	4.6
087	Chiller Sides	46.5	3.4
088	Chiller Top	46.5	3.9



Table E: Source Order Ranking - Receiver R01-2nd Story

089	Chiller Top	46.3	3.3
090	Chiller Sides	46.2	3.7
091	Chiller Top	46.2	3.7
092	Chiller Sides	46.2	3.8
093	Chiller Sides	46.1	3.6
094	Chiller Sides	46.1	3.9
095	Chiller Sides	46.0	5.0
096	Chiller Top	46.0	6.2
097	Chiller Top	46.0	2.9
098	Chiller Sides	46.0	3.5
099	Chiller Top	46.0	3.9
100	Chiller Sides	45.8	3.5



Appendix F: Noise Control Acoustic Specifications



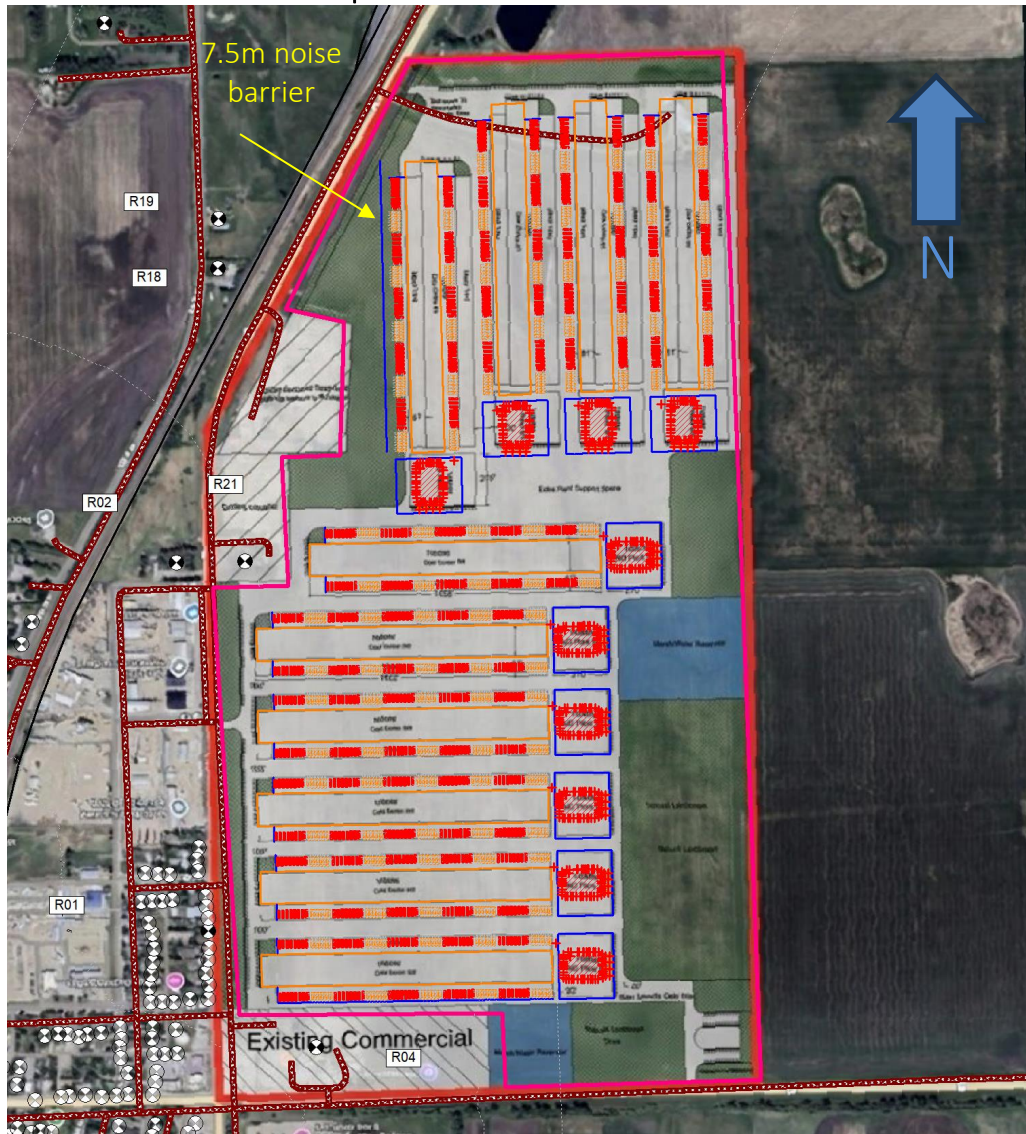
Summary

The table below lists the noise control items designed to bring the Olds Data Center in compliance with regulations for nighttime operations.

