

March 26, 2020

Aercoustics Project #: 17283.01

North Kent Wind 1 LP

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Subject: North Kent Wind Farm Phase 2 I-Audit - MECP Responses
REA #5272-A9FHRL

Aercoustics Engineering Limited (Aercoustics) has been retained by North Kent Wind 1 LP to complete the acoustic immission audit requirements outlined in the Renewable Energy Approval (REA) for the North Kent Wind Farm (NKWPP). NKWPP operates under REA #5272-A9FHRL.

The following letter presents responses to the comments provided by the Ministry of the Environment, Conservation, and Parks (MECP) Approvals Branch in an email dated March 13, 2020. These comments and responses are related to the following documents:

- **Aercoustics I-Audit Report for R3408**, “North Kent Wind 1 LP – Phase 2 Acoustic Immission Audit – Part 1 of 5 – R3408”, dated February 28, 2020.
- **Aercoustics I-Audit Report for R3099**, “North Kent Wind 1 LP – Phase 2 Acoustic Immission Audit – Part 2 of 5 – R3099 V2.0”, dated February 24, 2020.
- **Aercoustics I-Audit Report for R3214**, “North Kent Wind 1 LP – Phase 2 Acoustic Immission Audit – Part 3 of 5 – R3214 V3.0”, dated February 24, 2020.
- **Aercoustics I-Audit Report for V6202**, “North Kent Wind 1 LP – Phase 2 Acoustic Immission Audit – Part 4 of 5 – V6202”, dated February 24, 2020.
- **Aercoustics I-Audit Report for R3281**, “North Kent Wind 1 LP – Phase 2 Acoustic Immission Audit – Part 5 of 5 – R3281”, dated February 25, 2020.

The MECP comments have been copied below, with responses immediately following each item. The following supporting documents have been included with the submission of this memo:

- Exhibit A – Sample Tonality Calculation for R3408 3m/s Downwind Condition (Excel File)
- Exhibit B – Sample Audio Files of Excluded Measurement Intervals (WAV Files)
- Exhibit C – Aerc013 R1 – Updated Report dated March 27, 2020 (PDF File)

Comments Specific to R3408

- 1) **Potential Exceedance – crosswind condition at 6 m/s:** *If section E5.5 (6) of the Compliance Protocol is applied (29 collected data points as opposed to minimum requirement of 30 data points), the background level for the 6 m/s bin becomes either 30 dBA or 30.9 dBA. With this background level, there will be an exceedance of 1 dB in the 6 m/s wind speed bin for the crosswind analysis.*

The application of either the 30 dBA or 30.9 dBA background levels, as described in section E5.5 (6) of the Compliance Protocol, is not considered appropriate in the 6 m/s wind bin due to impact of wind-induced noise at high wind speeds. Measurement data at higher wind speeds is expected to be significantly impacted by both foliage noise as well as wind self-noise. Ambient noise in rural environments increases dramatically with an increase in wind speed. The trend of measured Background data at R3408 is not unusual and is consistent with the levels measured at other locations in Phase 2 of monitoring at NKWPP.

A significant number of Background datapoints (29 of 30) are available in the 6 m/s wind bin which are considered representative of the impact of wind-related noise at higher wind speeds and, as such, have been included in the assessment of compliance. It should be noted that there is sufficient data in the 2, 3, 4, and 5 m/s wind bins with better signal-to-noise which demonstrates compliance for the Crosswind conditions.

At all wind bins having sufficient data for assessment, the cumulative sound impact calculated at R3408 complies with the MECP sound level limits during Crosswind conditions.

- 2) **Tonality Assessment:** *Please include a sample calculation for the tonality assessment for the 3 m/s wind speed bin for the downwind condition.*

The sample calculations requested have been included as Exhibit A with this submission.

- 3) Noise Abatement Action Plan (NAAP):** *As the sound levels in the 3 m/s wind speed bin demonstrate non-compliance with the Ministry's sound level limits, and per Section E5.1 of the Compliance Protocol, the owner/operator of the wind facility will be required to submit a NAAP to the Director and the District Manager within 60 days of receiving a written request from the Ministry, or within a date agreed to by the Director and/or the District Manager. The Ministry will typically require that the NAAP outline proposed mitigation measures (including timelines) to bring the wind facility into compliance with the Ministry's applicable Sound level limits. The NAAP will also be expected to include details about the completion and submission of a new I-Audit to the Ministry to verify that compliance has been achieved, following implementation of the mitigation measures. Ministry is requesting that the company should provide a NAAP as soon as possible.*

NKWPP will provide a NAAP as requested.

