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**Subject:** North Kent Wind Power Project Acoustic Audit – Immission – Phase 1 Report Submission
REA# 5272-A9FHRL
Aercoustics Project #: 17283.01

**Date:** June 28, 2019

Aercoustics Engineering Limited ("Aercoustics") has been retained by North Kent Wind 1 L.P. to complete the immission audit ("I-audit") requirement outlined in Section E of the Renewable Energy Approval ("REA") for the North Kent 1 Wind Power Project ("NKWPP"). NKWPP operates under REA #5272-A9FHRL, issued on June 29, 2016 [1]. Measurements were conducted per the Compliance Protocol for Wind Turbine Noise (the "Protocol") [2]. As per the REA, five (5) measurement locations are required. Individual reports have been issued for each of the five measurement locations.

## Documents for Submission

Individual reports and data packages have been prepared for each measurement location. The following table summarizes the documents that accompany this submission.

Table 1: Documents for Submission

| Receptor | Document | File Name | File Type |
|---|---|---|---|
| All | Summary Memo | Aerc005 – NKWPP Phase 1 I-Audit Summary Memo 17283.01 (2019.06.28) | PDF |
| R3048 | Report | Aerc006 - NKWPP Phase 1 I-Audit R3408 17283.01 (2019.06.27) | PDF |
| | Data Package: All Data | Aerc006a - NKWPP - P1 I-Audit R3408 - Summary Data for MECP - 2019.06.27 | Excel |
| | Data Package: Narrowband Spectra | Aerc006b - NKWPP - P1 I-Audit R3408 - Narrowband Spectra for MECP - 2018.06.27 | Excel |
| R3099 | Report | Aerc007 - NKWPP Phase 1 I-Audit R3099 17283.01 (2019.06.27) | PDF |
| | Data Package: All Data | Aerc007a - NKWPP - P1 I-Audit R3099 - Summary Data for MECP - 2019.06.27 | Excel |
| | Data Package: Narrowband Spectra | Aerc007b - NKWPP - P1 I-Audit R3099 - Narrowband Spectra for MECP - 2018.06.27 | Excel |
| R3214 | Report | Aerc008 - NKWPP Phase 1 I-Audit R3214 17283.01 (2019.06.27) | PDF |
| | Data Package: All Data | Aerc008a - NKWPP - P1 I-Audit R3214 - Summary Data for MECP - 2019.06.27 | Excel |
| | Data Package: Narrowband Spectra | Aerc008b - NKWPP - P1 I-Audit R3214 - Narrowband Spectra for MECP - 2018.06.27 | Excel |
| V6202 | Report | Aerc009 - NKWPP Phase 1 I-Audit V6202 17283.01 (2019.06.27) | PDF |
| | Data Package: All Data | Aerc009a - NKWPP - P1 I-Audit V6202 - Summary Data for MECP - 2019.06.27 | Excel |
| | Data Package: Narrowband Spectra | Aerc009b - NKWPP - P1 I-Audit V6202 - Narrowband Spectra for MECP - 2018.06.27 | Excel |
| R3281 | Report | Aerc010 - NKWPP Phase 1 I-Audit R3281 17283.01 (2019.06.27) | PDF |
| | Data Package: All Data | Aerc010a - NKWPP - P1 I-Audit R3281 - Summary Data for MECP - 2019.06.27 | Excel |
| | Data Package: Narrowband Spectra | Aerc010b - NKWPP - P1 I-Audit R3281 - Narrowband Spectra for MECP - 2018.06.27 | Excel |

# Audit Results

The audit has been completed as per the methodology outlined in Parts D and E5.5 RAM-I (Revised Assessment Methodology) of the "*MECP Compliance Protocol for Wind Turbine Noise*" (Updated: April 21, 2017) [2].

