



TransAlta Corporation

TransAlta Keephills 1 Repowering Project

Noise Impact Assessment Update

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CA0060761.5444_TA Keephills Repowering NIA_Rev0



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APPENDIX A

TransAlta Keephills Unit 3 Auxiliary Boiler - Noise Impact Assessment

1.0 INTRODUCTION

TransAlta Corporation (TransAlta) operates the Keephills Thermal Electric Power Plant (Keephills) near Wabuman Lake, Alberta. Keephills is located within Section 36, Township 51, Range 4, west of the Fifth Meridian (36-051-04-W5M). Environmental noise from Keephills is regulated by the Alberta Utilities Commission (AUC) through Rule 012: Noise Control (AUC 2024a). Rule 012 requires preparation of a noise impact assessment (NIA) for any planned modifications to Keephills that constitute a potential change to previously approved noise emissions.

In December 2019, TransAlta proposed the Sundance Thermal Electric Power Plant (Sundance) and Keephills Repowering Project (the Project), which would involve replacing the steam source for select Sundance and Keephills generating units with natural gas-fired turbine generators and heat recovery steam generator (HRSG) units. The applications that TransAlta submitted to the AUC included an NIA for the Project prepared in accordance with Rule 012 (Golder 2019). The Project was approved by the Alberta Utilities Commission (AUC) in April 2020 (AUC 2020a, 2020b).

TransAlta is now proposing to develop an updated version of the Keephills 1 Repowering Project (the Updated Project), which would involve replacing the existing steam source for the Keephills Unit 1 (K1) steam turbine with two natural gas-fired turbine generators and HRSG units.

TransAlta retained WSP Canada Inc. (WSP) to prepare an NIA for the Updated Project. The NIA for the Updated Project was prepared in accordance with Rule 012 guidance and methodology. The results of the Updated Project NIA are presented in this report.

The NIA report for the Updated Project is structured as follows:

- Section 1 provides a brief introduction to the Updated Project NIA.
- Section 2 provides a description of Updated Project equipment, including emissions values used to model the potential noise impact of this equipment.
- Section 3 outlines the assessment approach used in the Updated Project NIA, including a description of:
 - assessment cases considered in the Updated Project NIA
 - noise study area and receptor location
 - applicable broadband and low frequency noise (LFN) compliance criteria
 - methodology used to predict Updated Project noise levels
- Section 4 presents results for each assessment case, including a comparison of predicted noise levels to Rule 012 compliance criteria.
- Section 5 summarizes the results of the Updated Project NIA.
- Section 6 provides information about the acoustical practitioners who prepared the Updated Project NIA.
- Appendix A is an NIA report that was prepared in support of the Keephills Unit 3 (K3) Auxiliary Boiler application (AUC Proceeding No. 28890) but not filed with the AUC.

2.0 PROJECT DESCRIPTION

Noise sources that will be installed at Keephills as part of the Updated Project consist of the following:

- two Siemens SGT6-5000F gas-fired turbine generators
- two HRSG units, each consisting of a body and an exhaust stack
- ancillary equipment (e.g., heaters, pumps, coolers, compressors) required to support operation of the turbines and HRSG units
- one auxiliary boiler
- two generator step-up (GSU) transformers
- two auxiliary transformers
- two static frequency convertor (SFC) package transformers

The gas-fired turbine generators, auxiliary boiler, fuel gas compressors, and boiler feedwater pumps will be located within new buildings. The remaining noise sources will be located outdoors.

It should be noted that the Keephills noise sources for the Updated Project are different than the Keephills noise sources considered in the original NIA for the Project (Golder 2019). More specifically, the Keephills design in the original version of the Project consisted of a single Mitsubishi Hitachi Power Systems (MHPS) M501JAC gas-fired turbine generator rather than a pair of Siemens SGT6-5000F turbines.

Table 1 presents noise emissions for major equipment that will be added to Keephills as part of the Updated Project. Noise emissions are presented as octave band sound power levels, expressed in unweighted decibels (dBZ), and total sound power levels, expressed in A-weighted decibels (dBA). In the case of Updated Project buildings, the sound power levels presented in Table 1 represent the combined noise from indoor equipment transmitted to the outdoor environment through the building walls, roofs, doors, and ventilation openings, as well as noise from wall-mounted and/or roof-mounted exhaust fans. Noise emissions values in Table 1 were established using a combination of information presented the original Project NIA (Golder 2019), empirical formulae from an engineering handbook (Bies and Hansen 2003), a widely accepted technical standard (NEMA 2000), and WSP's previous experience developing noise models for power plants.

Table 1: Updated Project Noise Emissions - Keephills Equipment

Source	Quantity	Octave Band Sound Power Level [dBZ]									Total Sound Power Level [dBA]
		31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	
HRSG Body	2	127.8	126.3	116.9	110.8	105.8	102.6	104.4	105.1	101.6	112.2
Glycol Cooler	2	109.8	112.8	112.8	109.8	106.8	102.8	99.8	96.8	88.8	109.0
Fin Fan Cooler	2	109.8	112.8	112.8	109.8	106.8	102.8	99.8	96.8	88.8	109.0
Rotor Air Cooler	2	109.8	112.8	112.8	109.8	106.8	102.8	99.8	96.8	88.8	109.0
Boiler Feedwater Building	2	109.7	110.6	105.2	97.3	97.1	105.2	103.0	98.9	88.9	108.7
Gas Turbine Building	2	133.5	119.7	118.7	103.3	101.7	99.3	96.2	92.0	85.7	106.9
Gas Conditioning Unit	2	98.2	98.5	98.0	96.6	96.6	98.0	101.3	100.1	96.0	106.3
Lube Oil Cooler	2	99.0	102.0	100.0	100.0	100.0	100.0	101.0	98.0	91.0	106.2
HRSG Blowdown Tank Pump	2	95.1	96.0	97.2	99.2	99.7	102.2	99.5	95.3	89.1	105.9
Recirculating Pump	2	95.1	96.0	97.2	99.2	99.7	102.2	99.5	95.3	89.1	105.9
GSU Transformer	2	101.5	107.5	109.5	104.5	104.5	98.5	93.5	88.5	81.5	104.9
Gas Turbine Air Inlet	2	117.2	115.5	111.0	102.0	91.7	98.2	86.4	92.8	102.5	104.8
Fuel Gas Separator	2	106.1	102.4	95.7	96.3	100.5	101.5	97.3	91.2	83.4	104.6
Gas Compressor Cooler	3	113.4	112.6	106.3	101.9	100.1	95.6	92.8	94.4	86.8	102.7
Auxiliary Transformer	2	95.7	103.6	104.0	101.3	102.7	92.8	86.3	76.6	67.5	101.5
Gas Turbine Generator Power Distribution Centre (PDC)	2	95.7	103.6	104.0	101.3	102.7	92.8	86.3	76.6	67.5	101.5
HRSG PDC	2	95.7	103.6	104.0	101.3	102.7	92.8	86.3	76.6	67.5	101.5
SFC Package Transformer	2	95.7	103.6	104.0	101.3	102.7	92.8	86.3	76.6	67.5	101.5
Gas Compressor Building	1	111.8	106.3	100.5	96.0	93.5	92.9	95.4	94.0	89.9	101.0
Auxiliary Boiler	1	104.0	104.0	103.0	101.0	98.0	95.0	92.0	89.0	86.0	100.7
HRSG Stack	2	122.0	118.0	102.0	95.0	93.0	99.0	77.0	75.0	50.0	100.6

