

# ACOUSTICAL REPORT – JONESFIELD TOWNSHIP

Meridian Wind Park

**B&V PROJECT NO. 198674**

**PREPARED FOR**

**DTE Electric Company**

**3 DECEMBER 2020**



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## 1.0 Introduction

Black & Veatch is providing project development services for a new wind park in Saginaw and Midland counties, Michigan. The wind park is expected to include 77 wind turbines spanning Jonesfield, Mt. Haley, and Porter Townships. This report focuses on the 26 wind turbine locations and the 1 alternate location proposed in Jonesfield Township, and will discuss the regulatory requirements, ambient sound level survey results, and the results of the project acoustical model.

## 2.0 Regulatory Summary

The proposed Meridian Wind Park must comply with sound level limits set forth in Jonesfield, Mt. Haley, and Porter Township ordinances. The following sections summarize the requirements in Jonesfield Township.

### 2.1 JONESFIELD TOWNSHIP

Section 612(l) of the Jonesfield Township Zoning Ordinance limits sound levels generated by a wind turbine to 60 decibels at the boundaries of a wind turbine generator project. DTE has additionally committed to limiting sound levels to DTE 'best practice' limits of 55 dBA  $L_{eq}$  (1-hour) at non-participating property lines, and 45 dBA  $L_{eq}$  (1-hour) at non-participating residences, and to model predicted sound levels using an acoustical model that incorporates conservative assumptions.

## 3.0 Ambient Sound Level Survey

An ambient sound level survey of the proposed Meridian Wind Park was completed 15 October 2018 through 17 October 2018 in Midland and Saginaw County, Michigan. Three measurement locations were selected within the area of the proposed project site to measure and monitor the ambient acoustical environment. One measurement location was selected in each township, representative of the expected worst-case receptors based on the then current turbine arrangement. The survey was completed to quantify and qualify the existing acoustical environment at the site in support of the permitting process.

### 3.1 SURVEY PROCEDURE

The ambient sound level survey was completed in accordance with relevant portions of general industry standards including ANSI S1.13, ANSI S12.9, ANSI S12.18, ASTM E1014, and ISO 1996. All sound levels were measured using Type 1 or Type 2 sound level meters that met the requirements of ANSI S1.4. The sound level meters were capable of determining specific average and statistical sound levels over a specified duration. The microphones were equipped with windscreens provided by the manufacturer. All equipment was laboratory calibrated within twelve months prior to the survey and the calibrations are traceable to the National Institute of Standards and Technology (NIST). (See 4.4.2 Appendix D).

In order to effectively quantify and qualify the existing sound levels, the ambient survey included both continuous sound level monitoring and short-term sound level measurements. Ambient sound levels were measured at locations corresponding to receptors (residential

buildings) identified prior to and during the ambient sound level survey. The exact survey locations were identified at the time of the survey and were selected to capture acoustical environments representative of the nearby receptors.

### **3.1.1 Continuous Monitoring**

Continuous sound monitors were placed at three monitoring locations for at least 38 hours. The measurement periods included at least two (2) evening and nighttime periods between 7:00 p.m. on 15 October 2018 and 10:00 a.m. on 17 October 2018. The continuous sound monitors were locked and secured within a case in the public right-of-way (ROW). They were unmanned, but periodically inspected by Black & Veatch professionals to ensure continuous operation. The microphone was placed approximately 5 feet above the ground.

### **3.1.2 Short-Term Monitoring**

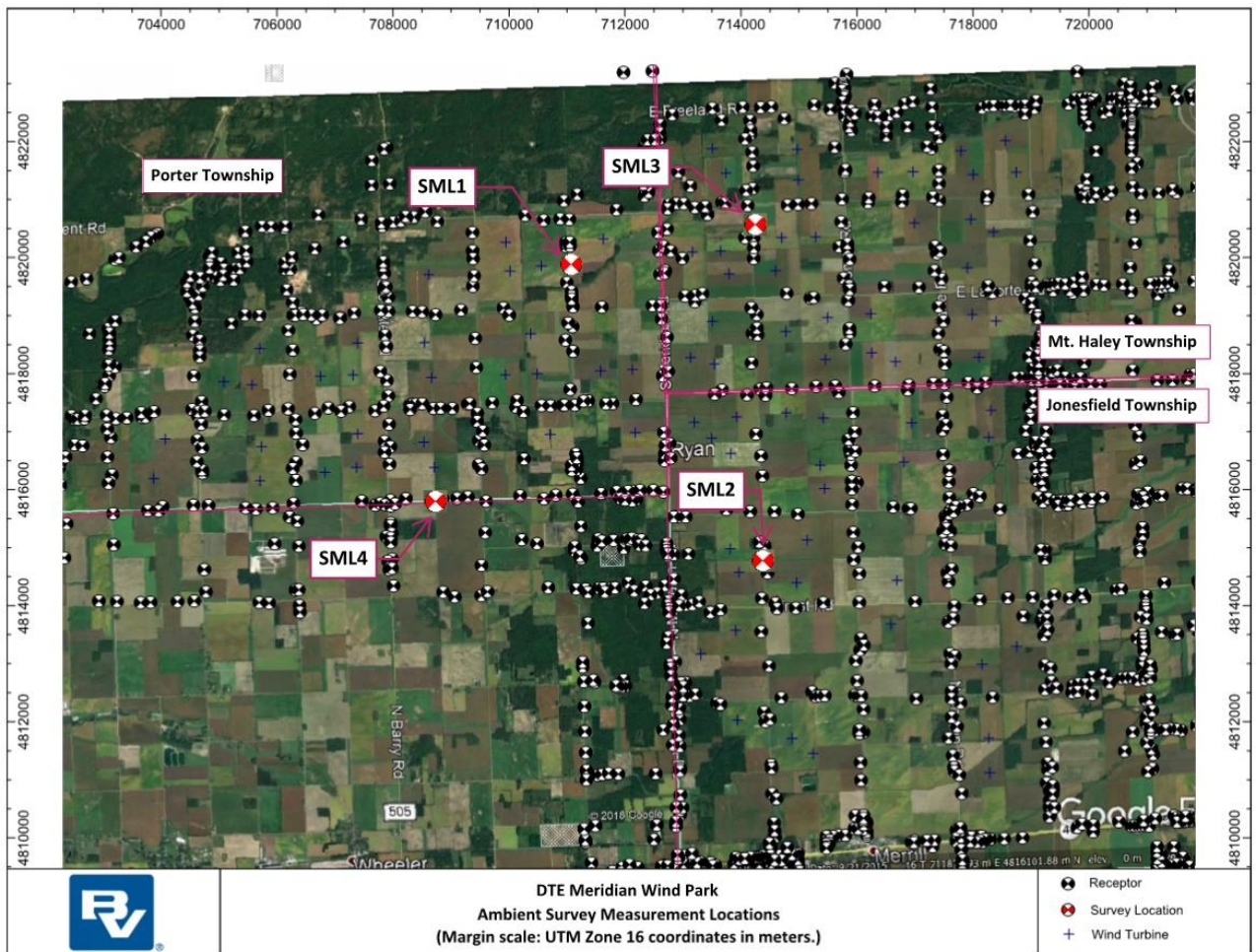
Attended short-term monitoring was conducted at a continuous sound monitoring location not equipped to record octave band sound level data, and one additional location in order to further quantify the existing acoustical environment near the existing Gratiot Wind Park to the southwest. These measurements were attended and performed by Black & Veatch acoustical professionals.

## **3.2 SOUND MEASUREMENT LOCATIONS**

The sound measurement locations (SMLs) listed in Table 1 (shown in Figure 2) were selected to correspond to receptors (i.e., residences) that will be within close proximity of project wind turbines, with at least one receptor located within each affected township. Continuous sound level monitoring was completed at SML1, SML2, and SML3. The additional measurement location (SML4) was added to determine the existing wind farm sound levels to the southwest of the proposed project site. Wind speed data from nearby MBS International Airport is included for informational purposes in 4.4.2 Appendix E.

**Table 1 – Sound Measurement Locations**

SOUND MEASUREMENT LOCATION	LAT/LONG	SITE DESCRIPTION	CONTINUOUS MONITORING	SHORT-TERM MONITORING
SML1	N 43.502287 W -84.389520	Country Road – Porter Township	X	X
SML2	N 43.454885 W -84.350469	Country Road – Jonesfield Township	X	N/A
SML3	N 43.507124 W -84.350726	Country Road – Mt. Haley Township	X	X
SML4	N43.466186 W -84.419672	Country Road in Porter Township near existing Gratiot wind park.	N/A	X



**Figure 1 - Sound Measurement Locations**

### 3.3 SURVEY RESULTS

#### 3.3.1 Sound Measurement Location 1

An acoustical monitor was placed at SML1 to collect ambient measurements during daytime and evening hours. Average wind speeds measured intermittently at microphone height during the survey ranged from 3 to 9 mph. The noticeable sound sources were wind in grass, birds and insects, distant traffic and farm equipment. Background  $L_{90}$  sound levels ranged from 28 dBA<sup>1</sup> to 48 dBA and are shown in Figure 3. Short-term measurements are shown in Figure 4.