The Phase 1 noise monitoring campaign spanned the following dates:

Table 2: Monitoring start and end dates at each receptor

| Location | Monitoring Start Date | Monitoring End Date | Monitoring Duration (weeks) |
|---|---|---|---|
| R3408 | March 21, 2019 | June 1, 2019 | 10 |
| R3099 | February 28, 2019 | June 6, 2019 | 14 |
| R3214 | February 28, 2019 | April 30, 2019 | 8.5 |
| V6202 | March 23, 2019 | May 13, 2019 | 7.25 |
| R3281 | February 28, 2019 | May 23, 2019 | 12 |

Based on the results presented in Section 10.2 of each report, the cumulative sound impact calculated at all receptors complies with the MECP sound level limits at all wind bins having sufficient data for assessment.

Based on discussions with North Kent Wind 1 LP. it was determined that to be consistent with Sections 3.8.3 and Section 5.1 of the Compliance protocol, the tonal assessment should be completed using IEC 61400-11 Ed. 3.0, with modifications to adapt the method to immission measurements and the tonal penalty structure taken from ISO 1996-2:2007 Annex C. No tonal penalty was found to be applicable at any of receptor locations based on the detailed tonal audibility analysis.

The following tables and figures summarize the results at each receptor.

Table 3: R3408 Assessment Table – Cumulative ***Downwind*** Turbine-only Sound Impact

| Audited Receptor | Wind speed at 10-m AGL [m/s] | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|---|
| **R3408** | Cumulative Sound Impact - Receptor Location [dBA] | - | - | - | - | 39 | 38 | 36‡ |
| | *Signal-to-noise [dB]* | - | - | - | - | 7.4 | 3.7 | 1.4‡ |
| Background Sound Level [dBA] | | 32 | 32 | 30 | 31 | 32 | 37 | 40 |
| MECP Exclusion Limit [dBA] | | 40 | 40 | 40 | 40 | 40 | 40 | 43 |
| Compliance? (Y/N) | | - | - | - | - | Yes | Yes | Yes |

\- Significantly fewer than the minimum data counts required were attained in this wind bin.
‡ Signal-to-noise level less than 3 dB. Increased uncertainty in the determination of the Cumulative Sound Impact.