3.0 ASSESSMENT APPROACH

The purpose of the Updated Project NIA is to assess potential environmental noise impacts from the Updated Project within the context of regulatory requirements specified in Rule 012. Specific regulatory requirements are described in detail in Section 3.3 of this report. In general, to demonstrate regulatory compliance, Rule 012 requires that cumulative noise levels at receptors be compared to a mandated permissible sound level (PSL) limit. Rule 012 considers relevant receptors to be “...*the most affected dwelling(s) located within 1.5 km of the boundary of the facility property...*” (AUC 2024a). Rule 012 indicates that cumulative noise levels should be calculated as the sum of:

- an ambient sound level (ASL) meant to represent the contribution from natural noise sources, non-industrial noise sources, and industrial facilities that are not regulated by the AUC or Alberta Energy Regulator (AER)
- the noise contribution from existing, approved, and proposed industrial facilities that are regulated by the AUC or AER (referred to collectively as Baseline Case facilities)
- the noise contribution from the Updated Project under normal operating conditions

3.1 Assessment Cases

The Updated Project NIA considered two assessment cases:

- Baseline Case, which consists of cumulative noise levels associated with natural sources, non-industrial sources, industrial facilities that not regulated by the AUC or AER, and existing, approved, and proposed industrial facilities that are regulated by the AUC or AER.
- Application Case, which consists of cumulative noise levels associated with the Baseline Case in combination with the predicted noise contribution from the Updated Project.

There are four existing, approved, and proposed AUC/AER-regulated facilities with the potential to contribute to cumulative noise levels in proximity to the Updated Project:

- Sundance
- Keephills
- Highvale Mine
- Pinnacle 1 & 2 Peaking Facility (Pinnacle)

Sundance originally consisted of six coal-fired generating units (S1, S2, S3, S4, S5, and S6). However, the AUC has approved TransAlta’s plans to retire S1, S2, S3, S4, and S5 (Golder 2018; TransAlta 2020, 2022a, 2022b), to operate S6 using 100% natural gas fuel (Golder 2018), and to repower S5 using gas-fired turbine generators and HRSG units (AUC 2020a). As such, the Baseline Case for the Updated Project NIA considered an operating scenario in which S1 through S4 are inactive, S6 is operating using 100% natural gas fuel, and S5 consists of gas-fired turbine generators and HRSG units.

Keephills originally consisted of three coal-fired generating units (K1, K2, and K3). However, the AUC has approved TransAlta’s plans to retire K1 (TransAlta 2021) and to operate K2 and K3 using 100% natural gas fuel (Golder 2018). As such, the Baseline Case for the Updated Project NIA considered an operating scenario in which K1 is inactive and K2 and K3 are operating using 100% natural gas fuel.

Highvale Mine was originally a multi-pit coal mine. However, active mining has ceased, and Highvale Mine is currently being reclaimed. There are seven pits that will be reclaimed during the life of the Updated Project: Pit 3, Pit 4, Pit 5, Pit 6, Pit 7, Pit 8, and Pit 9. Reclamation activities will move between these pits over the life of the Updated Project. For example, reclamation activities may occur in Pit 3 during the first year of Updated Project operations but move to Pit 4 and Pit 5 during later years. To capture maximum potential noise impacts from this temporal and spatial variability, the Updated Project NIA considered an operating scenario in which reclamation activities are underway simultaneously in each of the seven pits.

It should be noted that Pinnacle has received regulatory approval (AUC 2024b) but has not yet been constructed. Pinnacle (as currently approved) would be located at the same physical location as the Keephills equipment being proposed for the Updated Project. As such, it will not be possible for Pinnacle (as currently approved) and the Updated Project to proceed together. WSP understands that TransAlta has decided not to proceed with development of Pinnacle. Therefore, the Updated Project NIA omits the noise contribution from Pinnacle when calculation Baseline Case and Application Case cumulative noise levels.

The Baseline Case for the Updated Project NIA established the noise contribution from Sundance Unit S6, Keephills, and Highvale Mine operations using information presented in the noise assessment prepared for the K3 Auxiliary Boiler in July 2024 (WSP 2024), which is attached as Appendix A of this report. The K3 Auxiliary Boiler noise assessment is the most recent assessment to include these Baseline Case facilities and contains the most up-to-date information about noise levels in the Updated Project area. The Baseline Case for the Updated Project NIA established the noise contribution from the repowered S5 using information presented in the original NIA prepared for the Project (Golder 2019), which is consistent with the existing AUC Approval for S5 (TransAlta 2020a).

3.2 Noise Study Area and Receptors

Rule 012 regulates noise from a receptor perspective and considers relevant receptors to be “...*the most affected dwelling(s) located within 1.5 km from the boundary of the facility property...*” (AUC 2024a). Because the Updated Project will be located within the existing Keephills footprint, the Updated Project NIA focused on potential noise impacts to the most affected occupied dwelling located within 1.5 km of the boundary of the Keephills facility property (receptor R02).

Receptor R02 is a one-storey farmhouse in the southwest quarter of 07-052-03-W5M. Receptor R02 is approximately 2.6 km from the centre of the Keephills plant site and approximately 1.0 km from the edge of the disturbed area for the Keephills ash lagoon.

Table 2 describes the receptor considered in the Updated Project NIA. Rule 012 does not specify appropriate receptor heights to use in noise assessments but does indicate that the height of receptors “...*should reflect the bedroom height of the dwellings*” (AUC 2024a). In accordance with this guidance, the Updated Project NIA modelled receptor R02, which is a one-storey dwelling, at 1.5 m above ground to match the height at which bedroom noise exposure is expected to occur. Figure 1 presents a map showing the location of the Updated Project and relevant noise receptor.

Table 2: Noise Receptor

Receptor	Description / Comment	Universal Transverse Mercator Coordinates [Zone 11]		Receptor Height [m]
		Easting [m]	Northing [m]	
R02	One-storey farmhouse in the southwest quarter of 07-052-03-W5M R02 is the closest occupied dwelling to the Keephills site^(a) R02 is located approximately 2.6 km from the centre of the Keephills plant site and approximately 1.0 km from the disturbed area for the Keephills ash lagoon	669709	5927857	1.5

(a) There is a TransAlta-owned residence in the southeast quarter of 31-051-03-W5M, which is closer to the Updated Project than R02 (Golder 2018; WSP 2023). However, this residence will be either unoccupied or occupied by a TransAlta employee at the time that work on the Updated Project commences. Because an “employee or worker residence” is not classified as a dwelling in the context Rule 012 (AUC 2024a), the TransAlta-owned residence is not considered a receptor in the Updated Project NIA.



LEGEND

SECONDARY HIGHWAY

LOCAL ROAD

NOISE RECEPTOR

REPOWERING SITE

KEEPHILLS POWER PLANT BOUNDARY

0

0.5

1

1:20,000

KILOMETRES

REFERENCE(S)

ALBERTA DIGITAL BASE DATA MAY BE OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED, ALTALIS LTD. © GOVERNMENT OF ALBERTA 2025. ALL RIGHTS RESERVED, OR S&P GLOBAL INC. IMAGERY COPYRIGHT © 20230430 & 20230501, ESRI AND ITS LICENSORS. SOURCE: PARKLAND COUNTY, VANTOR. USED UNDER LICENSE, ALL RIGHTS RESERVED.

PROJECTED COORDINATE SYSTEM: NAD 1983 UTM ZONE 11N

CLIENT

transalta

PROJECT

KEEPHILLS 1 REPOWERING

TITLE

PROJECT LOCATION AND NOISE RECEPTOR

CONSULTANT

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3.3 Assessment Criteria

3.3.1 Broadband Noise

Rule 012 requires that compliance be assessed by comparing cumulative noise levels to PSL limits. Appropriate PSL limits for individual receptors are calculated using a desktop technique outlined in Rule 012. The Rule 012 calculation technique accounts for time of day, population density, and proximity to heavily travelled roads and railways. Applicable PSL limits are specified in dBA units, which incorporate scaling to represent the frequency sensitivity of the human auditory system.