Noise Control Recommendations – Nighttime

Item	Noise Source	Noise Control
1	Chillers	Install chillers with ≤ 85 dBA PWL per unit
2	NG Plant Step-up Transformers	Install transformers with ≤ 80 dBA PWL per unit
3	NG Plant Bldg Air Inlet Filter House	Install air inlet silencers to achieve ≤ 85 dBA PWL per unit
4	Noise barriers	Install ≥ 7.5 m high, highly absorbing (both sides assumed absorption coefficient 0.84) noise barrier on the NW corner of the data center as depicted on Figure 3, see below for available industrial noise barrier specifications

Proposed Noise Barrier Locations

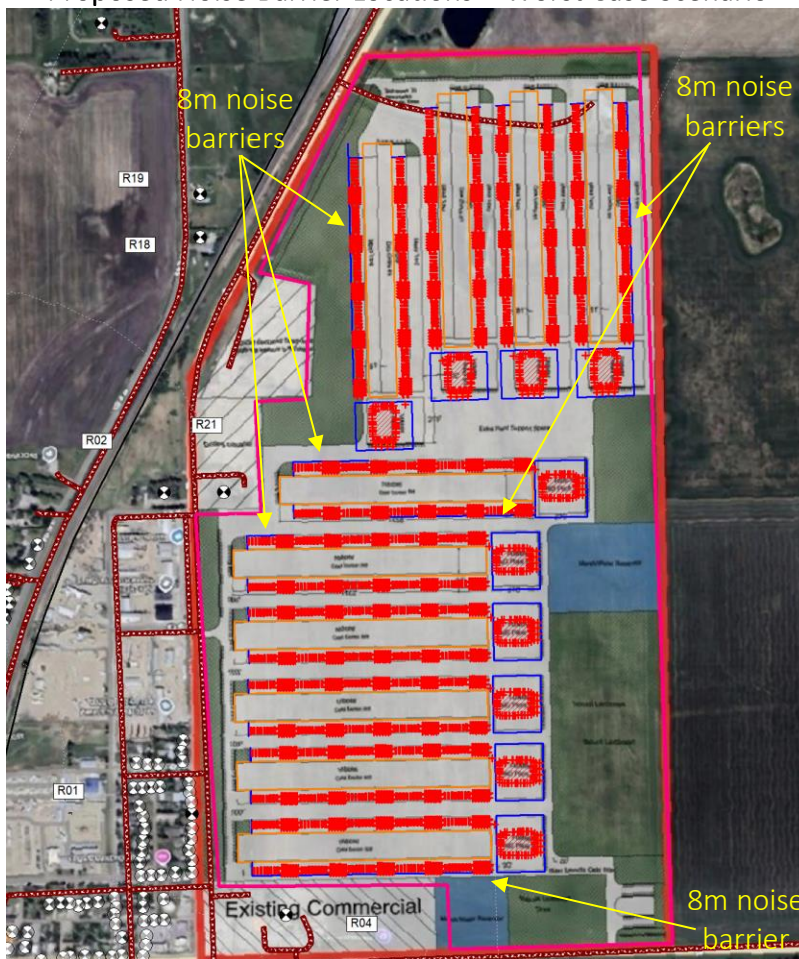


The table below lists the noise control items designed to bring the Olds Data Center in compliance with regulations for the identified worst-case event assuming nighttime compliance is achieved by implementing the above noise control recommendations.