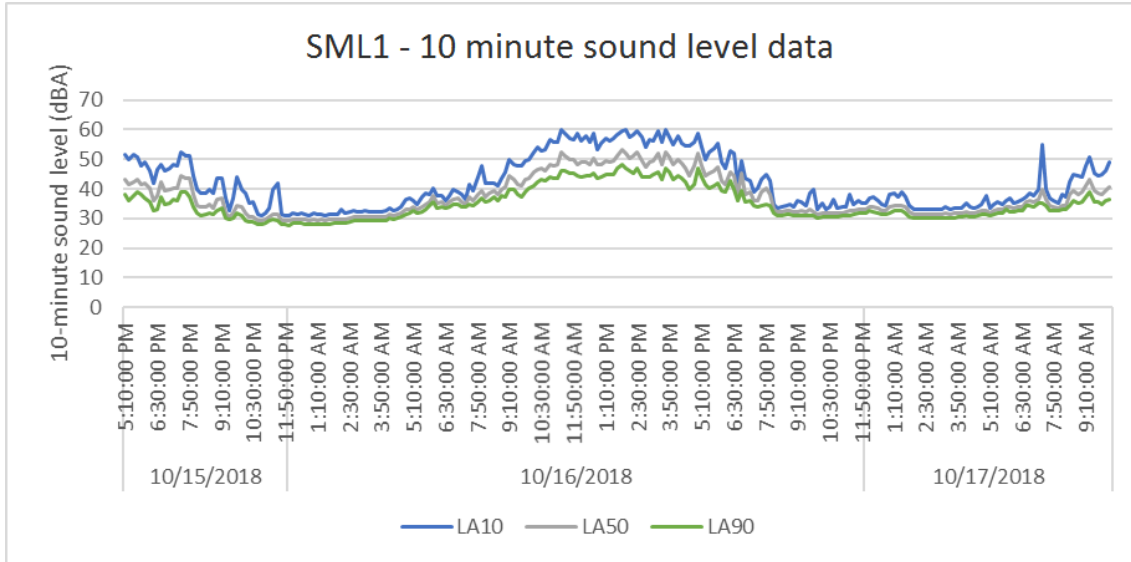


Figure 2 - SML1 continuous sound level data

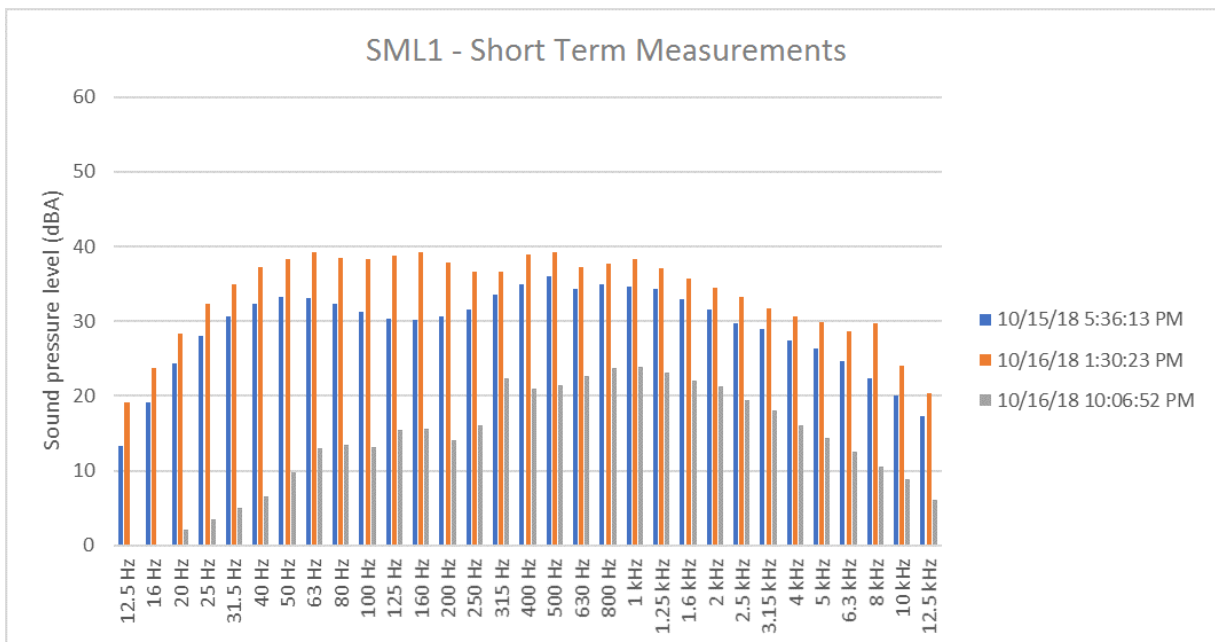


Figure 3 - SML1 short term  $L_{eq}$  measurement data

<sup>1</sup> Sound levels under 30 dBA may have been impacted by equipment electrical noise floor of  $\leq 20$  dBA



### 3.3.2 Sound Measurement Location 2

An acoustical monitor was placed at SML2 to collect ambient measurements during daytime and evening hours. Average wind speeds measured intermittently at microphone height during the survey ranged from 2 to 14 mph. The perceived sound sources were wind in grass and crops, distant traffic, and faint sound from the Gratiot Wind Park. Background  $L_{90}$  sound levels ranged from 20 dBA<sup>2</sup> to 51 dBA as shown in Figure 5.

The acoustical monitor at SML2 collected one-third octave band data through the survey. 10-minute excerpts of that measured data are included in Figure 6, for comparison to short-term measurements at other locations.

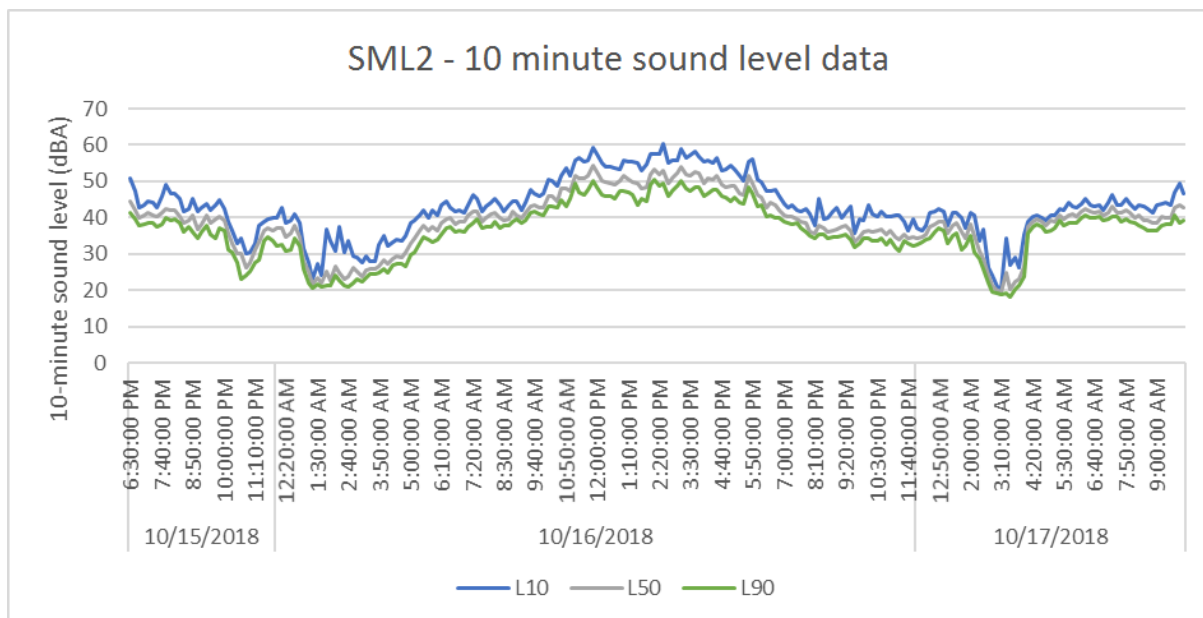


Figure 4 - SML2 continuous sound level data

<sup>2</sup> Sound levels under 27 dBA may have been impacted by equipment electrical noise floor of  $\leq 17$  dBA.



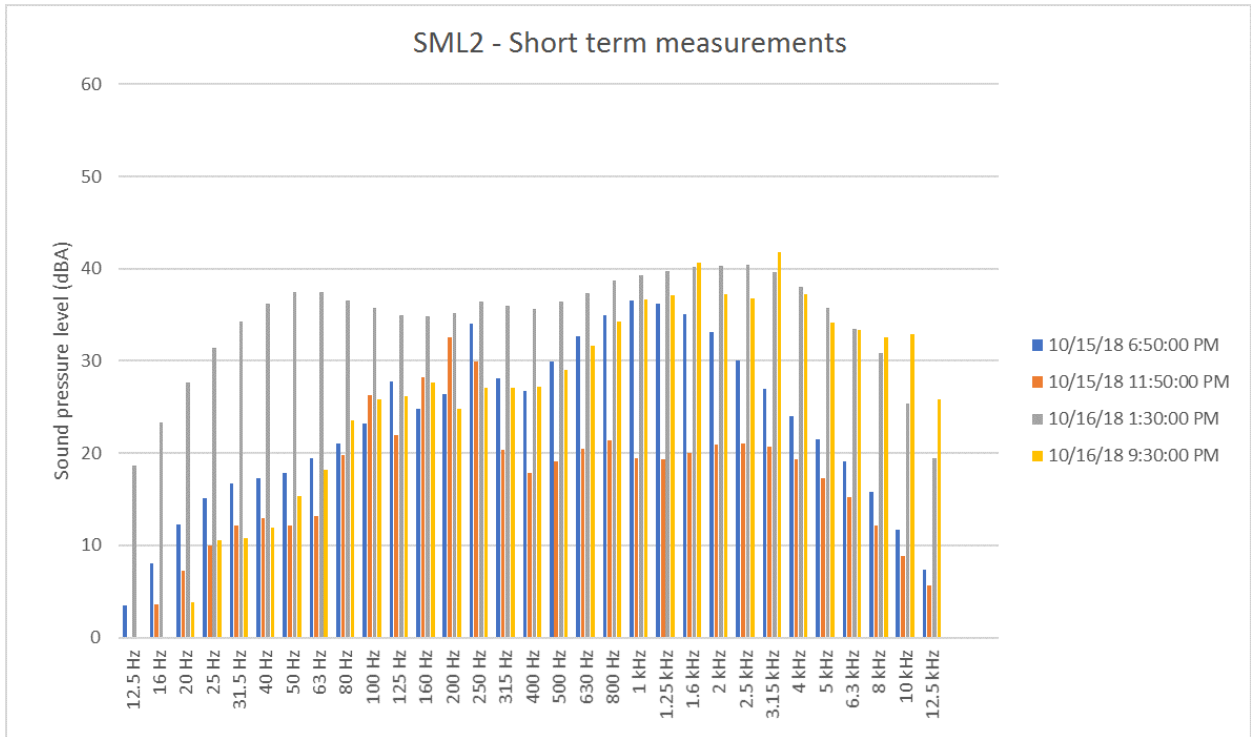


Figure 5 - SML2  $L_{eq}$  spectrum measurement data

### 3.3.3 Sound Measurement Location 3

An acoustical monitor was placed at SML3 to collect ambient measurements during daytime and evening hours. Average wind speeds measured intermittently at microphone height during the survey ranged from 2 to 8 mph. The noticeable sound sources were wind in grass and crops, faint sound from pole-mounted electrical equipment nearby, distant traffic, and trickling water from drain tiles and a culvert near road. Background  $L_{90}$  sound levels ranged from 20 dBA<sup>3</sup> to 51 dBA as shown in Figure 7. Short-term measurements are shown in Figure 8.