The combined noise contribution from natural sources, non-industrial sources, and unregulated industrial facilities is characterized using ASL values. Although Rule 012 “...does not require the use of a specific [ASL]...”, Rule 012 does indicate that “...[t]he assumed [ASL] is five dBA less than the applicable [PSL]...” (AUC 2024a).

There are no unregulated facilities with the potential to influence ASL values at receptor R02. As such, ASL values at this receptor are primarily influenced by natural and non-industrial sources (e.g., birds, insects, rustling vegetation, agricultural and recreational activities, traffic on highways and local roads). Based on this analysis, it is reasonable for the Updated Project NIA to make use of assumed ASL values from Rule 012. The use of assumed ASL values in the Updated Project NIA is further justified by the fact that previous NIAs for TransAlta facilities in the area have made use of assumed ASL values (Golder 2018, 2019; WSP 2023, 2024).

Appropriate PSL limits and ASL values for receptor R02 were calculated using the desktop technique outlined in Rule 012. Table 3 presents PSL limits and ASL values for R02. The PSL limits and ASL values for R02 reflect the fact that this receptor is located more than 500 m from heavily travelled roads and railways in an area with a population density of less than nine dwellings per quarter section of land.

Table 3: Permissible Sound Levels and Ambient Sound Levels

Receptor	Permissible Sound Level [dBA]		Ambient Sound Level [dBA]		Description / Comment
	Daytime	Nighttime	Daytime	Nighttime	
R02	50	40	45	35	R02 is in a remote area with population density less than nine dwellings per quarter section. R02 is located more than 500 m from heavily travelled roads and railways.

3.3.2 Low Frequency Noise

Low frequency noise (LFN) can be an issue even when overall noise levels are otherwise acceptable. Consequently, Rule 012 requires a separate assessment of potential LFN impacts. Rule 012 indicates that an LFN issue exists if both the following conditions are met:

- The value of the noise level expressed in C-weighted decibels (dBC), minus the value of the noise level expressed in dBA, is greater than or equal to 20.
- A clear tonal component exists in a one-third octave band frequency between 20 hertz (Hz) and 250 Hz.

Rule 012 requires that both conditions be satisfied (i.e., dBC minus dBA ≥20 **and** a clear tonal component between 20 Hz and 250 Hz) for an LFN issue to exist. Satisfaction of one condition does not result in an LFN issue.

A computer noise model can be used to predict Updated Project noise levels in both dBA and dBC units. However, Rule 012 does not provide assumed ASL values in dBC units. As such, the Updated Project NIA applied the first part of the LFN test to predicted Updated Project noise levels in isolation from other sources. Moreover, it is not possible for a standard computer model to provide predicted noise levels at one-third octave band resolution. This type of high-resolution spectral data is typically only available from field measurements collected once a facility commences operations. As such, it is not possible to apply the second part of the LFN test in the Updated Project NIA.

Rule 012 recognizes the technical limitations associated with applying the complete two-part LFN test prior to a facility commencing operations. Consequently, Rule 012 indicates that application of LFN analysis in “...*predictive noise impact assessments is for information purposes only.*” (AUC 2024a). In other words, the result of the LFN test, as applied in the Updated Project NIA, has no bearing on Updated Project compliance with Rule 012.

3.4 Noise Prediction Methodology

In accordance with Rule 012, a computer noise model of the Updated Project was developed using the International Organization of Standardization (ISO) 9613-2 technical standard (ISO 2024). The computer model was used to calculate Updated Project noise levels at receptor R02. Inputs to the computer model consisted of source emissions in the form of octave band sound power levels and environmental parameters that influence noise propagation (e.g., ground cover, temperature, humidity, and wind conditions). Noise source emissions for the Updated Project are presented in Table 1 and Table 2. A summary of environmental inputs to the computer model is presented in Table 4.

Table 4: Environmental Inputs to Updated Project Noise Model

Parameter	Model Setting ^(a)	Description / Comments
Standard	ISO 9613-2 (ISO 2024)	Model treated noise sources and noise propagation in accordance with this standard.
Ground Factor	0.0 – water and paved surfaces, including Sundance and Keephills sites 0.2 – compacted surfaces, including mine pits 0.5 – gravel-covered surfaces 0.8 – surrounding farm fields	These values represent the acoustic properties of the ground in accordance with ISO 9613-2. A value of 0.0 represents hard/reflective ground. A value of 1.0 represents soft/absorptive ground.
Temperature / Humidity	10°C / 70% relative humidity	These are typical default values for ISO 9613-2 intended to represent nighttime summer conditions.
Wind Conditions	1 to 5 m/s from sources to receptors	These represent default ISO 9613-2 wind conditions: moderate temperature inversion, wind from sources to receptors 100% of the time.
Terrain	Terrain considered	Ground elevation contours at 5 m intervals were included in the models.

(a) Model settings were selected for consistency with previous NIAs for TransAlta facilities in the area (Golder 2018, 2019; WSP 2023, 2024).

When calculating noise levels at receptors, the ISO 9613-2 algorithm used the environmental inputs listed in Table 4 to account for four noise attenuation mechanisms:

- geometric divergence
- atmospheric absorption
- ground absorption
- screening by barriers

Geometric divergence accounts for the fact that a given noise source radiates a finite amount of acoustic energy, and as this finite amount of energy propagates into the environment, it is spread out over a larger and larger area (i.e., the surface of an ever-expanding sphere). This geometric spreading means that the farther away a receptor is located from a source, the less energy will be received (i.e., the lower the observed noise level).

Atmospheric absorption accounts for the fact that the acoustic energy associated with a given noise source is absorbed via interaction with molecules in the air through which it propagates. Attenuation effects associated with atmospheric absorption are most substantial at high frequencies but can be important at lower frequencies for large propagation distances.

Ground absorption accounts for the fact that each time the acoustic energy emitted by a noise source interacts with the ground, some of it is absorbed. The amount of energy absorbed depends on the type of ground surface. During interactions with the hard ground, very little energy is absorbed, but during interactions with porous ground, a substantial amount of energy is absorbed. As a result, if all other factors are held constant, observed noise levels associated with sources operating in an area of hard ground will be higher than observed noise levels associated with sources operating in an area of porous ground.

Screening by barriers accounts for the fact that a physical object (either terrain-based or anthropogenic) placed between a noise source and a receptor can block acoustic energy, reducing observed noise levels at the receptor.

According to the ISO 9613-2 standard, the overall accuracy of the propagation algorithm used in the Updated Project NIA computer model is ± 3 dBA for distances between source and receptor up to 1 km. The accuracy for propagation distances greater than 1 km is not stated in the standard. Model accuracy also depends on the accuracy of the noise emissions inputs, which is often ± 2 dBA. Accounting for both these sources of uncertainty, the overall accuracy of the noise level predictions presented in the Updated Project NIA is expected to be ± 3.6 dBA. Several conservative assumptions regarding propagation conditions and facility operations were made to account for the level of uncertainty inherent in the noise level predictions.

Most importantly, receptor R02 was assumed to be downwind from each source 100% of the time. Because downwind conditions tend to enhance noise propagation, this assumption is conservative and likely overestimates the noise impact of the Updated Project.

There are seven pits at the Highvale Mine that will be reclaimed during the life of the Updated Project, and reclamation activities will move between these pits. For example, reclamation activities may occur in Pit 3 during the first year of Project operations but move to Pit 4 and Pit 5 during later years. However, the Updated Project NIA considered an operating scenario in which reclamation activities are underway simultaneously in each of the seven pits. This approach is conservative and likely overestimates the cumulative noise impact of the Updated Project and Highvale Mine.