Extended Noise Control Recommendations – Worst-Case - Nighttime

Item	Noise Source	Noise Control
1	Back-up/Emergency Generators Upgrade	Upgrade all back-up/emergency generators to achieve 65 dBA @ 7m for single unit
2	Noise barriers	Install/upgrade ≥ 8 m high, highly absorbing noise barriers (both sides assumed with absorption coefficient 0.84) as depicted on Figure 7 below, see below for available industrial noise barrier specifications

Proposed Noise Barrier Locations – Worst Case Scenario

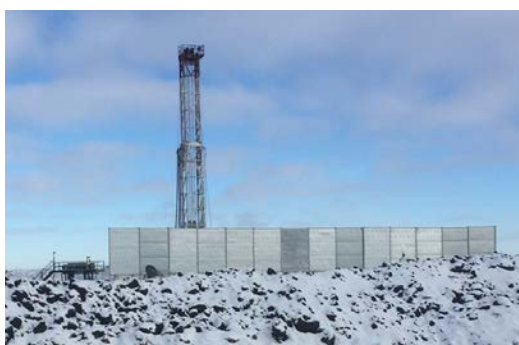
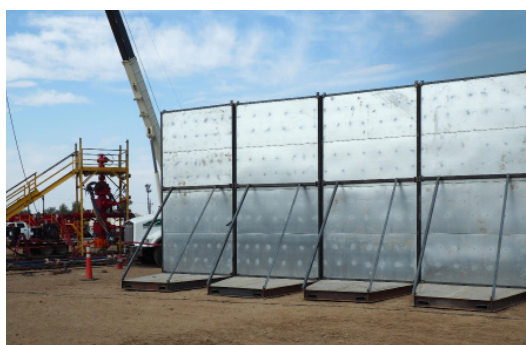




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FREESTANDING SK-8 NOISE CONTROL PANEL PORTABLE LOW FREQUENCY NOISE BARRIER/ABSORBER PANELS

ENC's freestanding, portable SK-8 acoustical panels are **engineered for quick positioning** close to noise sources and are designed for maximum **low-frequency sound blocking & absorbing**. Structurally engineered to be freestanding and **meet regulatory code requirements**. Heights are available from 16 to 24 feet with accommodations for doors, gates, truck loading, and emergency exits.



SK-8 BARRIER PANEL SPECIFICATIONS

- Sound Transmission Class rated STC-43 in accordance with ASTM E-413
- Sound Absorption Rating of N.R.C. 1.00
- Engineered to meet UBC/IBC Wind Load requirements
- Panels available with emergency exit signs and doors
- Sizes: 8 feet wide by 16 to 24 feet high

TEMPORARY ACOUSTICAL NOISE BARRIER SYSTEMS

Designed to provide optimum sound control in blocking and absorbing unwanted noise.

ENVIRONMENTAL



ENTERTAINMENT



CONSTRUCTION



INDUSTRIAL



OIL & GAS



Learn more about commercial noise control at
www.environmental-noise-control.com or call us at 1-800-679-8633

FREESTANDING SK - 8 NOISE BARRIER PANELS

Environmental Noise Control's (ENC) acoustical noise barrier panel systems is manufactured with state-of-the-art acoustical composite materials. Our proprietary SK-8 sound panels are fabricated with a galvanized steel exterior, absorptive acoustical insulation with a septum barrier, and perforated metal panels. ENC's SK-8 temporary sound wall system is available in 8 feet-wide modules with heights of 16, 20, or 24 feet.

Freestanding SK-8 Sound Panel System



Sound Transmission Loss (dB)

% Octave Band Center Frequency	Transmission Loss
31.5 Hz	21
63 Hz	14
125 Hz	26
250 Hz	32
500 Hz	28
1000 Hz	51
2000 Hz	60
4000 Hz	67
STC	43

The modular design of ENC's temporary SK-8 sound panel system meet or exceed UBC & IBC code requirements.

An independent acoustical laboratory has conducted tests in accordance with ASTM E-90 & ASTM E-413 requirements, to measure sound transmission loss & validating the Sound Transmission Class rating of STC-25, STC-32 & STC-43. ENC's composite barrier/absorber blankets, which are laboratory tested & certified, meet or exceed the specifications in the Sound Transmission Loss Data Table.

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CORPORATE OFFICE
Hawthorne, CA

REGIONAL OFFICES & FIELD OPERATIONS
Aledo, TX; Carson, CA; Longmont, CO
Napa, CA; Shreveport, LA; McDonald, PA
Calgary, Alberta

For more information on our quality products or possible applications, please visit our website or call to speak with one of our representatives. Rapid engineering & deployment response is available worldwide.