- 4) Irregular Data:** *Please provide an explanation for the large number of data points with sound pressure levels ranging from 50 to 65 dBA at windspeeds of 0 to 7 metres per second.*

All datapoints with sound pressure levels ranging from 50 to 65 dBA at windspeeds of 0 to 7 m/s have been excluded from the assessment. Each data point and the reason for exclusion has been provided to the MECP in a data package.

Intervals that are excluded are done so because they are not suitable to be included in the assessment of Turbine Only noise impact level, either because they have acoustic contamination or because they do not represent conditions when the turbines would be running at high output.

Data points have been excluded for times when not all the turbines were on or off, periods of rain, low temperature, transient events ($L_{Aeq} - L_{90} > 6$ dB), extraneous data points manually verified, equipment malfunctions, times that are outside of the specified measurement period of 10 PM – 5 AM, periods when the closest turbine is generating less than 54% power, and periods that do not satisfy the crosswind/downwind conditions. In addition, sample audio files of gusty intervals, transient events and extraneous data points manually verified have been provided with this submission. See Exhibit B.

Comments Specific to R3099

- 5) **Calibration Certificates:** *Pertaining to the signal conditioner with serial number 0034594, the calibration certificate states that calibration was due on June 7, 2019 but measurements were conducted from October 9, 2019 to October 22, 2019 with this conditioner.*

An updated calibration certificate (June 18, 2019) has been included in the revised reporter and is included as an attachment. See Exhibit C.

- 6) **Turbine OFF Levels:** *The sound levels in the 1 and 2 m/s wind speed bins range from 20 to 50 dBA. Please provide an explanation for the high ambient sound levels and the large variance in the data (Standard deviation of 9.6 dB as listed in Table 6 of report) at these low wind speeds.*

The predominant ambient noise source at this location was local traffic on St. Clair road. The majority of the datapoints which were contaminated with car passbys were excluded through the application of the data reduction and filtering methodology described in the Compliance Protocol and in Section 6.1 of Aercoustics I-Audit Report for R3099. Despite this, manual exclusion of contaminated datapoints is often required to remove all contaminated data intervals. Manual exclusion through listening tests was not conducted on the audio recordings in the 1 and 2 m/s wind bins as insufficient data was collected for Turbine ON levels to assess compliance in these wind bins.

- 7) **7m/s Bin Turbine OFF Level:** *The Turbine OFF sound level for the 7 m/s wind speed bin is 46.9 dBA. Please provide an explanation for why this sound level is so high.*

Measurement data at higher wind speeds is expected to be impacted by both foliage noise as well as wind self-noise. Ambient noise in rural environments increases dramatically with an increase in wind speed, particularly when there is vegetation in the vicinity.

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 foliage as much as practically possible. Despite this, wind-induced noise cannot be eliminated at very high wind speeds.

The trend of measured Background data at this location is not unusual and is consistent with the levels measured at other locations in Phase 2 of monitoring at NKWPP.

- 8) Irregular Data:** *Please provide an explanation for the large number of data points with sound pressure levels ranging from 50 to 65 dBA at windspeeds of 0 to 7 metres per second.*

The vast majority of datapoints with sound pressure levels ranging from 50 to 65 dBA at windspeeds of 0 to 7 m/s have been excluded from the assessment. Each data point and the reason for exclusion has been provided to the MECP in a data package.

Intervals that are excluded are done so because they are not suitable to be included in the assessment of Turbine Only noise impact level, either because they have acoustic contamination or because they do not represent conditions when the turbines would be running at high output.

Data points have been excluded for times when not all the turbines were on or off, periods of rain, low temperature, transient events (LAeq - L90 > 6 dB), extraneous data points manually verified, equipment malfunctions, times that are outside of the specified measurement period of 12 AM – 5 AM periods when the closest turbine is generating less than 54% power, and periods that do not satisfy the crosswind/downwind conditions. In addition, sample audio files of gusty intervals, transient events and extraneous data points manually verified have been provided with this submission. See Exhibit B.