4.0 ASSESSMENT RESULTS

4.1 Baseline Case

Baseline Case reflects operations as they would exist without development of the Updated Project. Baseline Case cumulative noise levels were calculated by summing the contribution from natural and non-industrial sources and the contribution from Baseline Case facilities (i.e., Sundance, Keephills, and Highvale Mine). The noise contribution from natural and non-industrial facilities was characterized using ASL values from Table 4. The noise contribution from Sundance Unit S6, Keephills, and Highvale Mine was characterized using information presented in the noise assessment prepared for K3 Auxiliary Boiler in July 2024 (WSP 2024) – see Appendix A of this report. The noise contribution from the approved repowering of Sundance unit S5 was characterized using information presented in the original NIA prepared for the Project (Golder 2019).

Table 5 presents Baseline Case cumulative noise levels at receptor R02. Table 6 compares Baseline Case cumulative noise levels to applicable PSL limits from Rule 012. Results presented in Table 6 indicate that Baseline Case cumulative noise levels are compliant with Rule 012 during both the daytime period and the nighttime period.

Table 5: Baseline Case Cumulative Noise Levels

Receptor	Period	Ambient Sound Level [dBA]	Baseline Case Facilities [dBA]			Baseline Case Cumulative Noise Level [dBA]
			Sundance ^(a)	Keephills ^(b)	Highvale Mine	
R02	Daytime	45	24.0	37.0	33.2	45.9
	Nighttime	35	24.0	37.0	nil ^(c)	39.3

(a) Sundance noise level includes the noise contribution from the approved repowering of S5 (Golder 2019).

(b) Keephills noise level includes contribution from K3 Auxiliary Boiler (WSP 2024) – see Appendix A of this report.

(c) Reclamation activities at Highvale Mine will only occur during the daytime period (i.e., between 7 am and 10 pm).

Table 6: Baseline Case Noise Assessment

Receptor	Baseline Case Cumulative Noise Level ^(a) [dBA]		Permissible Sound Level [dBA]		Margin of Compliance ^(b) [dBA]	
	Daytime	Nighttime	Daytime	Nighttime	Daytime	Nighttime
R02	46	39	50	40	4	1

(a) In accordance with Rule 012, Baseline Case cumulative noise levels from Table 5 were rounded to the nearest whole number before assessing compliance with PSL limits.

(b) The margin of compliance is the difference between the Baseline Case cumulative noise levels and the PSL limits. A margin of compliance ≥ 0 dBA indicates compliance with Rule 012.

4.2 Application Case

4.2.1 Broadband Noise

Application Case reflects operations as they will exist following development of the Updated Project. Application Case cumulative noise levels were calculated by summing Baseline Case cumulative noise levels from Table 5 with the predicted noise contribution from the Updated Project under normal operating conditions.

Table 7 presents Application Case cumulative noise levels for receptor R02. Table 8 compares Application Case cumulative noise levels to applicable PSL limits from Rule 012. Results presented in Table 8 indicate that Application Case cumulative noise levels are compliant with Rule 012 during both the daytime period and the nighttime period.

Table 7: Application Case Cumulative Noise Levels

Receptor	Period	Baseline Case Cumulative Noise Level [dBA]	Updated Project [dBA]	Application Case Cumulative Noise Level [dBA]
R02	Daytime	45.9	33.6	46.1
	Nighttime	39.3	33.6	40.3

Table 8: Application Case Broadband Noise Assessment

Receptor	Application Case Cumulative Noise Level ^(a) [dBA]		Permissible Sound Level [dBA]		Margin of Compliance ^(b) [dBA]	
	Daytime	Nighttime	Daytime	Nighttime	Daytime	Nighttime
R02	46	40	50	40	4	0

(a) In accordance with Rule 012, Application Case cumulative noise levels from Table 7 were rounded to the nearest whole number before assessing compliance with PSL limits.

(b) The margin of compliance is the difference between the Application Case cumulative noise levels and the PSL limits. A margin of compliance ≥ 0 dBA indicates compliance with Rule 012.

4.2.2 Low Frequency Noise

Table 9 applies the first part of the two-part LFN test from Rule 012 to predicted Updated Project noise levels in isolation from other sources. More specifically, Table 9 presents the difference between predicted Updated Project noise levels in dBA and dBC units, then compares this difference to the threshold value of 20 set out in Rule 012.

Table 9: Low Frequency Noise Assessment

Receptor	Updated Project Noise Level		Difference: dBC minus dBA	Rule 012 Low Frequency Noise Threshold
	[dBA]	[dBC]		
R02	33.6	61.6	28.0	20

Table 9 indicates the difference between Updated Project noise levels expressed in dBA and dBC is greater than 20 at R02, which suggests a potential LFN issue associated with the Updated Project. However, it is important to note that the LFN test in Table 9 is applied to the Updated Project in isolation from other sources since Rule 012 does not provide representative ASL values in dBC units. If it were possible to include ASL values in the LFN analysis, it is likely the difference between dBC and dBA noise levels would be reduced.

More importantly, Table 9 only applies the first part of the two-part LFN test, but Rule 012 requires satisfaction of both part of the test (i.e., dBC minus dBA ≥ 20 and a clear tonal component between 20 Hz and 250 Hz) for an LFN issue to exist. Because the second part of the LFN test cannot be applied before a facility commences operations, Rule 012 is clear that LFN analysis in “...*predictive noise impact assessments is for information purposes only*” (AUC 2024a). In other words, the fact that Table 9 shows a dBC minus dBA difference greater than 20 has no bearing on Updated Project compliance with Rule 012.

5.0 SUMMARY AND DISCUSSION

An NIA was prepared for the Updated Project in accordance with assessment methods from Rule 012 (AUC 2024a). The NIA characterized potential noise impacts from the Updated Project in the context of PSL limits and LFN criteria specified in Rule 012.

As demonstrated in Table 8, the Updated Project NIA predicts that Application Case cumulative noise levels will be compliant with PSL limits at the closest and most affected dwelling receptor (R02). In other words, the Updated Project is predicted to comply with Rule 012.

Results presented in Table 9 indicate a potential LFN issue associated with the Updated Project. However, it is likely this potential LFN issue is a calculation artifact arising from the inability to include ASL values and high-resolution spectral data in predictive assessments of LFN. For this reason, Rule 012 is clear that LFN analysis in “...*predictive noise impact assessments is for information purposes only*” (AUC 2024a), and the potential LFN issue has no bearing on compliance with Rule 012.

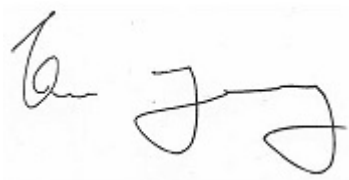
6.0 ACOUSTICAL PRACTITIONER INFORMATION

Andrew Faszer, PEng, INCE, was responsible for senior technical review of emissions calculations, modelling, and reporting related to the Project NIA. Andrew is a senior engineer with a broad environmental and industrial background and over 20 years of consulting experience. Andrew’s experience includes noise studies for oil and gas developments, conventional and wind power projects, industrial, and mining projects.

Victor Young, MSc, performed noise emissions calculations, developed computer noise models, and authored the Project NIA report. Victor has worked as an acoustic scientist in Alberta for approximately 15 years. During this time, Victor has been involved in a variety of energy, utilities, and mining projects throughout Western Canada. Victor’s experience includes field measurements and data analysis, computer noise modelling, and preparation of noise assessment reports.