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Appendix G: Technical Details and Best Practices Approach



Technical Details

Sound is the phenomena of vibrations transmitted through air, or other medium such as water or a building structure. The range of pressure amplitudes, intensities, and frequencies of the sound energy is very wide, and many specialized fields have developed using different ranges of these variables, such as room acoustics and medical ultrasound.

Due to the wide range of intensities, which are perceived as sound, standard engineering units become inconvenient. Sound levels are commonly measured on a logarithmic scale, with the level (in decibels, or dB) being proportional to ten times the common logarithm of the sound energy or intensity. Normal human hearing covers a range of about twelve to fourteen orders of magnitude in energy, from the threshold of hearing to the threshold of pain. On the decibel scale, the threshold of hearing is set as zero, written as 0 dB, while the threshold of pain varies between 120 to 140 dB. The most usual measure of sound is the sound pressure level (SPL), with 0 dB SPL set at $2.0 \times 10^{-5} \text{ N/m}^2$ (also written $20 \mu\text{Pa}$), which corresponds to a sound intensity of $10^{-12} \text{ Watts/m}^2$ (or 1 pWatt/m², written 1 pW/m²).

Normal human hearing spans a frequency range from about 20 Hertz (Hz, or cycles per second) to about 20,000 Hz (written 20 kHz). However, the sensitivity of human hearing is not the same at all frequencies. To accommodate the variation in sensitivity, various frequency-weighting scales have been developed. The most common is the A-weighting scale, which is based on the sensitivity of human hearing at moderate levels; this scale reflects the low sensitivity to sounds of very high or very low frequencies. Sound levels measured on the A-weighted scale are written in A-weighted decibels, commonly shown as dBA or dB(A).

Human hearing becomes more sensitive to lower frequency sounds as the level of the sound increases. For this purpose, the C-weighting scale was developed to assess reaction to higher levels sounds. Although the C-weighting scale, or the sound level in dBC, is seldom used on its own, the levels in dBC and dBA are often used together to assess the significance of the low-frequency components of sound. In some cases, a limit is placed on the dBC level at a location in order to limit the amount of low-frequency noise.

When sound is measured using the A-weighting scale, the reading is often called the “Noise level”, to confirm that human sensitivity and reactions are being addressed. A table of some common noise sources and their associated noise levels are shown in the table below.

When the A-weighting scale is not used, the measurement is said to have a “linear” weighting, or to be unweighted, and may be called a “linear” level. As the linear reading is an accurate measurement of the physical (sound) pressure, the term “Sound Pressure Level”, or SPL, is usually (but not universally) reserved for unweighted measurements.

Noise is usually defined as “unwanted sound”, which indicates that it is not just the physical sound that is important, but also the human reaction to the sound that leads to the perception of sound as noise. It implies a judgment of the quality or quantity of sound experienced. As a human reaction to sound is involved, noise levels are usually given in A-weighted decibels (dBA). However, use of the C-weighting scale, usually in combination with the dBA level, is becoming more common as well. An alternate definition of noise is “sound made by somebody else”, which emphasizes that the ability to control the level of the sound alters the perception of noise.



Noise Levels of Familiar Sources

Source Or Environment	Noise Level (dBA)
High Pressure Steam Venting To Atmosphere (3 m)	121
Steam Boiler (2 m)	90-95
Drilling Rig (10 m)	80-90
Pneumatic Drill (15 m)	85
Pump Jack (10 m)	68-72
Truck (15 m)	65-70
Business Office	65
Conversational Speech (1 m)	60
Light Auto Traffic (30 m)	50
Living Room	40
Library	35
Soft Whisper (5 m)	20-35

The single number A-weighted level is often inadequate for engineering purposes, although it does supply a good estimate of people’s reaction to a noise environment. As noise sources, control measures, and materials differ in the frequency dependence of their noise responses or production, sound is measured with a narrower frequency bandwidth; the specific methodology varies with the application. For most work, the acoustic frequency range is divided into frequency bands where the center frequency of each band is twice the frequency of the next lower band; these are called “Octave” bands, as their frequency relation is called an “Octave” in music, where the field of acoustics has its roots. For more detailed work, the octave bands, and certain standard octave and 1/3 octave bands have been specified by international agreements.

Where the noise at the receiver is steady, it is easy to assess the noise level. However, both the production of noise at the source and the transmission of noise can vary with time; most noise levels are not constant, either because of the motion of the noise source (as in traffic noise), because the noise source itself varies, or because the transmission of sound to the receiver location is not steady as over long distances. This is almost always the case for environmental noise studies. Several single number descriptors have been developed and are used to assess noise in these conditions.