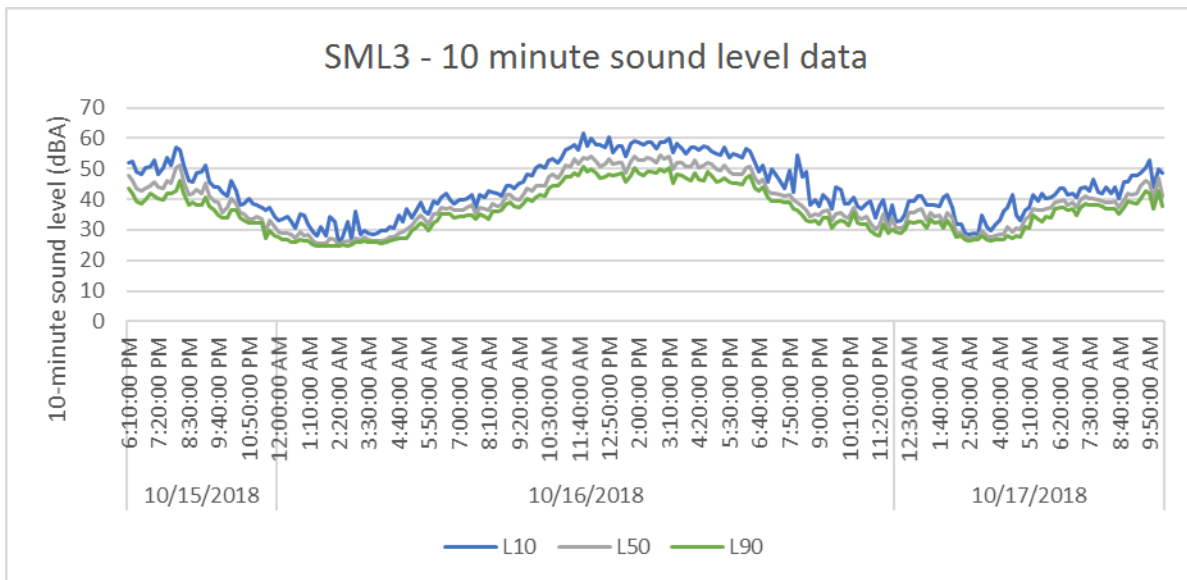


Figure 6 - SML3 continuous sound level data

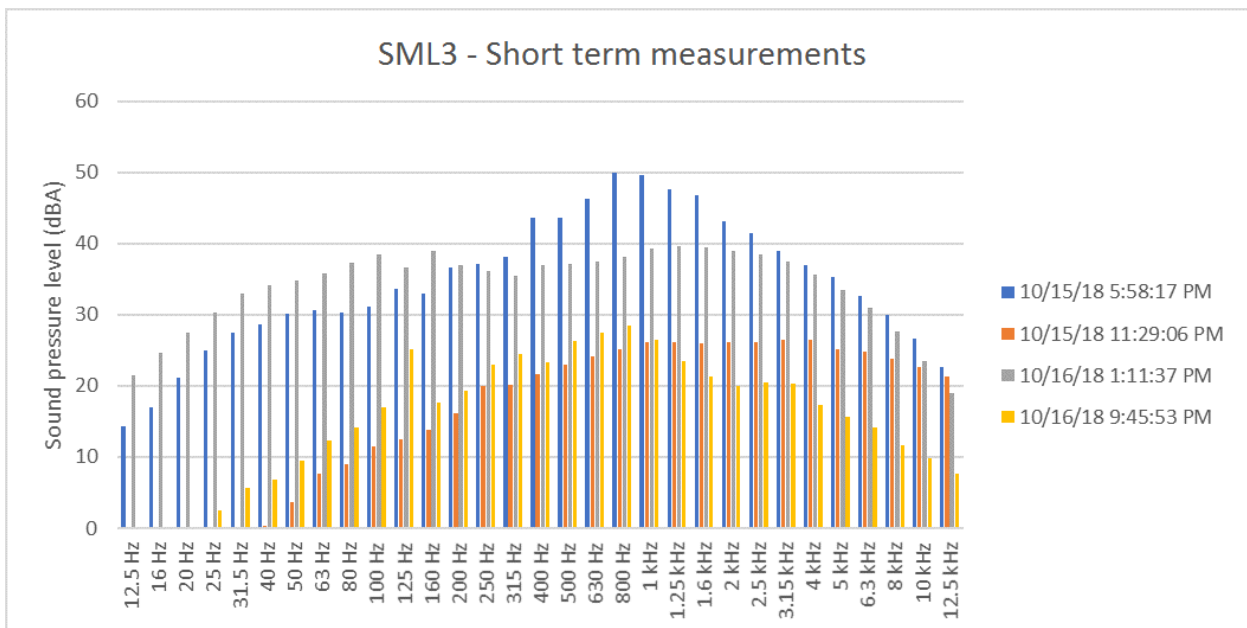


Figure 7 - SML3 short term  $L_{eq}$  measurement data

<sup>3</sup> Sound levels under 29 dBA may have been impacted by equipment electrical noise floor of  $\leq 19$  dBA.

### 3.3.4 Sound Measurement Location 4

Short term measurements were conducted at SML4 to quantify the ambient acoustical environment near the edge of the proposed wind park, and to measure the impact of neighboring Gratiot Wind Park to the southwest. Average wind speeds during the measurements ranged from 4 to 17 mph. The noticeable sound sources were wind turbines in Gratiot Wind Park, wind in trees, crops, powerlines, and occasional distant traffic. Results of the short term measurements are shown in Figure 9.

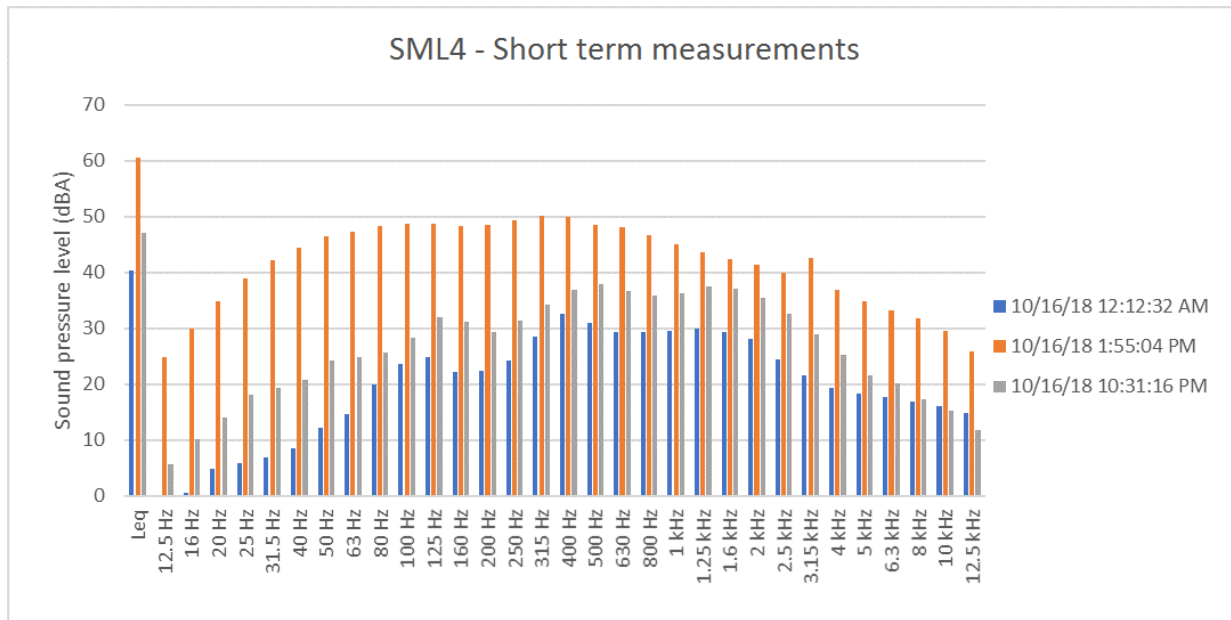


Figure 8 - SML4 short term  $L_{eq}$  measurement data

## 4.0 Acoustical Model

The environmental sound levels resulting from the operation of 77 Meridian Wind Park WTGs were predicted using commercial acoustical modeling software (DataKustik CadnaA version 2020 MR 1) that implements ISO 9613 and NORD2000 calculation methodologies. ISO 9613 methodology was utilized as the primary calculation methodology, using conservative assumptions (consistent with Mt. Haley Township modeling requirements) for meteorological and ground conditions throughout the Wind Park. The ISO 9613 acoustical model was used to identify receptors and turbines that would be further evaluated using the newer NORD2000 calculation methodology. NORD2000 was developed by the Danish Environmental Protection Agency to accurately model noise propagation in more detailed, site-specific meteorological conditions.

