

February 25, 2020

Aercoustics Project #: 14215.04

Suncor Energy Services Inc.

150-6th Avenue S.W, P.O Box 2844
Calgary, Alberta
T2P 3E3

ATTN: Mark Kozak

Subject: Additional Acoustic I-Audit for the Adelaide Wind Power Project
R754 - Phase 2
REA#8279-9AUP2B

Aercoustics Engineering Limited (“Aercoustics”) has been retained by Suncor Energy Services Incorporated (“Suncor”) to conduct an additional acoustic audit to support the completion of the requirements outlined in the Renewable Energy Approval (“REA”) for the Suncor Adelaide Wind Power Project (“SAWPP”). SAWPP operates under REA #8279-9AUP2B.

This letter contains responses to MECP comments received on February 12, 2020 for the Adelaide Wind Power Project Phase 2 I-audit report for receptor R754 which are provided below. Original MECP comment is provided in black and Aercoustics’ response is provided in purple.

1 – Detailed Wind Roses: Additional wind roses for when the turbines were in operation and parked (Turbine ON/Turbine OFF) should be included in the report.

A revised report which includes additional wind roses for when the turbines were in operation and parked (Turbine ON/Turbine OFF) is attached as part of the submission with this letter.

2 – FFT Data: Please provide the raw FFT data in the form of an excel file. In addition, please revise the report to include the tonal audibility values for each wind speed bin.

The Emission test results for SAWPP turbines WTG05 and WTG26 indicate that there were no reportable tones and the maximum tonal audibility from the wind turbines is below 3 dB. Accordingly, as per Section D3.8.3 of the Protocol, no further assessment of tonality is required for the I-Audit.

Regardless of the E-Audit test results the tonality analysis for the Phase 2 I-Audit at R754 has been completed and the results included in a revised report attached as part of the submission with this letter.

In addition, the raw FFT data in the form of an excel file has been attached as part of the submission with this letter.

3 – Compliance at 7 m/s: Please complete the sound level assessment for the 7 m/s wind speed bin and comment on the compliance.

Insufficient data was collected for both TON and TOFF in the 7 m/s wind bin as per the Compliance Protocols sample size requirements. Therefore, a Turbine ONLY sound level in the 7m/s wind bin has not been reported and compliance has not been assessed in the 7m/s wind bin.

It should be noted that there is sufficient data in the lower wind bins for a complete assessment as per the Protocol's sample size requirement.

The majority of the available Turbine ON data at 7 m/s was collected on two nights (Nov 14/15th) during gusty conditions and is considered of lower quantity and quality compared to lower wind bins for which an assessment has been made. The Turbine ON data in the 7m/s wind bin is influenced to a greater extent by wind-related ambient noise which is more prevalent at this high wind speed and has been verified by listening. Measures to reduce the impact of wind-related noise were employed at the monitor location, as prescribed in the Protocol; a secondary wind screen was installed to reduce-self noise, and the monitoring equipment was located away from trees as much as practically possible. However, it is not possible to eliminate the affect of wind induced noise at very high wind speeds. Sufficient representative background data in the 7m/s wind bin in similar gusty conditions is not available to conduct the appropriate background correction for the assessment of the Turbine ONLY level in the 7m/s wind bin.

4 – Background Sound Levels: There is an increase in the background sound levels from the phase 1 additional I-Audit to the phase 2 additional I-Audit (See table below). Please provide a rationale for the increase in background sound level between the audits.

Background Sound Levels		
Audit Report	4m/s	5m/s
Phase 1	36.3 dBA	37.7 dBA
Phase 2	40.1 dBA	40.1 dBA

It is not possible to definitively identify the reason for the increase in background sound level from the phase 1 I-Audit to the phase 2 I-audit. It is suspected that the increase in background sound level measured is attributable to the variability and increase in ambient sound levels from Ontario Highway 402. The impact of Ontario Highway 402 is discussed further in response #5 below.

It should be noted that efforts to collect Turbine ON and Background data in the same general time period were carried out for the Phase 2 audit (on the same night for Nov 25 and Dec 12). Therefore, the ambient levels measured are also present during Total Noise intervals with the Turbines running. As such the measured Background levels are representative of the ambient sound levels at the monitor location and provide an appropriate background correction for this monitor location.

5 – Deviation from Protocol: The Turbine OFF data was filtered for downwind direction as stated in Section 3.3.3 of the audit report. Please comment on the impact that this will have on the background sound levels. Please conduct the sound level measurements without filtering the background data in the downwind direction, compare the results and demonstrate compliance without this additional filtering.

Ontario Highway 402 – located 3 kilometers South of R754 – was observed to be a distant ambient noise source at this location, both through listening and spectral analysis of the measured data. It was noted that the contribution of the noise from Ontario Highway 402 varied with the wind direction. Removal of the Ontario Highway 402 contamination was not possible due to the continuous nature of the source, and so an effort was made to further filter the dataset to control for the variations caused

by wind direction. This was done by adding a downwind filter to the background data set and targeting nights for collecting ambient when Total noise intervals were captured to facilitate a representative background correction.