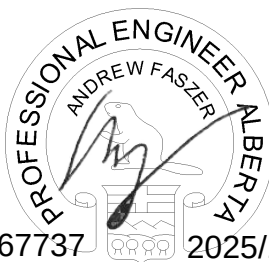
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WSP Canada Inc.



Victor Young, MSc
Acoustic Scientist

VY/AF/jlb



67737 2025/12/08
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WSP. 2024. TransAlta Keephills Unit 3 Auxiliary Boiler – Noise Impact Assessment. Prepared for TransAlta Corporation. Dated July 19, 2024. Prepared in support of AUC Proceeding 28890.

APPENDIX A

**TransAlta Keephills Unit 3 Auxiliary
Boiler - Noise Impact Assessment**



REPORT

TransAlta Keephills Unit 3 Auxiliary Boiler *Noise Impact Assessment*

Submitted to:

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TransAlta Corporation

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Submitted by:

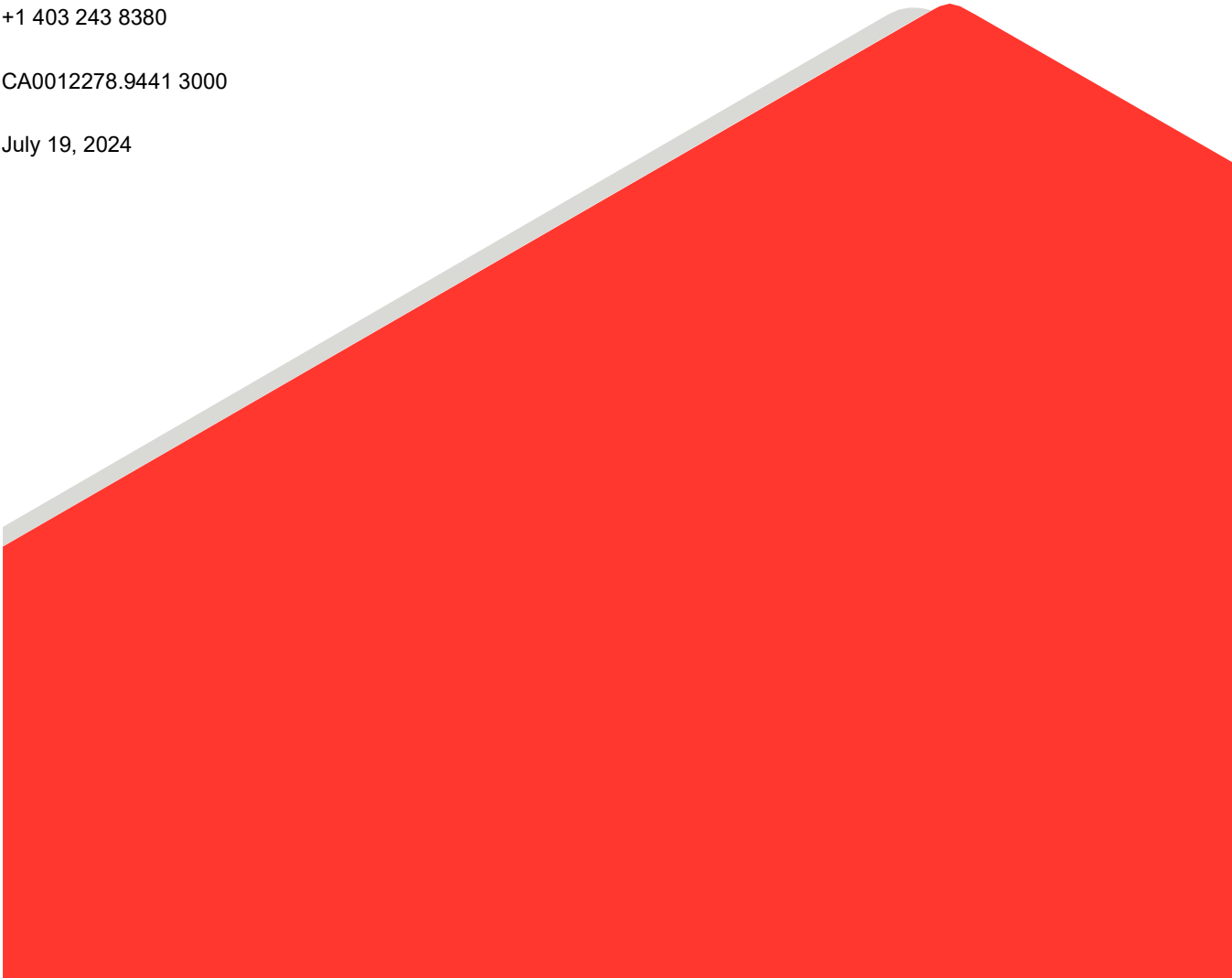
WSP Canada Inc.

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CA0012278.9441 3000

July 19, 2024

A large, solid red graphic element that starts as a thin line on the left, rises to a peak, and then descends to the right, forming a large, irregular shape that occupies the bottom half of the page.

Distribution List

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1.0 INTRODUCTION

TransAlta Corporation (TransAlta) operates the Keephills Thermal Electric Power Plant (Keephills) in the area of Wabamun Lake, Alberta. Keephills is located approximately 5 km south of Wabamun Lake, in Section 36, Township 51, Range 4, west of the Fifth Meridian (36-051-04-W5M). TransAlta is proposing to add an auxiliary boiler to Keephills generating unit #3 (K3). In this report, addition of the auxiliary boiler will be referred to as “the Project”.

Environmental noise from power plants in Alberta is regulated by the Alberta Utilities Commission (AUC) through Rule 012: Noise Control (AUC 2021). Because development of the Project will introduce new noise sources into the existing environment, Rule 012 requires the preparation and submission of a noise impact assessment (NIA).

TransAlta retained WSP Canada Inc. (WSP) to prepare a NIA for the Project. The Project NIA was prepared in accordance with Rule 012 guidance and methodology. The results of the Project NIA are presented in this report.

The NIA report for the Project is structured as follows.

- Section 1 provides a brief introduction to the Project NIA.
- Section 2 provides a description of Project equipment, including emissions values used to model the potential noise impact of this equipment.
- Section 3 outlines the assessment approach used in the Project NIA, including a description of:
 - assessment cases considered in the Project NIA
 - noise study area and relevant receptor location
 - applicable broadband and low frequency noise (LFN) compliance criteria
 - methodology used to predict Project noise levels
- Section 4 presents results for each assessment case, including a comparison of noise level predictions to Rule 012 compliance criteria.
- Section 5 summarizes the results of the Project NIA.
- Section 6 provides information about the acoustical practitioners who prepared the Project NIA.

2.0 PROJECT DESCRIPTION

The Project will consist of a 44,984-kW natural-gas auxiliary boiler and a 2,616-kW superheater unit. Noise sources associated with the Project will consist of one exhaust stack, one ventilation fan, and one steam vent. All three Project noise sources will be located outdoors on the west side of the existing K3 building. The exhaust stack and ventilation fan will emit noise whenever the Project is operating. The steam vent will only emit noise temporarily during Project start-up activities. Nevertheless, the Project NIA modelled all three sources as active with maximum noise emissions 24 hours per day. This approach to modelling the Project is conservative and will tend to overestimate potential noise impacts.

Table 1 presents noise emissions used to represent Project sources in the NIA. Noise emissions in Table 1 are presented as octave band sound power levels, expressed in unweighted decibels (dBZ), and total sound power levels, expressed in A-weighted decibels (dBA). Noise emissions for Project equipment were established using a combination of equipment-specific data supplied by TransAlta, empirical formulae from an engineering handbook (Bies and Hansen 2003), and WSP's past experience assessing noise from similar types of equipment.