### 4.1 SOUND SOURCES

Two types of turbines are expected to be implemented in the Wind Park, 67 of which will be 2.82 MW GE 2.82-127 turbines, the remaining ten will be 3.6 MW Vestas V136. The ten Vestas turbines will be installed in Jonesfield Township; the remaining 16 turbines installed in the township will be GE turbines. Each WTG is assumed to be an omnidirectional point source located at hub height. Hub height for the GE 2.82-127 turbines is 89 meters, and 82 meters for the Vestas V136 turbines. Sound sources other than the Meridian WTGs were not included in the acoustical model.

Vendor provided sound power level data was incorporated in both acoustical models. The vendor provided sound power level for the Vestas turbine is 108.5 dBA. The vendor provided sound power level for the GE turbine is 110 dBA.

Vendor supplied mitigation was implemented for both turbine types. The Vestas serrated trailing edge (STE) blade reduces overall sound power level to 105.5 dBA. For GE turbines, a low noise trailing edge (LNTE) blade option reduces overall sound power level to 108.5 dBA. Sound modelling for Jonesfield Township assumes that all wind turbines in the township are supplied with LNTE/STE blades.

In addition to the vendor supplied mitigation, operational controls to further reduce turbine sound levels were implemented at some turbines. GE 'Noise Reduced Operation' (NRO) mode limits turbine rotation speed, thereby reducing turbine sound levels. GE NRO is categorized by the overall sound power level of the turbine at the reduced speed, from NRO 108 (108 dBA sound power level) to NRO 105 (105 dBA sound power level). NRO was applied to the model as needed to certain GE turbines to show that the turbines can be operated within DTE 'best practice' sound limits. A full list of turbines with preliminary assumed operational profiles is included in Appendix A.

#### 4.1.1 ISO 9613 Methodology

Turbine sound levels in the ISO 9613 model included an additional 2 dB as required by Mt. Haley township regulations. Overall modeled sound power level for turbines equipped with LNTE/STE blades, after the 2-dB addition, is 107.5 dBA for the Vestas turbines and 110.5 dBA for the GE turbines. The additional 2 dB was included in all operating conditions for turbines in

Jonesfield and Porter townships as a conservative sound modeling assumption, accounting for any fluctuations in steady-state turbine sound levels.

#### **4.1.2 NORD2000 Methodology**

Turbine sound levels in the NORD2000 model used vendor supplied sound power levels with the addition of vendor-specified uncertainty. GE turbine datasheets specify an uncertainty of 0.8 dB for turbine sound power levels, which was added to their expected sound power levels in the acoustical model. Vestas datasheets did not specify an uncertainty value for sound power levels, so 1 dB was added as a conservative assumption. These uncertainty values were included for all turbine operating conditions and mitigation methods, including all levels of NRO. Overall modeled sound power level for turbines with LNTE/STE, after the addition of uncertainty, is 106.5 dBA for the Vestas turbines and 109.3 dBA for the GE turbines, with NRO adjustments applied to certain GE turbines.

## **4.2 RECEPTORS**

Over 340 receptors in Jonesfield Township, including residences and public buildings, were included in the acoustical model based on data provided by the project team. Receptors were given a height of 2 m (6.5 feet) above the ground, and any noise level falling between two whole decibels was rounded to the nearest whole number, both as required by Mt. Haley Township regulations. Receptors were classified into two groups for assessing compliance: participants and non-participants. Participants are parcels included in DTE's special land use permit application and parcels outside the Project Site but under a Participation Agreement, while non-participants are parcels that are subject to neither a standard utility easement for wind energy development nor participation agreement. A labeled map of Jonesfield Township parcels and receptors is included in Appendix B.

## **4.3 SOUND PROPAGATION**

The following assumptions were included in the acoustical model, which yield conservative results in terms of sound propagation (i.e., including a safety margin for actual operation):

- Terrain / topography based on the most current GIS data available.
- Ground is assumed to be acoustically "mixed" ( $G = 0.5$ ); this is a conservative assumption for most of the year since the ground within the wind park is mainly cultivated farmland, which is usually considered "porous" ground.
- Shielding / attenuation effects of interceding barriers (such as residential buildings) and foliage were not included in the acoustical model.

### **4.3.1 ISO 9613**

- The acoustical model considers all receptors to be downwind from all sound sources, which is a conservative assumption. The downwind calculation assumes a wind speed of 1 to 5 m/s (approximately 2 to 11 mph) at 3 to 11 m (approximately 10 to 36 ft) above the ground.

- ISO 9613 calculations are representative of atmospheric conditions causing downward refraction of sound waves, i.e., a moderate temperature inversion such as would be present on a clear, calm night.

#### 4.3.2 NORD2000

- The acoustical model was run for wind speeds from 7 to 15 m/s (approximately 16 to 34 mph) at 89 meters (GE turbine hub height).
- A terrain roughness of 0.05 meters was used, consistent with agricultural areas with vegetation.
- Results were calculated for twelve wind directions, in 30-degree increments.
- A temperature gradient of -9.8 degrees Celsius per kilometer (-28 degrees Fahrenheit per mile) was used to representative of a well-mixed layer, typical of windy days.

### 4.4 MODELING RESULTS

#### 4.4.1 ISO 9613

The ISO 9613 predicted sound levels resulting from the operation of the Meridian Wind Park in Jonesfield Township are shown in Figure 9. The sound model, assuming worse-case conditions and including application of NRO at certain GE turbines, predicts sound levels at 1 receptor potentially exceeding 45 dBA  $L_{eq}$  (1-hour) as shown in Table 2. 4.4.2 Appendix C has a full list of receptors and expected sound levels. The wind park is predicted to comply with Jonesfield Township limits for sound levels at project boundaries, and DTE ‘best practice’ limit for non-participating property lines.

**Table 2 - Potential Exceedances - ISO Methodology**

RECEPTOR	EASTING (M)	NORTHING (M)	PARTICIPANT STATUS	APPLICABLE LIMIT	POTENTIAL EXCEEDANCE
1873	714456.5	4814563.6	Non-Participant	45 dBA	0.5

#### 4.4.2 NORD2000

The ISO 9613 results were used to identify receptors that would be evaluated in greater depth using the NORD2000 modeling methodology. Receptor 1873 was evaluated at various conditions as described in Section 4.3.2 to determine if compliance could be reached by mitigating or curtailing the contributing turbines during specific meteorological conditions.

For all evaluated meteorological conditions, non-participating receptor 1873 is predicted to comply with Jonesfield Township ordinance and DTE ‘best practice’ limits. The wind park is predicted to comply with Jonesfield Township limits for sound levels at project boundaries, and DTE ‘best practice’ limit for non-participating property lines.