- 9) Calibration Certificates:** *Pertaining to the table in Appendix F, the date calibrated for the Data Acquisition Card with serial number 1C009CC and Signal Conditioner with serial number 0034594 differ from the dates on their respective calibration certificate. Please revise the report to fix these discrepancies.*

The report has been revised and is included as an attachment. See Exhibit C.

Comments Specific to R3214

- 10) Irregular Data:** *Please provide an explanation for the large number of data points with sound level of 4.2 dBA and various wind speeds.*

Datapoints with sound levels of 4.2 dBA were recorded during the nights of December 11th and December 18th exclusively. These datapoints were excluded from the assessment due to the low sound levels failing to meet the minimum sound pressure level threshold of 15 dBA. The low sound pressure level is due to an equipment malfunction. Datapoints recorded during the measurement days before and after (i.e. Dec. 10th, 12th, 17th, and 19th) have been manually verified to confirm that they are unaffected by the equipment malfunction.

11) 7m/s Bin Turbine OFF Level: *The Turbine OFF sound level for the 7 m/s wind speed bin is 45.5 dBA. Please provide an explanation for why this sound level is so high.*

Measurement data at higher wind speeds is expected to be impacted by both foliage noise as well as wind self-noise. Ambient noise in rural environments increases dramatically with an increase in wind speed, particularly when there is vegetation in the vicinity.

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 foliage as much as practically possible. Despite this, wind-induced noise cannot be eliminated at very high wind speeds.

The trend of measured Background data at monitor R3214 is not unusual and is consistent with the levels measured at other locations in Phase 2 of monitoring at NKWPP.

12) Turbine OFF Levels: *The sound levels in the 1 and 2 m/s wind speed bins range from 20 to 50 dBA. Please provide an explanation for the high ambient sound levels and the large variance in the data (Standard deviation of 8.6 dB for both bins as listed in Table 6 of the report) at these low wind speeds.*

The predominant ambient noise source at this location was local traffic on St. Clair road. The majority of the datapoints which were contaminated with car passbys were excluded through the application of the data reduction and filtering methodology described in the Compliance Protocol and in Section 6.1 of Aercoustics I-Audit Report for R3214. Despite this, manual exclusion of contaminated datapoints is often required to remove all contaminated data intervals. Manual exclusion through listening tests was not conducted on the audio recordings in the 1 and 2 m/s wind bins as insufficient data was collected for Turbine ON levels to assess compliance in these wind bins.

13) Irregular Data: *Please provide an explanation for the large number of data points with sound pressure levels ranging from 50 to 60 dBA at windspeeds of 0 to 7 metres per second.*

The vast majority of datapoints with sound pressure levels ranging from 50 to 60 dBA at windspeeds of 0 to 7 m/s have been excluded from the assessment. Each data point and the reason for exclusion has been provided to the MECP in a data package.

Intervals that are excluded are done so because they are not suitable to be included in the assessment of Turbine Only noise impact level, either because they have acoustic contamination or because they do not represent conditions when the turbines would be running at high output.

Data points have been excluded for times when not all the turbines were on or off, periods of rain, low temperature, transient events (LAeq - L90 > 10 dB), extraneous data points manually verified, equipment malfunctions, times that are outside of the specified measurement period of 12 AM – 5 AM, periods when the closest turbine is generating less than 60% power and periods that do not satisfy the crosswind/downwind conditions. In addition, sample audio files of gusty intervals, transient events and extraneous data points manually verified have been provided with this submission. See Exhibit B.

Comments Specific to V6202

14) Potential Exceedance: *If section E5.5 (6) of the Compliance Protocol is applied, the background level for the 7 m/s bin becomes either 30 dBA or 39.6 dBA. With this background level, there will be an exceedance of 2 or 3 dB in the 7 m/s wind speed bin. This exceedance requires the submission of a NAAP. Ministry is requesting that the company should provide a NAAP as soon as possible.*

The application of either the 30 dBA or 39.6 dBA background levels, as described in section E5.5 (6) of the Compliance Protocol, is not considered appropriate in the 7 m/s wind bin due to impact of wind-induced noise at very high wind speeds. Measurement data at higher wind speeds is expected to be significantly impacted by both foliage noise as well as wind self-noise. Ambient noise in rural environments increases dramatically with an increase in wind speed. The trend of measured Background data at V6202 is not unusual and is consistent with the levels measured at other locations in Phase 2 of monitoring at NKWPP.