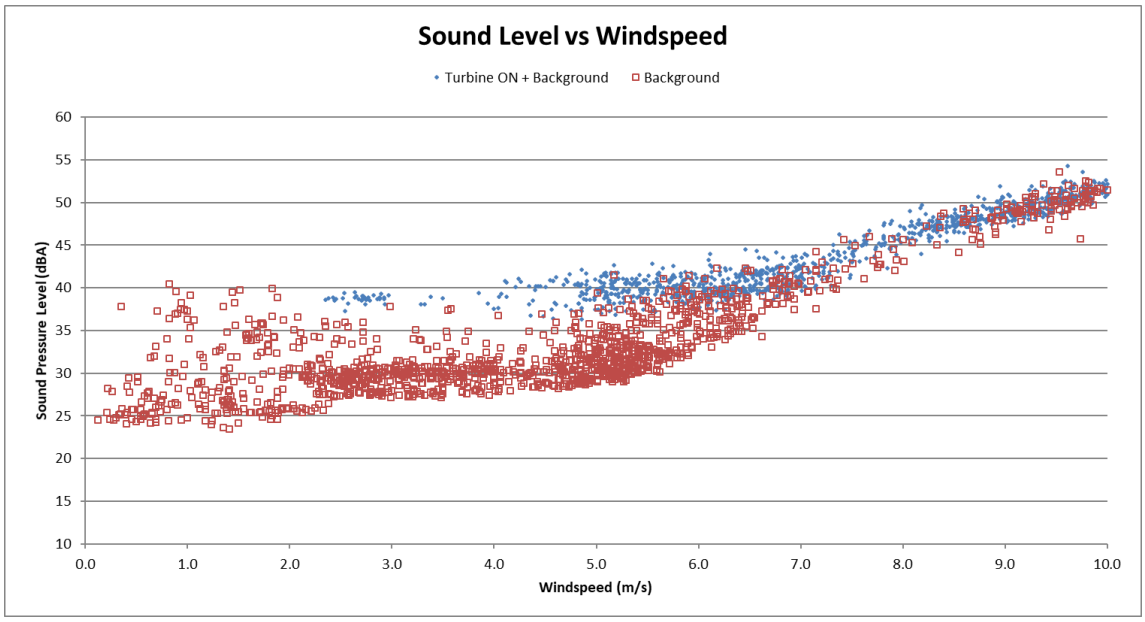



Figure 1: R3408- Measured Downwind Sound Levels for Turbine ON and Background vs Wind Speed

Table 4: R3408 Assessment Table – Cumulative ***Crosswind*** Turbine-only Sound Impact

| Audited Receptor | Wind speed at 10-m AGL [m/s] | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|---|
| **R3408** | Cumulative Sound Impact - Receptor Location [dBA] | - | 35 | 37 | 37 | 38 | 38 | 40‡ |
| | *Signal-to-noise [dB]* | - | 5.2 | 7.4 | 6.9 | 6.4 | 4.0 | 2.6‡ |
| Background Sound Level [dBA] | | 32 | 32 | 30 | 31 | 32 | 37 | 40 |
| MECP Exclusion Limit [dBA] | | 40 | 40 | 40 | 40 | 40 | 40 | 43 |
| Compliance? (Y/N) | | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

\- Significantly fewer than the minimum data counts required were attained in this wind bin.
‡ Signal-to-noise level less than 3 dB. Increased uncertainty in the determination of the Cumulative Sound Impact.

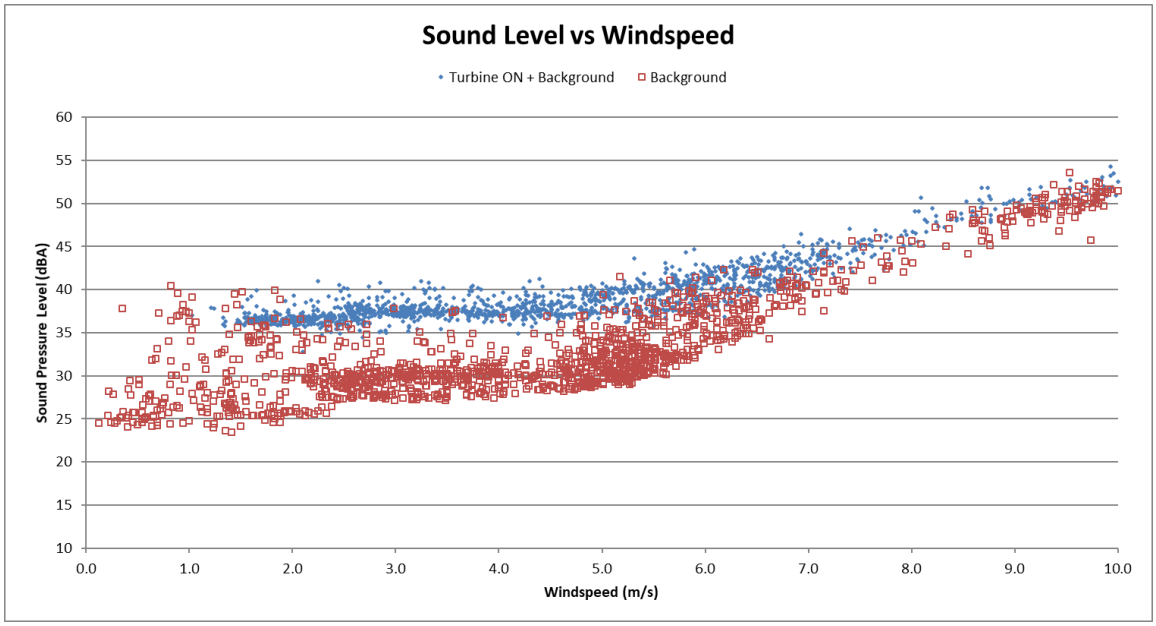



Figure 2: R3408- Measured Crosswind Sound Levels for Turbine ON and Background vs Wind Speed