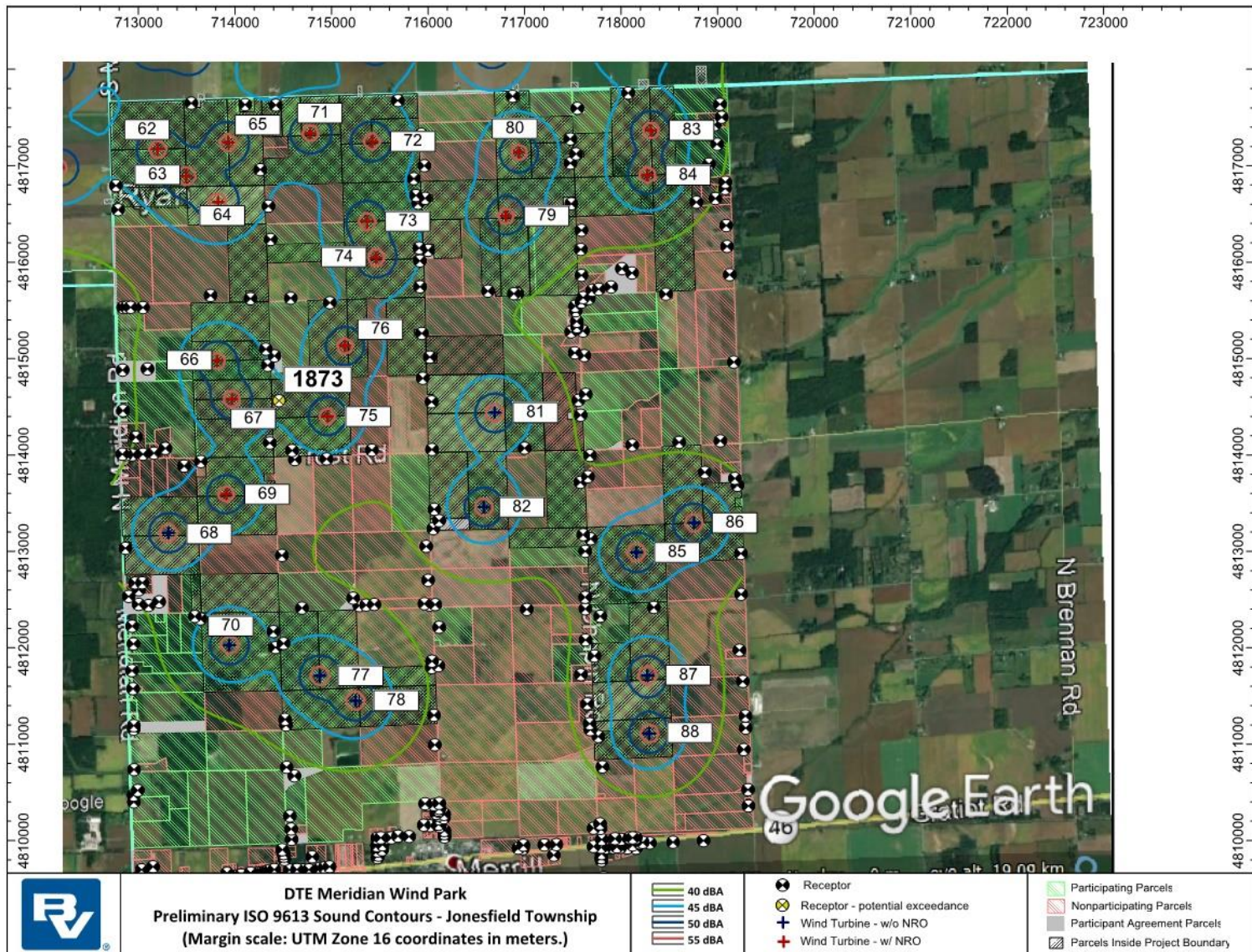


Figure 9 – Meridian Wind Park – Jonesfield Township ISO 9613 Sound Contours



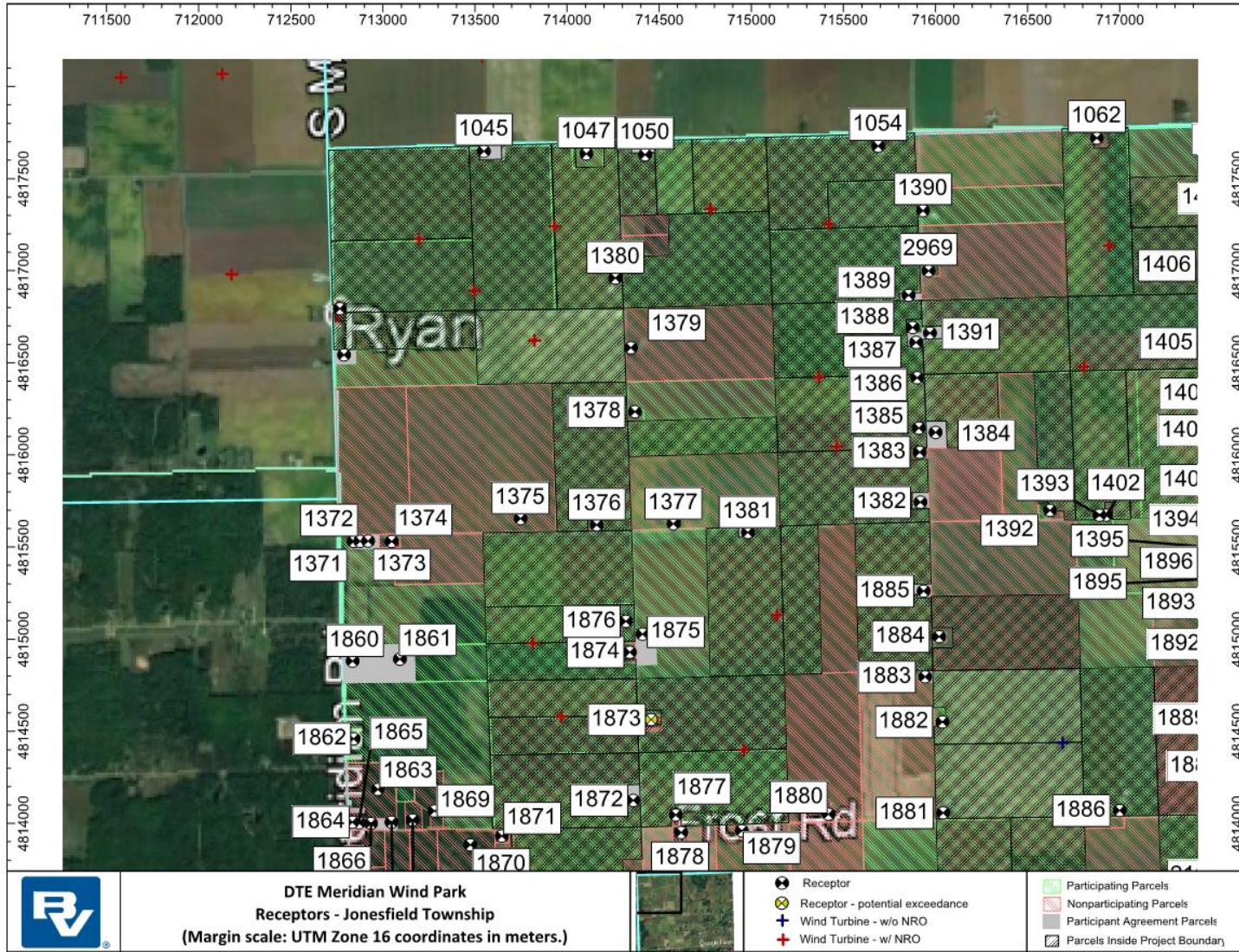
## Appendix A.

Table 3 – Wind turbine modeling parameters

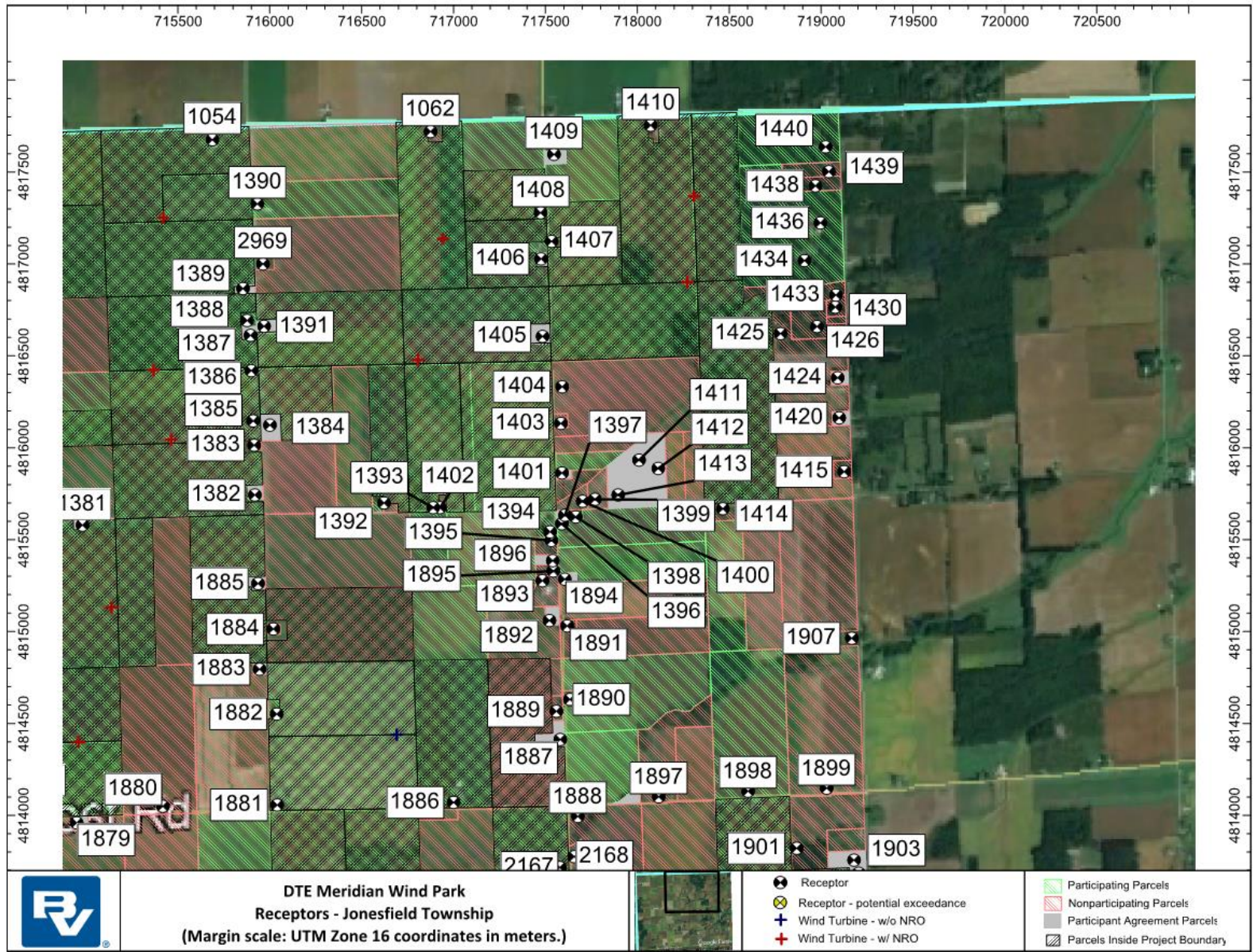
TURBINE	EASTING (M)	NORTHING (M)	SOUND POWER LEVEL(dBA)	VENDOR MITIGATION	ASSUMED OPERATIONAL CONTROLS
2	703900	4816742	110.5	LNTE	-
3	705150.3	4817918	107	LNTE	NRO 105
4	705732.6	4817869	107	LNTE	NRO 105
5	705703.8	4818435	107	LNTE	NRO 105
6	705508.3	4816682	110.5	LNTE	-
8	706748.7	4817956	107	LNTE	NRO 105
10	707421.4	4818370	107	LNTE	NRO 105
12	707370.5	4816380	109	LNTE	NRO 107
14	708636	4819707	110.5	LNTE	-
15	708541.3	4818536	107	LNTE	NRO 105
16	708664.4	4817933	107	LNTE	NRO 105
17	708528.1	4816819	108	LNTE	NRO 106
18	708893.7	4816608	110.5	LNTE	-
19	710187.1	4820251	109	LNTE	NRO 107
20	710229.3	4819719	110.5	LNTE	-
22	709935.4	4818025	107	LNTE	NRO 105
23	710478.8	4817996	107	LNTE	NRO 105
24	710373.1	4818681	107	LNTE	NRO 105
25	710711	4816953	107	LNTE	NRO 105
26	711625.8	4820325	110.5	LNTE	-
27	711578	4818048	107	LNTE	NRO 105
28	712127.7	4818068	107	LNTE	NRO 105
29	712178.4	4816980	107	LNTE	NRO 105
30	713505.4	4821882	107	LNTE	NRO 105
31	713746.3	4821457	107	LNTE	NRO 105
32	713163.8	4820130	109	LNTE	NRO 107
33	713648.5	4820113	107	LNTE	NRO 105
35	713133.5	4818217	107	LNTE	NRO 105
36	713508.4	4818922	107	LNTE	NRO 105
37	713539.1	4818162	107	LNTE	NRO 105
38	714972.5	4821864	110.5	LNTE	-
39	714990.7	4821339	107	LNTE	NRO 105
40	714600.6	4819775	107	LNTE	NRO 105
41	714702.5	4820344	107	LNTE	NRO 105
42	715288.8	4820375	107	LNTE	NRO 105
45	715453.5	4818244	107	LNTE	NRO 105
46	716363.4	4821467	107	LNTE	NRO 105
47	716965.5	4821481	107	LNTE	NRO 105