Table 1: Project Noise Emissions

Source	Quantity	Location	Octave Band Sound Power Level (dBZ)									Total Sound Power Level (dBA)
			31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	
steam vent ^(a)	1	outdoors on west side of existing K3 building	116.2	113.5	103.4	104.4	107.8	109.8	120.7	126.0	110.3	128.3
exhaust stack	1	outdoors on west side of existing K3 building	109.0	109.0	108.0	106.0	103.0	100.0	97.0	94.0	91.0	105.7
ventilation fan	1	outdoors on west side of existing K3 building	93.4	89.2	100.0	106.5	98.0	95.3	92.5	87.3	83.4	102.0

(a) The Project steam vent only emits noise during start-up activities. However, it was modelled with maximum noise emissions 24 hours per day.

3.0 ASSESSMENT APPROACH

The purpose of the Project NIA is to assess potential environmental noise impacts from the Project within the context of regulatory requirements specified in Rule 012. Specific regulatory requirements are described in detail in Section 3.3 of this report. In general, to demonstrate regulatory compliance, Rule 012 requires that cumulative noise levels at receptors be compared to a mandated permissible sound level (PSL) limit. Rule 012 considers relevant receptors to be "... *the most affected dwelling(s) located within 1.5 km from the boundary of the facility property...*" (AUC 2021). Rule 012 indicates that cumulative noise levels should be calculated as the sum of:

- an ambient sound level (ASL) meant to represent the contribution from natural noise sources, non-industrial noise sources, and industrial facilities that are not regulated by the AUC or the Alberta Energy Regulator (AER)
- the noise contribution from existing, approved, and proposed industrial facilities that are regulated by the AUC or AER (referred to collectively as Baseline Case facilities)
- the noise contribution from the Project under normal operating conditions

3.1 Assessment Cases

The Project NIA considered two assessment cases:

- Baseline Case, which consists of cumulative noise levels associated with natural sources, non-industrial sources, industrial facilities that are not regulated by the AUC or AER, and existing, approved, and proposed industrial facilities that are regulated by the AUC or AER.
- Application Case, which consists of cumulative noise levels associated with the Baseline Case in combination with the predicted noise contribution from the Project.

There are four existing, approved, and proposed AUC/AER-regulated facilities with the potential to contribute to cumulative noise levels in proximity to the Project:

- Keephills Thermal Electric Power Plant (Keephills)
- Pinnacle 1 & 2 Peaking Facility (Pinnacle)
- Sundance Thermal Electric Power Plant (Sundance)
- Highvale Mine

Keephills originally consisted of three coal-fired generating units (K1, K2, and K3). However, the AUC has approved TransAlta's plans to retire K1 (TransAlta 2021) and to operate K2 and K3 using 100% natural gas fuel (Golder 2018). As such, the Baseline Case for the Project NIA considered an operating scenario in which K1 is inactive and K2 and K3 are operating using 100% natural gas fuel.

Pinnacle is a peaking power plant being proposed for development by TransAlta within the existing Keephills footprint. Pinnacle will operate on an as-needed basis during periods of peak electricity demand. TransAlta expects Pinnacle to operate approximately 20% of the time on an annual average basis (WSP 2023). Nevertheless, the Baseline Case for the Project NIA considered an operating scenario in which Pinnacle noise sources are active 100% of the time.

Sundance originally consisted of six coal-fired generating units (S1, S2, S3, S4, S5, and S6). However, the AUC has approved TransAlta's plans to retire S1, S2, S3, S4, and S5 (Golder 2018; TransAlta 2020, 2022a, 2022b) and to operate S6 using 100% natural gas fuel (Golder 2018). As such, the Baseline Case for the Project NIA considered an operating scenario in which S1 through S5 are inactive, and S6 is operating using 100% natural gas fuel.

Highvale Mine was originally a multi-pit coal mine. However, active mining has ceased, and the Highvale Mine is currently being reclaimed. There are seven pits that will be reclaimed during the life of the K3 auxiliary boiler Project: Pit 3, Pit 4, Pit 5, Pit 6, Pit 7, Pit 8, and Pit 9. Reclamation activities will move between these pits over the life of the Project. For example, reclamation activities may occur in Pit 3 during the first year of K3 auxiliary boiler operations but move to Pit 4 and Pit 5 during later years. To capture maximum potential noise impacts from this temporal and spatial variability, the Baseline Case for the Project NIA considered an operating scenario in which reclamation activities are underway simultaneously in each of the seven pits.

The Baseline Case for the Project NIA established the noise contribution from Keephills, Pinnacle, Sundance, and Highvale operations using information presented in the noise assessment prepared for Pinnacle in August 2023 (WSP 2023). The Pinnacle noise assessment is the most recent assessment to include these Baseline Case facilities and contains the most up-to-date information about noise levels in the Project area.

3.2 Noise Study Area and Receptor

Rule 012 regulates noise from a receptor perspective and considers relevant receptors to be “... *the most affected dwelling(s) located within 1.5 km from the boundary of the facility property...*” (AUC 2021). Because the Project will be located within the existing Keephills footprint, the Project NIA focused on potential noise impacts to occupied dwellings located within 1.5 km of the boundary of the Keephills facility property. There is one such dwelling: a one-storey farmhouse located in the southwest quarter of 07-052-03-W5M, approximately 2.6 km from the centre of the Keephills site and approximately 1.0 km from the edge of the disturbed area for the Keephills ash lagoon. For consistency with previous NIAs completed for TransAlta facilities in the Project area (Golder 2018; WSP 2023), this dwelling receptor is referred to as R02.

Table 2 describes the receptor considered in the Project NIA. Rule 012 does not specify appropriate receptor heights to use in noise assessments but does indicate that the height of receptors “...*should reflect the bedroom height of the dwellings*” (AUC 2021). In accordance with this guidance, the Project NIA modelled receptor R02 (a one-storey dwelling) at 1.5 m above ground to match the height at which bedroom noise exposure is expected to occur. Figure 1 presents a map showing the location of the Project and receptor R02.

Table 2: Noise Receptor

Receptor ^(a)	Description / Comment	Universal Transverse Mercator Coordinates (Zone 11)		Receptor Height (m)
		Easting (m)	Northing (m)	
R02	Occupied one-storey farmhouse located in the southwest quarter of 07-052-03-W5M. R02 is the closest occupied dwelling to the Project and to the Keephills site^(b). R02 is located approximately 2.6 km north of the centre of the Keephills site and approximately 1.0 km north of the disturbed area for the Keephills ash lagoon.	669709	5927857	1.5

(a) Receptor identification code selected for consistency with previous TransAlta NIAs (Golder 2018; WSP 2023).

(b) There is a TransAlta-owned residence located in the southeast quarter of 31-051-03-W5M, which is closer to the Project than R02 (Golder 2018; WSP 2023). However, this residence will be either unoccupied or occupied by a TransAlta employee at the time that work on the Project commences. Because an “*employee or worker residence*” is not classified as a dwelling in the context of Rule 012 (AUC 2021), the TransAlta-owned residence is not considered a receptor in the Project NIA.

3.3 Assessment Criteria

3.3.1 Broadband Noise

Rule 012 requires that compliance be assessed by comparing cumulative noise levels to PSL limits. Appropriate PSL limits for individual receptors are calculated using a desktop technique outlined in Rule 012. The Rule 012 calculation technique accounts for time of day, population density, and proximity to heavily travelled roads and railways. Applicable PSL limits are specified in dBA units, which incorporate scaling to represent the frequency sensitivity of the human auditory system.

The combined noise contribution from natural sources, non-industrial sources, and unregulated industrial facilities is characterized using ASL values. Although Rule 012 “...*does not require the use of a specific [ASL]...*”, Rule 012 does indicate that “...[t]he assumed [ASL] is five dBA less than the applicable [PSL]...” (AUC 2021).