Table 5: R3099 Assessment Table – Cumulative Turbine-only Sound Impact

| Audited Receptor | Wind speed at 10-m AGL [m/s] | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|---|
| **R3099** | Cumulative Sound Impact - Receptor Location [dBA] | - | 39× | 39† | 40 | 40 | 40‡ | - |
| | *Signal-to-noise [dB]* | - | 11.5 | - | 11.2 | 7.3 | 2.4‡ | - |
| Background Sound Level [dBA] | | 28 | 28 | (30) | 29 | 34 | 41‡* | - |
| MECP Exclusion Limit [dBA] | | 40 | 40 | 40 | 40 | 40 | 40 | 43 |
| Compliance? (Y/N) | | - | Yes× | Yes | Yes | Yes | Yes‡ | - |

- Significantly fewer than the minimum data counts required were attained in this wind bin.

× Total Noise data counts are deficient from the required count of 60 by 7 points and Background data counts are deficient from the required count of 30 by 7. A significant amount of data is available in this wind bin, however, so it has been included in this assessment of compliance

† Insufficient background data was collected in this wind bin. In accordance with Section E5.5(6b) of the Protocol, an assumed background level of 30 dBA has been used in the assessment of compliance in this wind bin.

‡ Signal-to-noise level less than 3 dB. Increased uncertainty in the determination of the Cumulative Sound Impact.

* Background sound level is greater than the applicable exclusion limit.

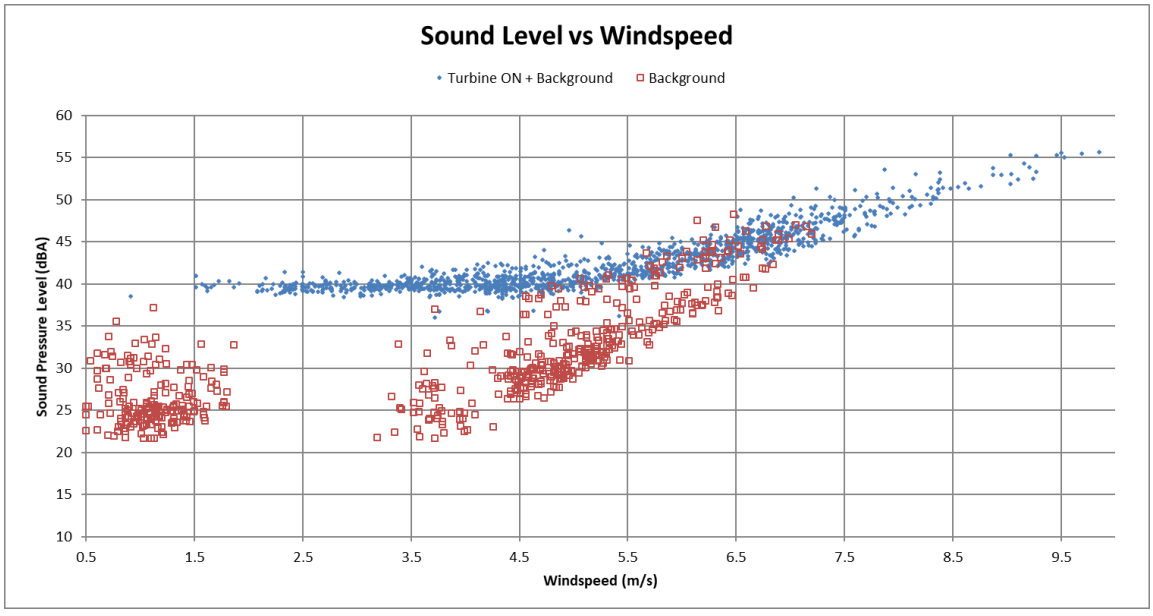



Figure 3: R3099 - Measured Sound Levels for Turbine ON and Background vs Wind Speed