The most common is the measurement of the “equivalent continuous” sound level, or L_{eq} , which is the level of a hypothetical source of a constant level which would give the same total sound energy as is measured during the sampling period. This is the “energy” average noise level. Typical sampling periods are one hour, nighttime (9 hours) or one day (24 hours); the sampling period used must be reported when using this unit.

The greatest value of the L_{eq} is that the contributions of different sources to the total noise level can be assessed, or in a case where a new noise source is to be added to an existing environment, the total noise level from new and old sources can be easily calculated. It is also sensitive to short term high noise levels.

Statistical noise levels are sometimes used to assess an unsteady noise environment. They indicate the levels that exceeded a fixed percentage of the measurement time period measured. For example, the 10th percentile level, written L_{10} , is the levels exceeded 10% of the time; this level is a good measure of frequent noisy occurrences such as steady road traffic. The 90% level, L_{90} , is the level exceeded 90% of the time, and is the background level,



or noise floor. A steady noise source will modify the background level, while an intermittent noise source such as road or rail traffic will affect the short-term levels only.

One disadvantage with the L_{eq} measure, when used alone, is that nearby loud sources (e.g. dogs barking, or birds singing) can confuse the assessment of the situation when it is the noise from a distant plant that is the concern. For this reason, the equivalent level and the statistical levels can be used together to better understand the noise environment. One such indication is the difference between the L_{eq} and the L_{90} levels. A large difference between the L_{eq} and L_{90} , greater than 10 dB, indicates the intrusion of short-term noise events on the general background level. A small difference, less than 5 dB, indicates a very steady noise environment. If the L_{eq} value exceeds the L_{10} value this indicates the presence of significant short-term loud events.

For most noise measurement, instruments are adjusted so that the time response of the instrument is similar to the response of the human ear; this is the “Fast” setting. Measurement with the “Fast” setting therefore assesses the sound environment according to the way humans would hear it and react to it. Where the noise level varies substantially and an average level is wanted without the complexity of and L_{eq} or statistical measurement, the “Slow” setting is used on the sound level meter. The “Slow” setting is also typically used in industrial settings where hearing damage is a concern. Where the noise level changes very rapidly, for example due to impacts or detonations, the “Fast” and “Slow” settings do not respond quickly enough to assess the maximum levels, and the “Impulse” meter setting is used.

The Sound Power Level (abbreviated L_w , SWL or PWL) is the decibel equivalent of the total energy emitted from a source in the form of noise. The reference level for the sound power is 10^{-12} Watts, or 1 pWatt (abbreviated pW). The sound power level is given by:

$$L_w, SWL, PWL = 10 \times \log_{10} (\text{Emitted Power} / 1 \text{ pW}) \text{ dB}$$

Therefore, a source emitting 1 Watt of power in the form of sound would have a sound power level of 120 dB. Sound power levels can be expressed in terms of frequency bands, an overall linear-weighted level or A-weighted, as is the case for sound pressure levels. However, sound power levels are inherent to the source of noise, whereas the sound pressure level is dependent on the source, but also on the distance from the source and other environmental factors.

Note that according to the acoustical literature (E.g. Noise Control Engineering from Bies and Hanson), the subjective effect of changes in SPL is as follows:

- A 3 dB change is “just perceptible”.
- A 5 dB change is “clearly noticeable”.
- A 10 dB change is “twice as loud or half as loud”.
- A 20 dB change is “much louder or much quieter”.



Best Practices Approach

The AUC encourages licensees to adopt and incorporate a best practices approach to noise management into their facility maintenance and operating procedures. This may include such things as taking regular fence line measurements to determine if there are any significant changes to sound emanating from the facility, orientating fans away from directly facing receivers, closing equipment building doors and windows whenever possible, equipping facility related vehicles including trucks with appropriate mufflers, and where possible, scheduling noisy events during daytime hours of 7 AM to 8 PM in order to reduce potential noise disturbances. Where high noise generating activity like high pressure blowdown or venting would occur, appropriate vent silencer should be fitted on the vent nozzle to minimize noise disturbance.