TURBINE	EASTING (M)	NORTHING (M)	SOUND POWER LEVEL (dBA)	VENDOR MITIGATION	ASSUMED OPERATIONAL CONTROLS
48	716992.1	4820605	107	LNTE	NRO 105
49	716235.8	4819032	107	LNTE	NRO 105
51	716663.6	4818207	107	LNTE	NRO 105
52	717796.3	4821834	107	LNTE	NRO 105
53	718002.2	4821436	107	LNTE	NRO 105
54	718556.3	4822020	107	LNTE	NRO 105
55	718745.7	4821473	107	LNTE	NRO 105
56	717904.2	4819822	107	LNTE	NRO 105
57	717963.5	4820660	107	LNTE	NRO 105
58	718354.3	4820442	107	LNTE	NRO 105
59	717956.7	4819017	107	LNTE	NRO 105
60	718103.9	4818282	107	LNTE	NRO 105
61	718398.3	4818906	107	LNTE	NRO 105
62	713195.8	4817171	107	LNTE	NRO 105
63	713495	4816891	107	LNTE	NRO 105
64	713822.8	4816622	107	LNTE	NRO 105
65	713930.2	4817241	107	LNTE	NRO 105
66	713813.4	4814979	107	LNTE	NRO 105
67	713968.2	4814579	107	LNTE	NRO 105
68	713310.2	4813183	107.5	STE	-
69	713910.5	4813593	107	LNTE	NRO 105
70	713940.5	4812027	107.5	STE	-
71	714779.4	4817336	107	LNTE	NRO 105
72	715420.6	4817252	107	LNTE	NRO 105
73	715367.6	4816423	107	LNTE	NRO 105
74	715463	4816045	107	LNTE	NRO 105
75	714959.1	4814399	107	LNTE	NRO 105
76	715139.1	4815131	107	LNTE	NRO 105
77	714878.5	4811710	107.5	STE	-
78	715248.7	4811451	107.5	STE	-
79	716806.5	4816479	107	LNTE	NRO 105
80	716942	4817137	107	LNTE	NRO 105
81	716690.7	4814439	107.5	STE	-
82	716578.5	4813459	107.5	STE	-
83	718308.4	4817368	107	LNTE	NRO 105
84	718272	4816901	107	LNTE	NRO 105
85	718157.4	4812989	107.5	STE	-
86	718754.8	4813295	107.5	STE	-
87	718272.6	4811715	107.5	STE	-
88	718291.1	4811109	107.5	STE	-

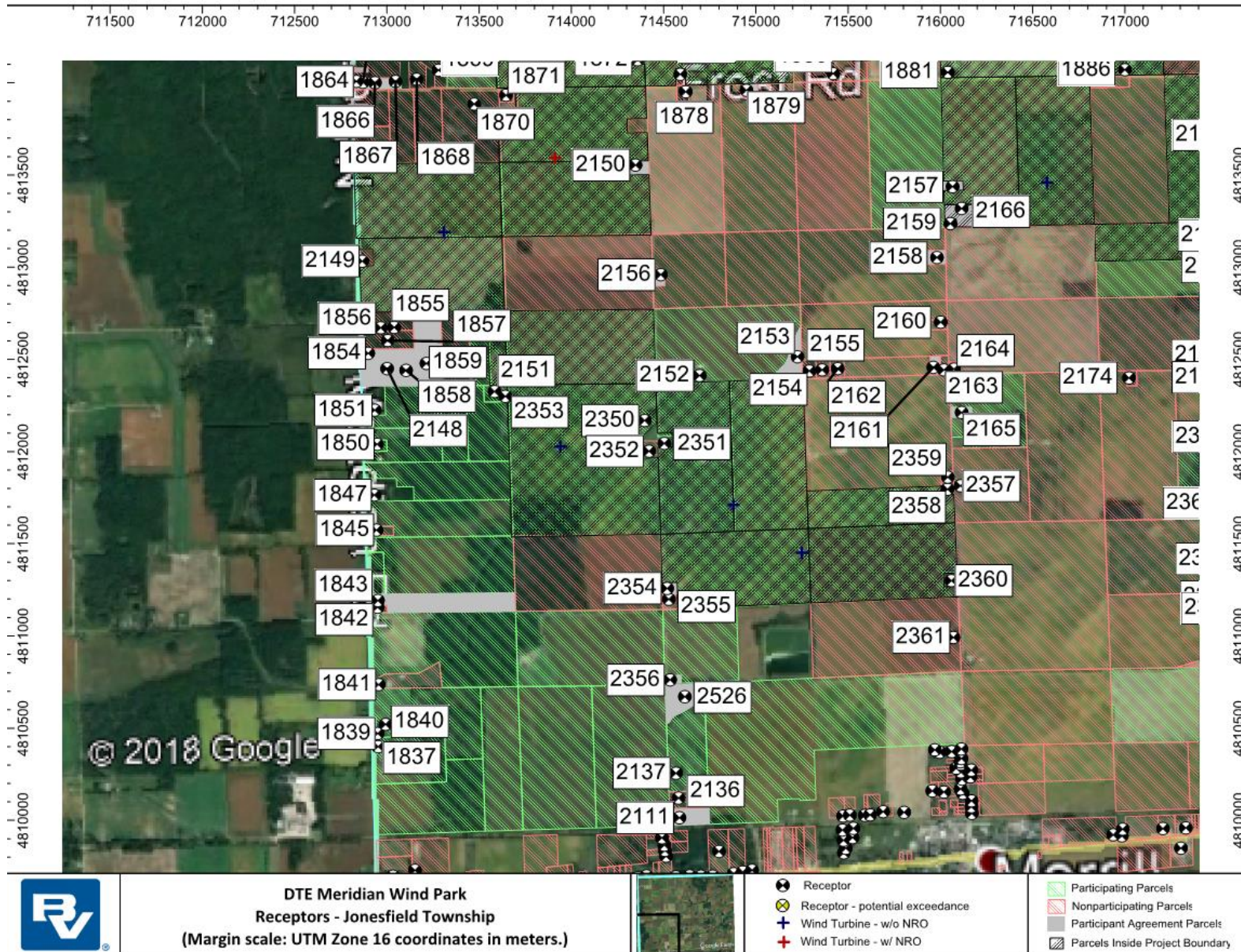
# Appendix B.