- LEGEND**
- NOISE RECEPTOR
 - PROJECT LOCATION
 - SECONDARY HIGHWAY
 - LOCAL ROAD



REFERENCE(S)
PROJECT FOOTPRINT PROVIDED BY CLIENT, JULY 14, 2023. ALBERTA TOWNSHIP SYSTEM AND HYDROGRAPHY DATA © GOVERNMENT OF ALBERTA 2023. ALL RIGHTS RESERVED.
TRANSPORTATION DATA OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED. TOPORAMA MAPS OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.
PROJECTED COORDINATE SYSTEM: NAD 1983 UTM ZONE 11N

CLIENT
transalta

PROJECT
KEEPPHILLS UNIT 3 AUXILIARY BOILER

TITLE
PROJECT LOCATION AND NOISE RECEPTOR

	CONSULTANT	YYYY-MM-DD	2024-07-17
	DESIGNED	VY	
	PREPARED	SG	
	REVIEWED	VY	
	APPROVED	AF	

PROJECT NO.	CONTROL	REV.	FIGURE
CA0012278.9441	3000	0	1

There are no unregulated facilities with the potential to influence ASL values at receptor R02. As such, ASL values at this receptor are primarily influenced by natural and non-industrial sources (e.g., birds, insects, rustling vegetation, agricultural and recreational activities, traffic on highways and local roads). Based on this analysis, it is reasonable for the Project NIA to make use of assumed ASL values from Rule 012. The use of assumed ASL values in the Project NIA is further justified by the fact that previous NIAs for TransAlta facilities in the area have made use of assumed ASL values (Golder 2018; WSP 2023).

Appropriate PSL limits and ASL values for receptor R02 were calculated using the desktop technique outlined in Rule 012. Table 3 presents PSL limits and ASL values for R02. The PSL limits and ASL values for R02 reflect the fact that this receptor is located more than 500 m from heavily travelled roads and railways in an area with a population density of less than nine dwellings per quarter section of land.

Table 3: Permissible Sound Levels and Ambient Sound Levels

Receptor	Permissible Sound Level (dBA)		Ambient Sound Level (dBA)		Description / Comment
	Daytime	Nighttime	Daytime	Nighttime	
R02	50	40	45	35	R02 is located in a remote area with a population density of less than nine dwellings per quarter section. R02 is located more than 500 m from heavily travelled roads and railways.

3.3.2 Low Frequency Noise

Low frequency noise (LFN) can be an issue even when overall noise levels are otherwise acceptable. Consequently, Rule 012 requires a separate assessment of potential LFN impacts. Rule 012 indicates that an LFN issue exists if both the following conditions are met.

- The value of the noise level expressed in C-weighted decibels (dBC), minus the value of the noise level expressed in dBA, is greater than or equal to 20.
- A clear tonal component exists in a one-third octave band frequency between 20 hertz (Hz) and 250 Hz.

Rule 012 requires that both of the above conditions be satisfied (i.e., dBC minus dBA ≥ 20 and a clear tonal component between 20 Hz and 250 Hz) for an LFN issue to exist. Satisfaction of one condition does not result in an LFN issue.

A computer noise model can be used to predict Project noise levels in both dBA and dBC units. However, Rule 012 does not provide assumed ASL values in dBC units. As such, the Project NIA applied the first part of the LFN test to predicted Project noise levels in isolation from other sources. It is not possible for a standard computer model to provide predicted noise levels at one-third octave band resolution. This type of high-resolution spectral data is typically only available from field measurements collected once a facility commences operations. As such, it is not possible to apply the second part of the LFN test in the Project NIA.

Rule 012 recognizes the technical limitations associated with applying the complete two-part LFN test prior to a facility commencing operations. Consequently, Rule 012 indicates that application of LFN analysis in “...*predictive noise impact assessments is for information purposes only.*” (AUC 2021). In other words, the result of the LFN test, as applied in the Project NIA, has no bearing on Project compliance with Rule 012.

3.4 Noise Prediction Methodology

In accordance with Rule 012, a computer noise model of the Project was developed using the International Organization of Standardization (ISO) 9613-2 technical standard (ISO 1996). The computer model was used to calculate Project noise levels at receptor R02. Inputs to the computer model consisted of source emissions in the form of octave band sound power levels and environmental parameters that influence noise propagation (e.g., ground cover, temperature, humidity, and wind conditions). Noise source emissions for the Project are presented in Table 1. A summary of environmental inputs to the computer model is presented in Table 4.

Table 4: Environmental Inputs to Project Noise Model

Parameter	Model Setting ^(a)	Description / Comment
Standard	ISO 9613-2 (ISO 1996)	Model treated noise sources and noise propagation in accordance with this standard.
Ground Factor	0.0 – water and paved surfaces, including Sundance and Keephills sites 0.2 – compacted surfaces, including mine pits 0.5 – gravel-covered surfaces 0.8 – surrounding farm fields	These values represent the acoustic properties of the ground in accordance with ISO 9613-2. A value of 0.0 represents hard/reflective ground. A value of 1.0 represents soft/absorptive ground.
Temperature / Humidity	10°C / 70% relative humidity	These are typical default values for ISO 9613-2 intended to represent nighttime summer conditions.
Wind Conditions	1 to 5 m/s from sources to receptors	These represent default ISO 9613-2 wind conditions: moderate temperature inversion, wind from sources to receptors 100% of the time.
Terrain	Terrain considered	Ground elevation contours at 5 m intervals were included in the models.

(a) Model settings were selected for consistency with previous NIAs prepared for TransAlta facilities in the area (Golder 2018; WSP 2023).

When calculating noise levels at receptors, the ISO 9613-2 algorithm used the environmental inputs listed in Table 4 to account for four noise attenuation mechanisms:

- geometric divergence
- atmospheric absorption
- ground absorption
- screening by barriers

Geometric divergence accounts for the fact that a given noise source radiates a finite amount of acoustic energy, and as this finite amount of energy propagates into the environment, it is spread out over a larger and larger area (i.e., the surface of an ever-expanding sphere). This geometric spreading means that the farther away a receptor is located from a source, the less energy will be received (i.e., the lower the observed noise level).

Atmospheric absorption accounts for the fact that the acoustic energy associated with a given noise source is absorbed via interaction with molecules in the air through which it propagates. Attenuation effects associated with atmospheric absorption are most substantial at high frequencies but can be important at lower frequencies for large propagation distances.

Ground absorption accounts for the fact that each time the acoustic energy emitted by a noise source interacts with the ground, some of it is absorbed. The amount of energy absorbed depends on the type of ground surface. During interactions with the hard ground, very little energy is absorbed, but during interactions with porous ground, a substantial amount of energy is absorbed. As a result, if all other factors are held constant, observed noise levels associated with sources operating in an area of hard ground will be higher than observed noise levels associated with sources operating in an area of porous ground.

Screening by barriers accounts for the fact that a physical object (either terrain-based or anthropogenic) placed between a noise source and a receptor can block acoustic energy and reduce observed noise levels at the receptor.

According to the ISO 9613-2 standard, the overall accuracy of the propagation algorithm used in the Project NIA computer model is ± 3 dBA for distances between source and receptor up to 1 km. The accuracy for propagation distances greater than 1 km is not stated in the standard. Model accuracy also depends on the accuracy of the noise emissions inputs, which is often ± 2 dBA. Accounting for both these sources of uncertainty, the overall accuracy of the noise level predictions presented in the Project NIA is expected to be ± 3.6 dBA. A number of conservative assumptions regarding propagation conditions and facility operations were made to account for the level of uncertainty inherent in the noise level predictions.