Construction Noise

Although there is no specific construction noise level limit detailed by the Rule, there are general recommendations for construction noise mitigation during equipment installation. This includes all activities associated with installation of the proposed new equipment. The document states:

“Licensees must manage the impact of construction noise on nearby dwellings. The following mitigation measures should be used:

- Conduct construction activity between the hours of 07:00 and 22:00 to reduce the potential impact of construction noise.
- Advise nearby residents of significant noise-causing activities and schedule these events to reduce disruption to them.
- Ensure all internal combustion engines are fitted with appropriate muffler systems; and

Should a valid complaint be made during construction, the licensee is expected to respond expeditiously and take prompt action to address the complaint.”

The AUC encourages licenses to adopt these recommendations into their noise management plan where reasonably practical to minimize potential noise disturbances during construction related activities.



Appendix H: Resumes of Acoustical Practitioners





RESUME

Neil Morozumi, P.Eng., INCE
Principle In Charge

Membership and Affiliations

Association of Professional Engineers and Geoscientists of Alberta (APEGA)
Institute of Noise Control Engineering (INCE)
Calgary Chamber of Commerce Consulting Engineers of Alberta (CEA)

Education

B.Sc. in Mechanical Engineering, 1999, University of Manitoba, Winnipeg, Manitoba

Credentials

Professional Engineer (APEGA),
200E Years' experience in similar role: 22

Professional Experience

OpenCycle Technologies Inc.
Managing Partner

March 2005 – Present

Under Neil's leadership, Patching Associates has created a series of tools and techniques to seamlessly integrate data and technology and better executive projects for our clients. This integrated philosophy is shifting the way engineering is done at Patching Associates. This experience brings valuable input for our clients on noise mitigation, testing new techniques, and working with regulators on the development of noise control standards.

OpenCycle Technologies Inc.
Acoustical Engineer and Project Manager

March 2000 – March 2005

Responsible for technical design, modelling and deliverable preparation.

Bio

Neil has been a member of Patching Associates for 22 years. He began working on all types of acoustical assessments in the Transportation sectors across Alberta, Saskatchewan and Manitoba. With a background in mechanical engineering, Neil brings a practical approach to acoustical engineering and assessments. This experience brings valuable input for our clients on noise mitigation, testing new techniques, and working with regulators on the development of noise control standards as well as attendance at community open houses.

As Principal and Engineer of Record, Neil is responsible for reviewing noise assessments for technical accuracy and alignment with both client expectations and goals as well as regulatory compliance.

- City of Calgary NE LRT Extension (Saddleridge)
- NW LRT Extension – Crowfoot Station to Rocky Ridge Station
- Airdrie Yankee Valley Boulevard CP Rail Crossing
- Crowchild Trail NW and 24th Avenue NW / 16th Avenue
- West Leg of Calgary LRT
- NE Calgary Westwinds Station to Saddleridge Station
- NE LRT Extension (Saddleridge)
- Calgary South East Stoney Trail (SEST) Detailed Design
- Calgary, SE, NE, NW, SW, W Stoney Trail Functional Planning Studies
- Calgary SW BRT Detailed Design
- Marda Loop BRT MAX Station Complaint Investigation
- Peigan Trail SE Road and Rail Detailed Design
- Northeast Stoney Trail (NEST) Detailed Design,
- Shaganappi, Beddington, Country Hills Widening Project (SBC)
- 144 Avenue and Centre Street NW Development
- Bow Trail Widening – 37 St SW to Sarcee Tr.
- Sarcee Trail Widening – John Laurie Blvd to Country Hills Blvd.
- Crowchild Tr SW Transitway
- Crowchild Tr – Rubberized Asphalt Noise Test
- Crowchild Trail NW Improvements
- Habitat for Humanity Silver Springs NW
- South Deerfoot Trail Interchanges (Douglasdale Blvd to McKenzie Lake Blvd)
- Glenmore Trail Widening (West of Crowchild Trail to Sarcee Trail SW)
- Glenmore Trail – Operational Improvements (101 St SW to Sarcee Tr)
- Seton 210 Avenue and Deerfoot Trail SE
- 88th Street SE
- Crowchild Trail and 24th Avenue NW Road and LRT
- 6th Street SW Collector and CP Rail
- Children’s Hospital/Foothills Health Centre Interchange
- Highway 22, Griffin Road, Eth Avenue Traffic Noise Study, Cochrane, Alberta
- Anthony Henday Dr – Hwy 16 West to Manning Drive Detailed Design, Edmonton, Alberta
- Route 90 – Academy Rd to Taylor Ave Widening Project, Winnipeg, Manitoba
- Airdrie Yankee Valley Boulevard and CP Rail Crossing
- Airdrie Measurements (2013, 2016, 2019)
- Airdrie 1st Avenue and Woodside Way
- Airdrie 24th Street SW
- Regina Bypass Noise Study, Regina, Saskatchewan
- Circle Drive, Saskatoon





Mackenzie Kunz, E.I.T.