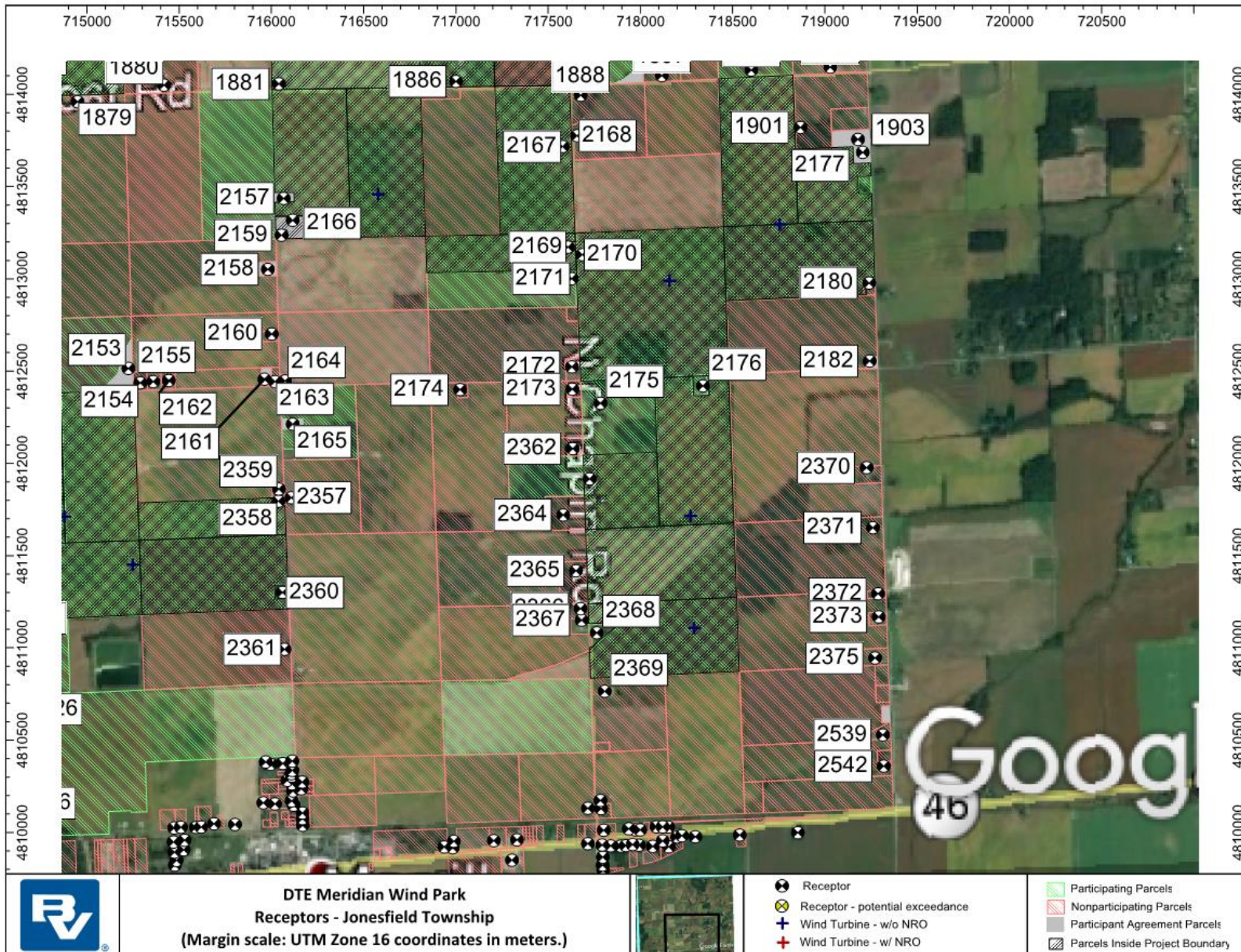












## Appendix C.

**Table 4 - Acoustical model results for Jonesfield Township receptors – ISO 9613**

RECEPTOR	EASTING (M)	NORTHING (M)	PARTICIPATION STATUS	APPLICABLE LIMIT (dBA)	EXPECTED SOUND LEVEL (dBA)
1045	713548.3	4817648	Participant Agreement	-	46.7
1047	714104.8	4817634	Participant	-	46
1050	714424	4817629	Participant	-	46
1054	715688.1	4817676	Participant	-	45
1062	716875.5	4817720	Nonparticipant	45	44
1369	712766.5	4816794	Nonparticipant	45	45
1371	712841.6	4815530	Nonparticipant	45	39
1372	712876.6	4815532	Participant Agreement	-	40
1373	712919.6	4815533	Participant Agreement	-	40
1374	713047.4	4815530	Nonparticipant	45	40
1375	713747.1	4815655	Nonparticipant	45	42
1376	714161.2	4815621	Nonparticipant	45	42
1377	714577.4	4815626	Nonparticipant	45	43
1378	714368.2	4816235	Nonparticipant	45	43
1379	714346.6	4816582	Nonparticipant	45	45
1380	714261.8	4816961	Participant	-	47
1381	714981.3	4815580	Participant Agreement	-	45
1382	715918.1	4815744	Participant Agreement	-	44
1383	715914.8	4816014	Nonparticipant	45	45
1384	716000.1	4816123	Participant Agreement	-	44
1385	715910	4816147	Participant	-	45
1386	715900	4816420	Participant Agreement	-	45
1387	715894.6	4816611	Participant Agreement	-	44
1388	715876.1	4816692	Participant	-	44
1389	715854.1	4816866	Participant Agreement	-	44
1390	715932.2	4817326	Participant	-	44
1391	715969.1	4816661	Participant Agreement	-	44
1392	716621.8	4815700	Participant	-	41
1393	716889.4	4815674	Participant Agreement	-	41
1394	717525	4815543	Participant	-	39
1395	717532.4	4815496	Nonparticipant	45	39
1396	717589.1	4815587	Nonparticipant	45	39
1397	717606.9	4815633	Participant Agreement	-	39
1398	717665.4	4815624	Nonparticipant	45	38



RECEPTOR	EASTING (M)	NORTHING (M)	PARTICIPATION STATUS	APPLICABLE LIMIT (dBA)	EXPECTED SOUND LEVEL (dBA)
1399	717768.9	4815720	Nonparticipant	45	38
1400	717702.4	4815709	Nonparticipant	45	39
1401	717590.3	4815863	Participant Agreement	-	39
1402	716925.8	4815674	Nonparticipant	45	40
1403	717583.8	4816132	Nonparticipant	45	40
1404	717590.7	4816332	Nonparticipant	45	41
1405	717484.7	4816606	Participant Agreement	-	43
1406	717476	4817028	Participant Agreement	-	44
1407	717533.2	4817123	Nonparticipant	45	44
1408	717474	4817278	Participant	-	44
1409	717546.7	4817596	Participant Agreement	-	43
1410	718072.6	4817755	Nonparticipant	45	45
1411	718009.1	4815933	Participant Agreement	-	39
1412	718113.8	4815888	Participant Agreement	-	38
1413	717895.3	4815743	Participant Agreement	-	38
1414	718465.6	4815669	Nonparticipant	45	37
1415	719125.8	4815870	Nonparticipant	45	36
1420	719098	4816163	Participant Agreement	-	37
1424	719089.8	4816381	Participant Agreement	-	38
1425	718779.7	4816621	Nonparticipant	45	42
1426	718977	4816659	Nonparticipant	45	40
1430	719077	4816765	Nonparticipant	45	39
1433	719080.2	4816831	Nonparticipant	45	40
1434	718910.1	4817019	Participant	-	42
1436	718996.2	4817224	Participant	-	41
1438	718969.3	4817425	Nonparticipant	45	41
1439	719041.7	4817503	Nonparticipant	45	41
1440	719024.9	4817637	Participant	-	40
1819	712999.3	4809135	Nonparticipant	45	29
1821	712999.2	4809199	Nonparticipant	45	29
1827	713035.9	4809465	Nonparticipant	45	30
1828	713096.7	4809466	Nonparticipant	45	30
1829	713105.8	4809557	Nonparticipant	45	30
1830	713014.2	4809543	Nonparticipant	45	30
1831	712988.8	4809614	Nonparticipant	45	30
1834	713033.8	4809697	Nonparticipant	45	30
1837	712952.7	4810400	Participant	-	33

RECEPTOR	EASTING (M)	NORTHING (M)	PARTICIPATION STATUS	APPLICABLE LIMIT (dBA)	EXPECTED SOUND LEVEL (dBA)
1839	712951.1	4810471	Participant	-	33
1840	712993.2	4810520	Participant	-	33
1841	712955.3	4810737	Nonparticipant	45	34
1842	712949.3	4811156	Nonparticipant	45	35
1843	712951.5	4811192	Participant Agreement	-	36
1845	712944	4811575	Nonparticipant	45	37
1847	712932.1	4811764	Nonparticipant	45	37
1850	712947.2	4812040	Participant	-	38
1851	712934.7	4812224	Nonparticipant	45	39
1854	712899.8	4812534	Participant Agreement	-	40
1855	713040.3	4812674	Nonparticipant	45	42
1856	712966.9	4812671	Nonparticipant	45	41
1857	713004.9	4812602	Nonparticipant	45	41
1858	713104	4812440	Participant Agreement	-	41
1859	713214	4812478	Participant Agreement	-	41
1860	712835.4	4814881	Participant Agreement	-	39
1861	713092.5	4814892	Participant Agreement	-	41
1862	712841.4	4814460	Nonparticipant	45	39
1863	712972.5	4814186	Nonparticipant	45	40
1864	712834.5	4814007	Participant Agreement	-	40
1865	712869.8	4814003	Participant Agreement	-	40
1866	712935.4	4814001	Nonparticipant	45	40
1867	713046.4	4814007	Participant Agreement	-	41
1868	713161.2	4814019	Nonparticipant	45	41
1869	713280.1	4814068	Nonparticipant	45	42
1870	713473.9	4813884	Nonparticipant	45	44
1871	713645.8	4813932	Nonparticipant	45	45
1872	714359.9	4814125	Participant Agreement	-	44
1873	714456.5	4814564	Nonparticipant	45	46
1874	714341	4814930	Nonparticipant	45	45
1875	714409.4	4815027	Participant Agreement	-	45
1876	714319.9	4815097	Participant	-	45
1877	714590.7	4814046	Nonparticipant	45	44
1878	714619.5	4813951	Nonparticipant	45	43
1879	714948.9	4813960	Participant Agreement	-	44
1880	715418.7	4814050	Nonparticipant	45	42
1881	716040.7	4814057	Participant	-	42

RECEPTOR	EASTING (M)	NORTHING (M)	PARTICIPATION STATUS	APPLICABLE LIMIT (dBA)	EXPECTED SOUND LEVEL (dBA)
1882	716037.6	4814551	Participant	-	42
1883	715944.5	4814795	Participant Agreement	-	42
1884	716019.7	4815014	Nonparticipant	45	42
1885	715935.7	4815261	Participant Agreement	-	42
1886	717000.1	4814070	Participant	-	44
1887	717581	4814414	Participant Agreement	-	40
1888	717676.3	4813995	Nonparticipant	45	40
1889	717558.9	4814567	Nonparticipant	45	39
1890	717633.7	4814631	Nonparticipant	45	39
1891	717618.4	4815031	Nonparticipant	45	38
1892	717521.4	4815060	Participant Agreement	-	39
1893	717482.8	4815277	Nonparticipant	45	39
1894	717605	4815285	Participant Agreement	-	38
1895	717543.4	4815330	Nonparticipant	45	38
1896	717539.6	4815386	Participant Agreement	-	38
1897	718115.8	4814101	Nonparticipant	45	39
1898	718602	4814132	Participant	-	39
1899	719029.8	4814148	Nonparticipant	45	38
1901	718867.3	4813821	Nonparticipant	45	42
1903	719179.2	4813757	Participant Agreement	-	41
1907	719167.4	4814964	Nonparticipant	45	35
2015	718297.7	4809976	Nonparticipant	45	36
2016	718120.4	4810030	Nonparticipant	45	36
2017	718150.7	4810028	Nonparticipant	45	36
2018	718087.9	4810030	Nonparticipant	45	36
2019	717999.4	4810014	Nonparticipant	45	36
2020	717973.2	4810014	Nonparticipant	45	36
2021	717937.2	4810020	Nonparticipant	45	36
2022	718538.1	4809985	Nonparticipant	45	35
2023	718225.2	4809982	Nonparticipant	45	36
2024	718199.2	4809975	Nonparticipant	45	36
2025	718153.2	4809922	Nonparticipant	45	35
2026	718120.4	4809954	Nonparticipant	45	35
2027	718067.4	4809925	Nonparticipant	45	35
2028	717991.7	4809930	Nonparticipant	45	35
2029	717957.4	4809934	Nonparticipant	45	35
2030	717921.9	4809928	Nonparticipant	45	35