Table 6: R3214 Assessment Table – Cumulative Turbine-only Sound Impact

| Audited Receptor | Wind speed at 10-m AGL [m/s] | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|---|
| **R3214** | Cumulative Sound Impact - Receptor Location [dBA] | - | - | 38† | 39 | 40 | 40 | - |
| | *Signal-to-noise [dB]* | - | - | - | 4.7 | 5.5 | 3.4 | - |
| Background Sound Level [dBA] | | 25 | - | (30) | 34 | 35 | 39 | - |
| MECP Exclusion Limit [dBA] | | 40 | 40 | 40 | 40 | 40 | 40 | 43 |
| Compliance? (Y/N) | | - | - | Yes | Yes | Yes | Yes | - |

- Significantly fewer than the minimum data counts required were attained in this wind bin.

† No background data was collected in this wind bin. In accordance with Section E5.5(6b) of the Protocol, an assumed background level of 30 dBA has been used in the assessment of compliance in this wind bin.

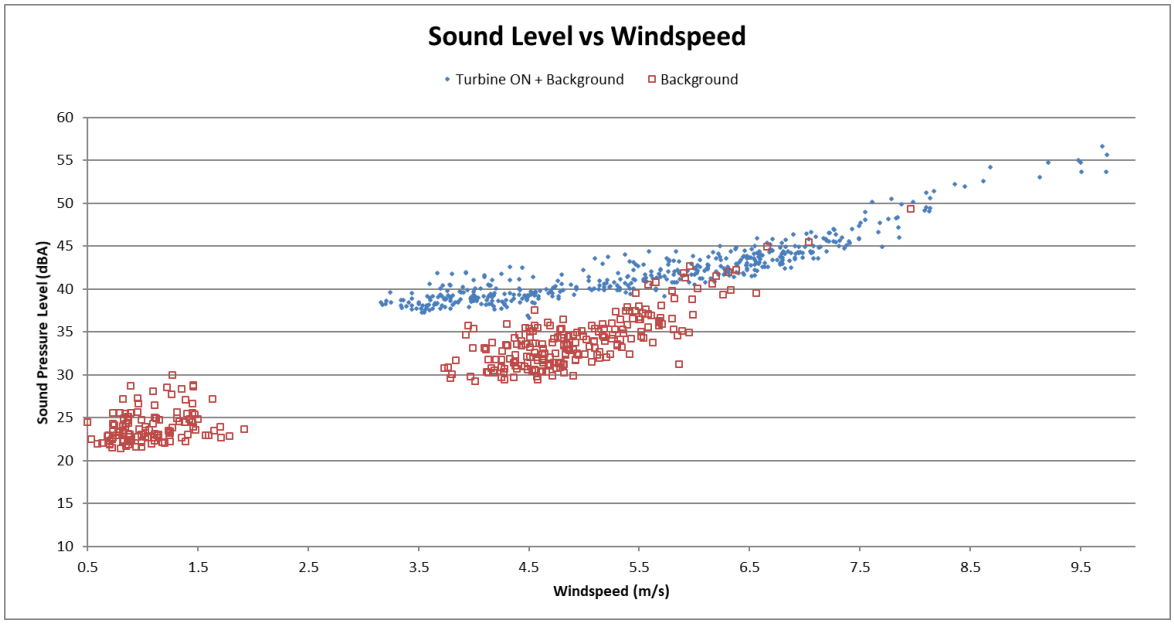



Figure 4: R3214 - Measured Sound Levels for Turbine ON and Background vs Wind Speed

Table 7: V6202 Assessment Table – Cumulative Turbine-only Sound Impact

| Audited Receptor | Wind speed at 10-m AGL [m/s] | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|---|
| **V6202** | Cumulative Sound Impact - Receptor Location [dBA] | - | - | 40† | 40 | 40 | 40 | 42 |
| | *Signal-to-noise [dB]* | - | - | - | 8.7 | 7.1 | 5.1 | 4.4 |
| Background Sound Level [dBA] | | - | - | (30) | 32 | 34 | 37 | 40 |
| MECP Exclusion Limit [dBA] | | 40 | 40 | 40 | 40 | 40 | 40 | 43 |
| Compliance? (Y/N) | | - | - | Yes | Yes | Yes | Yes | Yes |

- Significantly fewer than the minimum data counts required were attained in this wind bin.