Education	<ul style="list-style-type: none"> ▪ B.Sc. Engineering, Chemical Engineering (with Distinction), Minor in Petroleum Engineering, (2016), University of Saskatchewan, Saskatoon, SK ▪ B.Sc. Biological Sciences, Minor in Chemistry (2004), University of Calgary, Calgary, AB
Relevant Professional Experience	<ul style="list-style-type: none"> ▪ January 2016 – Present: Patching Associates Acoustical Engineering Ltd., Calgary, AB <ul style="list-style-type: none"> - Acoustical Consultant, E.I.T. ▪ May 2015 – August 2015: Canadian Natural Resources Ltd., Rocky Mountain House, AB <ul style="list-style-type: none"> - Relief Operator ▪ May 2014 – December 2014: Patching Associates Acoustical Engineering Ltd. Calgary, AB <ul style="list-style-type: none"> - Technical Assistant
Professional Development and Certification	<ul style="list-style-type: none"> ▪ H2S Alive, WHMIS, Standard First Aid CPR/AED Level C, TDG, PST ▪ Patching Associates internal training, including: Basics of Acoustics, Hearing and Hearing Loss, Architectural Acoustics ▪ Compliant UAV Pilot
Highlight Projects	<ul style="list-style-type: none"> ▪ Field measurements and analysis at numerous gas plants and energy facilities in Alberta, BC, and Saskatchewan ▪ Project Manager for University of Calgary Electrical Engineering Capstone Project, 2018 ▪ Sound measurements and 3D modelling of hydraulic fracturing and drilling rig operations in northeastern British Columbia and Western Alberta ▪ UAV program lead. UAV sound measurements and 3D modeling of gas plants and energy facilities in Alberta, British Columbia and Saskatchewan ▪ Development of screening NIA using appendix 3.5 of AER Directive 038 ▪ Various sub-station and generator projects for a municipality in Alberta.
Professional Affiliations:	<ul style="list-style-type: none"> ▪ Association of Professional Engineers and Geoscientists of Alberta (APEGA). Registered as Engineer in Training (E.I.T.) ▪ Institute of Noise Control Engineering (INCE)





Burak Caglayan, P.Eng.

Education	<ul style="list-style-type: none">▪ M.Sc. Engineering, Petroleum and Natural Gas Engineering (2014), Middle East Technical University, METU, Turkiye▪ B.Sc. Engineering, Petroleum and Natural Gas Engineering (2009), Middle East Technical University, METU, Turkiye
Relevant Professional Experience	<ul style="list-style-type: none">▪ October 2022 – Present: OpenCycle Technologies Inc., Calgary, AB<ul style="list-style-type: none">- Acoustical Consultant, P.Eng.▪ March 2014 – November 2018: Perenco, Turkiye<ul style="list-style-type: none">- Petroleum Engineer▪ June 2010 – February 2014: Baker Hughes, Turkiye & Kuwait<ul style="list-style-type: none">- Field Engineer
Professional Development and Certification	<ul style="list-style-type: none">▪ H2S Alive, WHMIS, Standard First Aid CPR/AED Level C▪ Patching Associates internal training, including Basics of Acoustics
Highlight Projects	<ul style="list-style-type: none">▪ Field measurements and analysis at numerous gas plants and energy facilities in Alberta, BC, and Saskatchewan▪ 3D modelling of hydraulic fracturing and drilling rig operations in northeastern British Columbia and Western Alberta▪ Development of screening NIA using appendix 3.5 of AER Directive 038
Professional Affiliations:	<ul style="list-style-type: none">▪ Association of Professional Engineers and Geoscientists of Alberta (APEGA). Registered as Professional Engineer (P.Eng.)