Ontario Highway 402 is located to the South of Receptor R754, in the downwind position with respect to the direction of the nearest turbine. As such Total Noise intervals will always be influenced by noise from Ontario Highway 402. As the distance from the microphone to the highway is relatively large, the sound contribution from the highway is expected to be highly dependant on the wind direction. Including lower ambient noise intervals captured during non-downwind wind directions will have the effect of overestimating the impact of the wind project at the audit location. This is the case with the Phase 1 audit as compliance was demonstrated with ambient data from downwind and non-downwind directions resulting in a conservative assessment. However, filtering the ambient sound levels to match the same conditions as the Total Noise results in a more accurate assessment.

Removing the background wind direction filter in the Phase 2 I-Audit has the effect of including additional background data in the 1, 2, 3 and 4 m/s wind bins. There is no corresponding Turbine ON data in wind bins 1, 2 and 3 m/s. For the 4m/s wind bin two data points are added without the background wind direction filter and this additional data has a negligible effect on the average sound level for this wind bin.

As such removing the wind direction filter does not effect the analysis or conclusions of the report. Two tables presenting the average measured sound levels at the monitoring location with and without background wind direction filter and corresponding data visualizations of the assessment dataset is provided below.

Table 1: R754 Average Measured Sound Levels with Background wind direction filter

Receptor	Period	Measurement Parameter	I audit Wind Bins (m/s)						
			1	2	3	4	5	6	7
R754	Total Noise	Number of Samples	0	0	24	157	208	129	55
		Average LAeq [dBA]	-	-	-	42.4	42.4	44.7	-
		Standard Deviation	-	-	0.6	1.6	1.4	1.3	1.4
	Background	Number of Samples	0	0	0	46	44	57	21
		Average LAeq [dBA]	-	-	-	40.1	40.1	43.0	-
		Standard Deviation	-	-	-	1.5	1.1	1.1	1.1
	Turbine Only	-	-	-	38	39	40	-	
Compliance	-	-	-	Yes	Yes	Yes	-		

- indicates insufficient data counts were collected for the wind speed bin

Visualizations of the assessment datasets with a background wind direction filter is presented in Figure 1.