† No background data was collected in this wind bin. In accordance with Section E5.5(6b) of the Protocol, an assumed background level of 30 dBA has been used in the assessment of compliance in this wind bin.

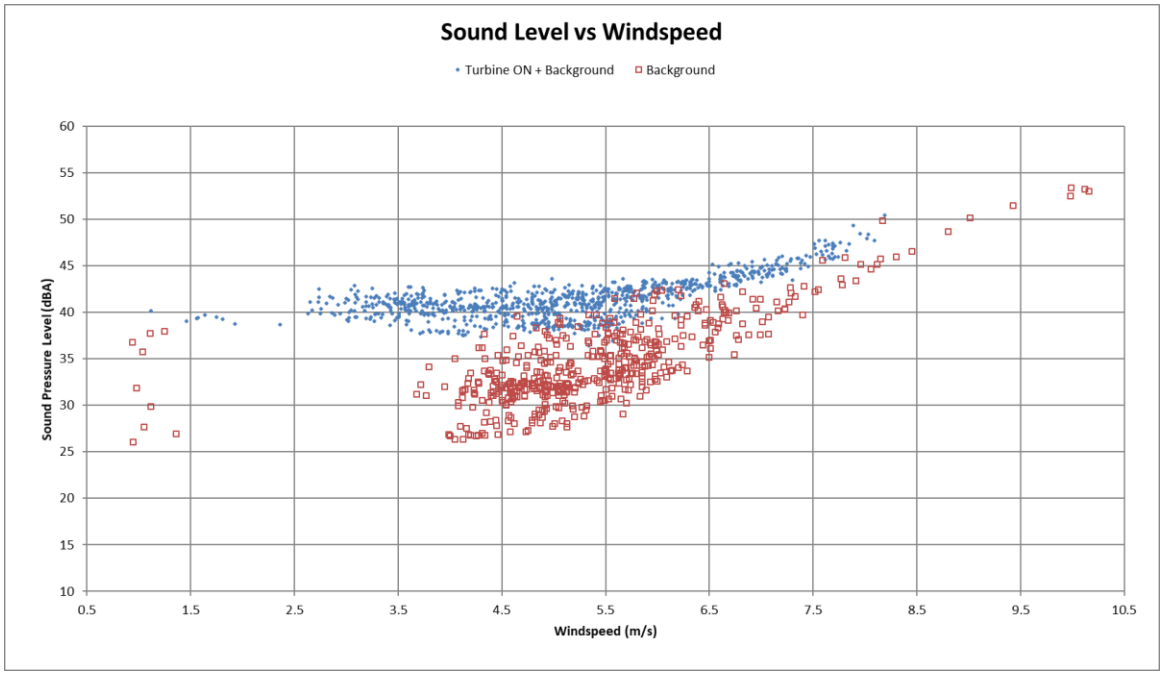



Figure 5: V6202 - Measured Sound Levels for Turbine ON and Background vs Wind Speed

Table 8: R3281 Assessment Table – Cumulative Turbine-only Sound Impact

| Audited Receptor | Wind speed at 10-m AGL [m/s] | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|---|
| **R3281** | Cumulative Sound Impact - Receptor Location [dBA] | - | - | 38† | 38 | 40 | 39‡ | - |
| | *Signal-to-noise [dB]* | - | - | (8.7) | 6.9 | 6.8 | 2.9 | - |
| Background Sound Level [dBA] | | 27 | 30 | (30) | 33 | 34 | 40 | - |
| MECP Exclusion Limit [dBA] | | 40 | 40 | 40 | 40 | 40 | 40 | 43 |
| Compliance? (Y/N) | | - | - | Yes | Yes | Yes | Yes | - |

- Significantly fewer than the minimum data counts required were attained in this wind bin.