A significant number of Background datapoints (20 of 30) are available in the 7 m/s wind bin which are considered representative of the impact of wind-related noise at higher wind speeds and, as such, have been included in the assessment of compliance. It should be noted that there is sufficient data in the 4, 5, and 6 m/s wind bins with better signal to noise which demonstrates compliance.

The cumulative sound impact calculated at V6202 complies with the MECP sound level limits at all wind bins having sufficient data for assessment, and as such, does not require the submission of a NAAP.

15) Irregular Data: *Please provide an explanation for the large number of data points with sound pressure levels ranging from 55 to 70 dBA at windspeeds of 0 to 7 metres per second.*

All datapoints with sound pressure levels ranging from 55 to 70 dBA at windspeeds of 0 to 7 m/s have been excluded from the assessment. Each data point and the reason for exclusion has been provided to the MECP in a data package.

Intervals that are excluded are done so because they are not suitable to be included in the assessment of Turbine Only noise impact level, either because they have acoustic

contamination or because they do not represent conditions when the turbines would be running at high output.

Data points have been excluded for times when not all the turbines were on or off, periods of rain, low temperature, transient events (LAeq - L90 > 6 dB), extraneous data points manually verified, equipment malfunctions, times that are outside of the specified measurement period of 10pm - 5am, periods when the closest turbine is generating less than 60% power, and periods that do not satisfy the crosswind/downwind conditions. In addition, sample audio files of gusty intervals, transient events and extraneous data points manually verified have been provided with this submission. See Exhibit B.

16) T06 wind turbine: *Please confirm the timeframe for the maintenance of blades in wind turbine T06 as there are inconsistency between the Operator letter dated February 13, 2020 in the report and John O'Neill's email dated November 15, 2019.*

The correct maintenance timeframe for turbine T06 is indicated in the Operator Letter included in Aercoustics I Audit Report for V6202. Turbine T06 was down for maintenance between September 20, 2019, and November 22, 2019, inclusive.

It should be noted that the Phase 2 measurement campaign at receptor V6202 started on November 26, 2019.

Comments Specific to R3281

17) 7m/s Bin Turbine OFF Level: *The Turbine OFF sound level for the 7 m/s wind speed bin is 46.3 dBA. Please provide an explanation for why this sound level is so high.*

Measurement data at higher wind speeds is expected to be impacted by both foliage noise as well as wind self-noise. Ambient noise in rural environments increases dramatically with an increase in wind speed, particularly when there is vegetation in the vicinity.

Measures to the 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 foliage as much as practically possible. Despite this, wind-induced noise cannot be eliminated at very high wind speeds.

The trend of measured Background data at this location is not unusual and is consistent with the levels measured at other locations in Phase 2 of monitoring at NKWPP.

18) Irregular Data: *Please provide an explanation for the large number of data points with sound pressure levels ranging from 50 to 65 dBA at windspeeds of 0 to 7 metres per second.*

All datapoints with sound pressure levels ranging from 50 to 65 dBA at windspeeds of 0 to 7 m/s have been excluded from the assessment. Each data point and the reason for exclusion has been provided to the MECP in a data package.

Intervals that are excluded are done so because they are not suitable to be included in the assessment of Turbine Only noise impact level, either because they have acoustic contamination or because they do not represent conditions when the turbines would be running at high output.

Data points have been excluded for times when not all the turbines were on or off, periods of rain, low temperature, transient events ($LA_{eq} - L_{90} > 10$ dB), extraneous data points manually verified, equipment malfunctions, times that are outside of the specified measurement period of 10 PM – 5 AM, periods when the closest turbine is generating less than 60% power, and periods that do not satisfy the crosswind/downwind conditions. In addition, sample audio files of gusty intervals, transient events and extraneous data points manually verified have been provided with this submission. See Exhibit B.

Closure

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

Sincerely,

AERCOUSTICS ENGINEERING LIMITED



Christopher Bosyj, M.A.Sc., P.Eng.



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