Each receptor was assumed to be downwind from each source 100% of the time. Because downwind conditions tend to enhance noise propagation, this assumption is conservative and likely overestimates the noise impact of the Project.

All Project equipment were modelled with maximum noise emissions 100% of the time. Because the steam vent will only emit noise temporarily during Project start-up activities, modelling all equipment as active 24 hours per day is conservative and likely overestimates the noise impact of the Project.

There are seven pits at the Highvale Mine that will be reclaimed during the life of the Project, and reclamation activities will move between these pits. For example, reclamation activities may occur in Pit 3 during the first year of Project operations but move to Pit 4 and Pit 5 during later years. However, the Project NIA considered an operating scenario in which reclamation activities are underway simultaneously in each of the seven pits. This approach is conservative and likely overestimates the cumulative noise impact of the Project and Highvale Mine.

4.0 ASSESSMENT RESULTS

4.1 Baseline Case

Baseline Case reflects operations as they would exist without development of the Project. Baseline Case cumulative noise levels were calculated by summing the contribution from natural and non-industrial sources and the contribution from Baseline Case facilities (i.e., Keephills, Pinnacle, Sundance, and Highvale Mine). The noise contribution from natural and non-industrial facilities was characterized using ASL values from Table 3. The noise contribution from Keephills, Pinnacle, Sundance, and Highvale Mine was characterized using information presented in the noise assessment prepared for Pinnacle in August 2023 (WSP 2023).

Table 5 presents Baseline Case cumulative noise levels for receptor R02. Table 6 compares Baseline Case cumulative noise levels to applicable PSL limits from Rule 012. Results presented in Table 6 indicate that Baseline Case cumulative noise levels are compliant with Rule 012.

Table 5: Baseline Case Cumulative Noise Levels

Receptor	Period	Ambient Sound Level (dBA)	Baseline Case Facilities ^(a) (dBA)				Baseline Case Cumulative Noise Level (dBA)
			Keephills	Pinnacle	Sundance	Highvale	
R02	Daytime	45	36.4	34.2	18.9	33.2	46.1
	Nighttime	35	36.4	34.2	18.9	n/a ^(b)	40.1

(a) Noise contribution from Baseline Case facilities taken from Table 7 of the Pinnacle noise assessment (WSP 2023).

(b) Reclamation activities at Highvale Mine will only occur during the daytime period (i.e., between 7 a.m. and 10 p.m.).

Table 6: Baseline Case Broadband Noise Assessment

Receptor	Baseline Case Cumulative Noise Level ^(a) (dBA)		Permissible Sound Level (dBA)		Margin of Compliance ^(b) (dBA)	
	Daytime	Nighttime	Daytime	Nighttime	Daytime	Nighttime
R02	46	40	50	40	4	0

(a) In accordance with Rule 012, Baseline Case cumulative noise levels from Table 5 have been rounded to the nearest whole number before assessing compliance with PSL limits.

(b) The margin of compliance is the difference between the Baseline Case cumulative noise levels and the PSL limits. A margin of compliance ≥ 0 dBA indicates compliance with Rule 012.

4.2 Application Case

4.2.1 Broadband Noise

Application Case reflects operations as they will exist following development of the Project. Application Case cumulative noise levels were calculated by summing the contribution from natural and non-industrial sources, the contribution from Baseline Case facilities, and the contribution from the Project itself under normal operating conditions. The noise contribution from natural and non-industrial sources was characterized using ASL values (see Table 3). The noise contribution from Baseline Case facilities was characterized using information presented in the noise assessment prepared for Pinnacle in August 2023 (WSP 2023). The noise contribution from the Project was characterized using a computer model (see Table 1 and Table 4).

Table 7 presents Application Case cumulative noise levels for receptor R02. Table 8 compares Application Case cumulative noise levels to applicable PSL limits from Rule 012. Results presented in Table 8 indicate that Application Case cumulative noise levels are compliant with Rule 012.

Table 7: Application Case Cumulative Noise Levels

Receptor	Period	Ambient Sound Level (dBA)	Baseline Case Facilities ^(a) (dBA)				Project (dBA)	Application Case Cumulative Noise Level (dBA)
			Keephills	Pinnacle	Sundance	Highvale		
R02	Daytime	45	36.4	34.2	18.9	33.2	27.9	46.2
	Nighttime	35	36.4	34.2	18.9	n/a ^(b)	27.9	40.4

(a) Noise contribution from Baseline Case facilities taken from Table 7 of the Pinnacle noise assessment (WSP 2023).

(b) Reclamation activities at Highvale Mine will only occur during the daytime period (i.e., between 7 a.m. and 10 p.m.).

Table 8: Application Case Broadband Noise Assessment

Receptor	Application Case Cumulative Noise Level ^(a) (dBA)		Permissible Sound Level (dBA)		Margin of Compliance ^(b) (dBA)	
	Daytime	Nighttime	Daytime	Nighttime	Daytime	Nighttime
R02	46	40	50	40	4	0

(a) In accordance with Rule 012, Application Case cumulative noise levels from Table 7 have been rounded to the nearest whole number before assessing compliance with PSL limits.

(b) The margin of compliance is the difference between the Application Case cumulative noise levels and the PSL limits. A margin of compliance ≥ 0 dBA indicates compliance with Rule 012.

4.2.2 Low Frequency Noise

Table 9 applies the first part of the two-part LFN test from Rule 012 to predicted Project noise levels in isolation from other sources. In particular, Table 9 presents the difference between predicted Project noise levels in dBA and dBC units, and then compares this difference to the threshold value of 20 set out in Rule 012. As shown in Table 9, the predicted difference between Project noise levels expressed in dBA and dBC is less than 20, which indicates there is no potential LFN issue associated with the Project (regardless of the outcome of the second part of the two-part LFN test).

Table 9: Low Frequency Noise Analysis

Receptor	Project Noise Level		Difference: dBC minus dBA	Rule 012 Low Frequency Noise Threshold	Assessment
	(dBA)	(dBC)			
R02	27.9	43.9	16.0	20	no potential LFN issue

5.0 SUMMARY AND DISCUSSION

A NIA was prepared for the Project in accordance with assessment methods from Rule 012 (AUC 2021). The NIA characterized potential noise impacts from the Project in the context of PSL limits and LFN criteria specified in Rule 012.

As demonstrated in Table 8, the Project NIA predicts that Application Case cumulative noise levels will be compliant with PSL limits at the closest and most affected dwelling receptor (R02). As demonstrated in Table 9, the Project NIA predicts there is no potential LFN issue associated with the Project. In conclusion, the Project is predicted to comply with Rule 012.

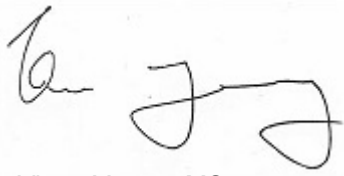
6.0 ACOUSTICAL PRACTITIONER INFORMATION

Andrew Faszer, PEng, INCE, was responsible for senior technical review of emissions calculations, modelling, and reporting related to the Project NIA. Andrew is a senior engineer with a broad environmental and industrial background and over 20 years of consulting experience. Andrew's experience includes noise studies for oil and gas developments, conventional and wind power projects, industrial, and mining projects.

Victor Young, MSc, performed noise emissions calculations, developed computer noise models, and authored the Project NIA report. Victor has worked as an acoustic scientist for more than 12 years. During this time, Victor has been involved in a variety of energy, utilities, and mining projects throughout Western Canada. Victor's experience includes field measurements and data analysis, computer noise modelling, and preparation of noise assessment reports.

Signature Page

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VY/AF/rd

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