Figure 1 Measurement Dataset - R754 with Background wind direction filter

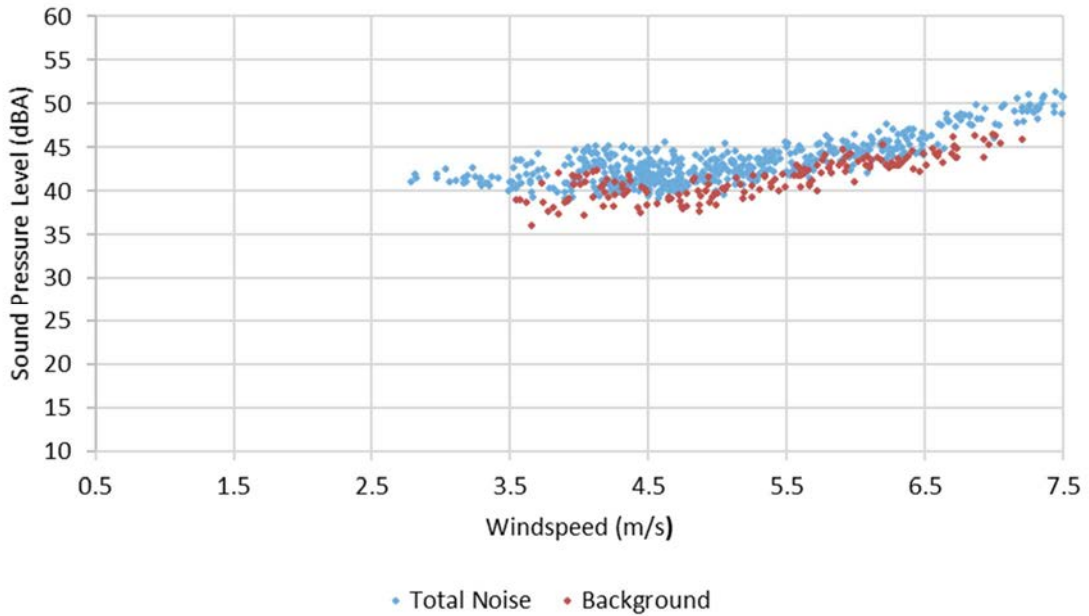


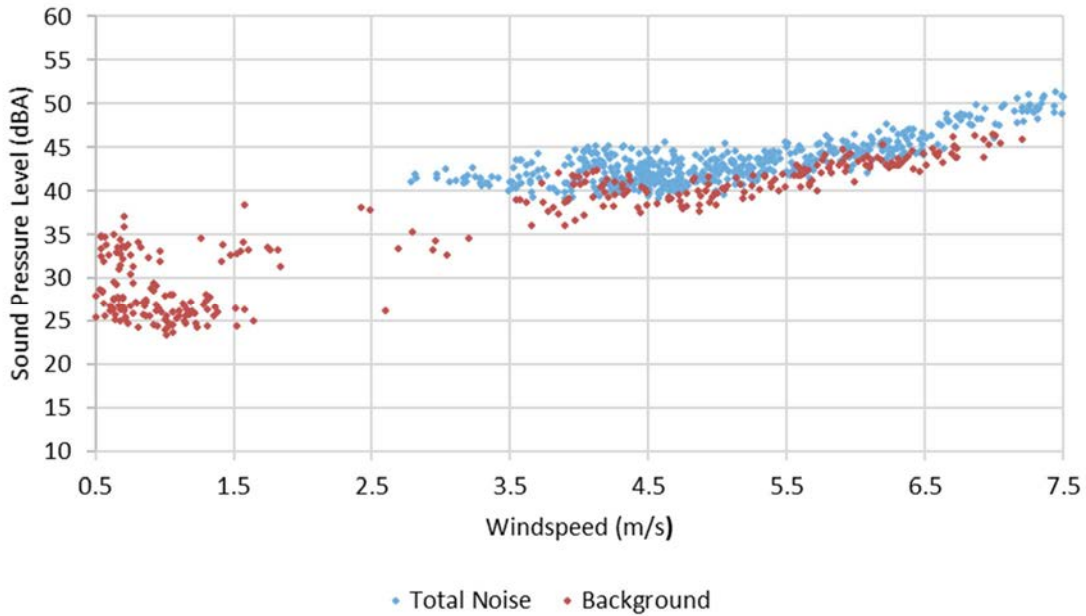
Table 2: Average Measured Sound Levels without Background wind direction filter

Receptor	Period	Measurement Parameter	I audit Wind Bins (m/s)						
			1	2	3	4	5	6	7
R754	Total Noise	Number of Samples	0	0	24	157	208	129	55
		Average LAeq [dBA]	-	-	-	42.4	42.4	44.7	-
		Standard Deviation	-	-	0.6	1.6	1.4	1.3	1.4
	Background	Number of Samples	126	15	7	48	44	57	21
		Average LAeq [dBA]	29.8	-	-	40.0	40.1	43.0	-
		Standard Deviation	-	-	-	1.7	1.1	1.1	1.1
	Turbine ONLY		-	-	-	39	39	40	-
	Compliance		-	-	-	Yes	Yes	Yes	-

- indicates insufficient data counts were collected for the wind speed bin

Visualizations of the assessment dataset without background wind direction filter is presented in Figure 2.

Figure 2 Measurement Dataset - R754 without Background wind direction filter



6 – Quality of sound level data: Please comment on the quality of data points (sound levels for Turbine ON versus sound levels for Turbine OFF status). In addition, please provide your professional opinion on the high sound levels for Turbine OFF status.

Sufficient data was collected in the wind bins 4, 5 and 6 m/s to satisfy the RAM I-Audit sample size requirement. The Compliance Protocol does not set expectations for the signal to noise ration that must be achieved.

Following this, it is worth noting the following:

1. The signal to noise ratio is 2.3 dB in the 4 and 5 m/s wind bin and 1.7 dB in the 6 m/s wind bins.
2. For wind bins with signal to noise ratio less than 3 dB there is higher uncertainty in the calculated Turbine ONLY level.
3. The signal to noise levels measured can be attributed to the background noise levels from Ontario Highway 402 during downwind conditions which cannot be removed from the dataset due to the continuous nature of the source.
4. Although sometimes achievable, it is not practical to expect signal-to-noise ratios greater than 3 dB for receptors in proximity to Ontario Highway 402.
5. The measured Background levels were captured in the same general time period as Turbine ON for some periods (on the same nights for Nov 25 and Dec 12). Therefore, the ambient levels measured are also present during Total Noise intervals with the Turbines running. As such the measured Background levels are representative of the ambient sound levels at the monitor location and provide an appropriate background correction for this monitor location.
6. The additional audit location R754 was chosen in consultation with the MECP with the intention of acquiring improved quality data compared to the audits previously submitted. It should be noted that the general quality of data has improved compared to the measured ambient in the 1st Acoustic Immission Audit.

Please do not hesitate to contact us should you have any questions or require anything further.

Sincerely,

AERCOUSTICS ENGINEERING LIMITED

A. Munro

Allan Munro, B.A.Sc., P.Eng

P. Ashtiani

Payam Ashtiani, B.A.Sc., P.Eng