† Background data counts are significantly deficient from the required count of 30 in the 3 m/s bin. In accordance with Section E5.5(6a) of the Protocol, the background level from a lower wind bin (2 m/s) has been used in the assessment of compliance in this wind bin. Since the ambient level typically increases with wind speed, this is a conservative measure.

‡ Signal-to-noise level less than 3 dB. Increased uncertainty in the determination of the Cumulative Sound Impact.

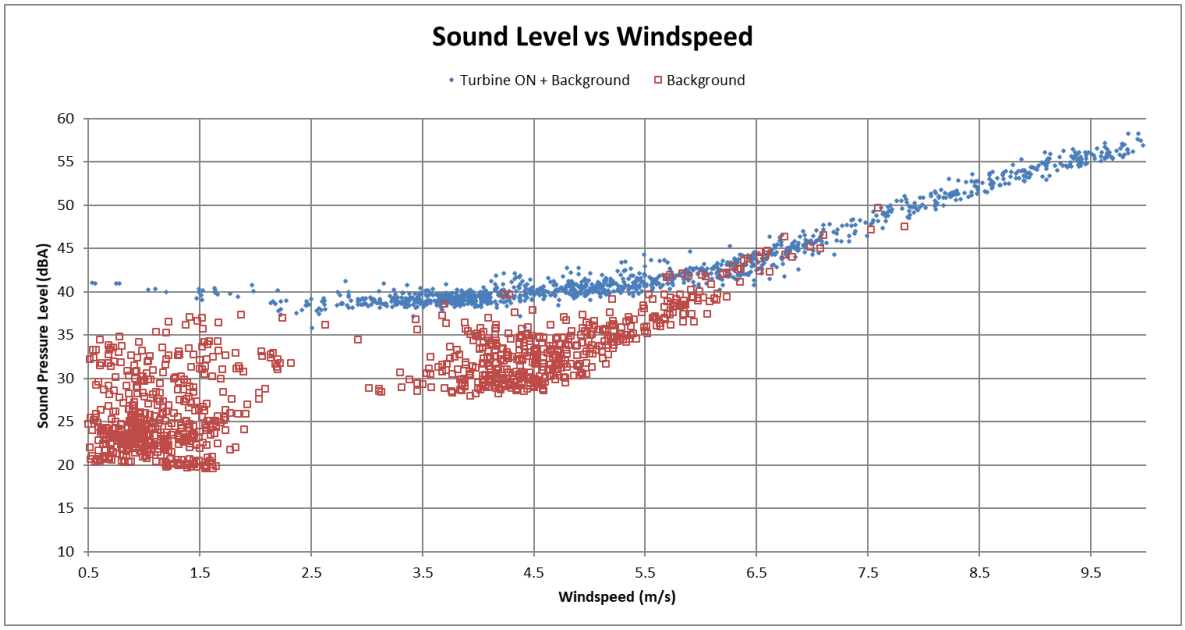


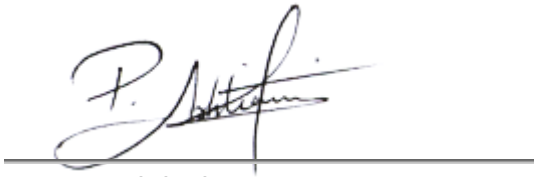

Figure 6: R3281 - Measured Sound Levels for Turbine ON and Background vs Wind Speed

Please see the specific test reports for a detailed account of each measurement campaign and the associated data analysis and conclusions.

Sincerely,

**AERCOUSTICS ENGINEERING LIMITED**

Addie Denison, B.A.Sc., P.Eng.



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