RECEPTOR	EASTING (M)	NORTHING (M)	PARTICIPATION STATUS	APPLICABLE LIMIT (dBA)	EXPECTED SOUND LEVEL (dBA)
2031	717893.4	4809926	Nonparticipant	45	35
2032	717840.1	4809926	Nonparticipant	45	35
2033	717792.3	4809931	Nonparticipant	45	35
2034	717796.7	4809866	Nonparticipant	45	35
2035	717795	4809823	Nonparticipant	45	34
2036	717797.4	4809794	Nonparticipant	45	34
2037	717715.8	4809938	Nonparticipant	45	35
2038	717800.9	4810011	Nonparticipant	45	35
2039	717786.9	4810128	Nonparticipant	45	36
2040	717715.3	4810131	Nonparticipant	45	36
2041	717783.1	4810173	Nonparticipant	45	36
2042	716988.6	4809952	Nonparticipant	45	34
2043	716937.1	4809922	Nonparticipant	45	34
2044	716983.4	4809916	Nonparticipant	45	34
2045	715509.5	4810028	Nonparticipant	45	35
2046	715590.6	4810027	Nonparticipant	45	35
2047	715473.1	4810024	Nonparticipant	45	35
2048	715619.9	4810029	Nonparticipant	45	35
2049	715689.3	4810047	Nonparticipant	45	35
2050	715803	4810043	Nonparticipant	45	34
2051	716170.1	4810038	Nonparticipant	45	34
2052	716168.1	4810075	Nonparticipant	45	34
2053	716168.8	4810106	Nonparticipant	45	34
2054	715955.7	4810160	Nonparticipant	45	35
2055	716120.6	4810147	Nonparticipant	45	34
2056	716109.5	4810170	Nonparticipant	45	35
2057	716163	4810236	Nonparticipant	45	35
2058	716117.3	4810225	Nonparticipant	45	35
2059	716110.5	4810263	Nonparticipant	45	35
2060	716110.8	4810305	Nonparticipant	45	35
2061	716108.8	4810318	Nonparticipant	45	35
2062	716113.8	4810336	Nonparticipant	45	35
2063	716113.8	4810387	Nonparticipant	45	35
2064	716061.8	4810373	Nonparticipant	45	35
2065	715996	4810369	Nonparticipant	45	36
2066	715969.4	4810382	Nonparticipant	45	36
2067	716086.1	4810282	Nonparticipant	45	35

RECEPTOR	EASTING (M)	NORTHING (M)	PARTICIPATION STATUS	APPLICABLE LIMIT (dBA)	EXPECTED SOUND LEVEL (dBA)
2068	716167.5	4810272	Nonparticipant	45	35
2069	716019.5	4810154	Nonparticipant	45	35
2070	715470	4809948	Nonparticipant	45	34
2071	715529.2	4809957	Nonparticipant	45	34
2072	715524.5	4809906	Nonparticipant	45	34
2073	715474.9	4809893	Nonparticipant	45	34
2074	715486.6	4809849	Nonparticipant	45	34
2075	715476.3	4809823	Nonparticipant	45	34
2076	714933.2	4809513	Nonparticipant	45	32
2077	714926.1	4809564	Nonparticipant	45	33
2078	714923.2	4809605	Nonparticipant	45	33
2079	714908.1	4809630	Nonparticipant	45	33
2080	714990.9	4809523	Nonparticipant	45	32
2081	714984.6	4809572	Nonparticipant	45	33
2082	714984.7	4809619	Nonparticipant	45	33
2083	714871.9	4809644	Nonparticipant	45	33
2084	714845.7	4809645	Nonparticipant	45	33
2085	714817.9	4809570	Nonparticipant	45	32
2086	714768.4	4809527	Nonparticipant	45	32
2087	714697.3	4809613	Nonparticipant	45	33
2088	714929.1	4809720	Nonparticipant	45	33
2089	714880.1	4809711	Nonparticipant	45	33
2090	714979.6	4809730	Nonparticipant	45	33
2091	714766.1	4809698	Nonparticipant	45	33
2092	714800	4809832	Nonparticipant	45	34
2093	714701.8	4809698	Nonparticipant	45	33
2094	714637.4	4809425	Nonparticipant	45	32
2095	714607.9	4809476	Nonparticipant	45	32
2096	714486.7	4809392	Nonparticipant	45	31
2097	714496.1	4809446	Nonparticipant	45	32
2098	714501.4	4809505	Nonparticipant	45	32
2099	714525	4809536	Nonparticipant	45	32
2100	714578.2	4809613	Nonparticipant	45	32
2101	714517.2	4809609	Nonparticipant	45	32
2102	714466.3	4809611	Nonparticipant	45	32
2103	714426.1	4809601	Nonparticipant	45	32
2104	714396.3	4809589	Nonparticipant	45	32

RECEPTOR	EASTING (M)	NORTHING (M)	PARTICIPATION STATUS	APPLICABLE LIMIT (dBA)	EXPECTED SOUND LEVEL (dBA)
2105	714337	4809581	Nonparticipant	45	32
2106	714317.1	4809582	Nonparticipant	45	32
2107	714276.7	4809577	Nonparticipant	45	32
2108	714319.9	4809543	Nonparticipant	45	32
2109	714566.9	4809694	Nonparticipant	45	33
2110	714641.4	4809699	Nonparticipant	45	33
2111	714586.2	4810014	Participant Agreement	-	35
2112	714513.3	4809805	Nonparticipant	45	33
2113	714507.5	4809838	Nonparticipant	45	34
2114	714504.3	4809865	Nonparticipant	45	34
2115	714407.1	4809699	Nonparticipant	45	33
2116	714362.1	4809690	Nonparticipant	45	33
2117	714333	4809681	Nonparticipant	45	33
2118	714309.4	4809673	Nonparticipant	45	33
2119	714280.3	4809665	Nonparticipant	45	33
2120	714246.2	4809661	Nonparticipant	45	32
2121	714209.8	4809658	Nonparticipant	45	32
2122	714160.3	4809665	Nonparticipant	45	32
2123	714124.1	4809580	Nonparticipant	45	32
2124	714103.8	4809570	Nonparticipant	45	32
2125	714084.7	4809569	Nonparticipant	45	32
2126	714045.2	4809563	Nonparticipant	45	32
2127	714026.9	4809564	Nonparticipant	45	32
2128	713992.3	4809552	Nonparticipant	45	32
2129	713955.5	4809536	Nonparticipant	45	31
2130	713880.4	4809550	Nonparticipant	45	31
2131	713916.6	4809662	Nonparticipant	45	32
2132	713974	4809630	Nonparticipant	45	32
2133	714036.5	4809637	Nonparticipant	45	32
2134	714065.7	4809644	Nonparticipant	45	32
2135	714490.3	4809906	Nonparticipant	45	34
2136	714581.2	4810121	Nonparticipant	45	35
2137	714567.4	4810256	Participant	-	36
2138	717749.6	4809238	Nonparticipant	45	31
2139	717732.4	4809406	Nonparticipant	45	32
2140	717815.6	4809268	Nonparticipant	45	31
2141	717833.5	4809329	Nonparticipant	45	32

RECEPTOR	EASTING (M)	NORTHING (M)	PARTICIPATION STATUS	APPLICABLE LIMIT (dBA)	EXPECTED SOUND LEVEL (dBA)
2142	717824.5	4809404	Nonparticipant	45	32
2143	717806.9	4809456	Nonparticipant	45	32
2144	717823.3	4809504	Nonparticipant	45	33
2145	717819.9	4809549	Nonparticipant	45	33
2146	717819.7	4809576	Nonparticipant	45	33
2147	717819	4809620	Nonparticipant	45	33
2148	713001.1	4812450	Participant Agreement	-	40
2149	712866.2	4813033	Nonparticipant	45	43
2150	714348.3	4813553	Participant Agreement	-	44
2151	713583.6	4812325	Participant	-	44
2152	714694.2	4812412	Participant	-	42
2153	715225.1	4812515	Participant Agreement	-	40
2154	715289.8	4812437	Nonparticipant	45	41
2155	715359.1	4812443	Nonparticipant	45	40
2156	714484.9	4812959	Participant Agreement	-	41
2157	716066.4	4813436	Participant Agreement	-	43
2158	715981.3	4813052	Participant Agreement	-	41
2159	716054.2	4813237	Participant Agreement	-	42
2160	716001.6	4812702	Nonparticipant	45	39
2161	715961.7	4812457	Participant Agreement	-	39
2162	715443.6	4812450	Nonparticipant	45	40
2163	716019	4812443	Nonparticipant	45	39
2164	716074.5	4812447	Nonparticipant	45	39
2165	716115.1	4812212	Participant Agreement	-	39
2166	716115.8	4813318	Participant Agreement	-	43
2167	717578	4813717	Participant	-	41
2168	717656.9	4813776	Nonparticipant	45	40
2169	717607.8	4813173	Participant Agreement	-	42
2170	717685.2	4813131	Participant	-	43
2171	717627.1	4813001	Participant	-	43
2172	717628.3	4812523	Nonparticipant	45	41
2173	717630.8	4812402	Nonparticipant	45	41
2174	717022.6	4812400	Nonparticipant	45	39
2175	717783.5	4812326	Participant	-	42
2176	718338.6	4812419	Participant	-	43
2177	719205.4	4813685	Participant Agreement	-	41
2180	719240.3	4812978	Nonparticipant	45	42



RECEPTOR	EASTING (M)	NORTHING (M)	PARTICIPATION STATUS	APPLICABLE LIMIT (dBA)	EXPECTED SOUND LEVEL (dBA)
2182	719242.5	4812554	Participant Agreement	-	39
2350	714397.3	4812169	Participant	-	44
2351	714503.2	4812045	Nonparticipant	45	45
2352	714421.8	4812002	Nonparticipant	45	45
2353	713642.6	4812300	Participant	-	45
2354	714518.8	4811258	Participant Agreement	-	43
2355	714527.9	4811200	Nonparticipant	45	43
2356	714535.2	4810762	Participant Agreement	-	39
2357	716109.1	4811814	Nonparticipant	45	39
2358	716038.8	4811795	Nonparticipant	45	40
2359	716040.7	4811861	Nonparticipant	45	39
2360	716060.4	4811300	Nonparticipant	45	39
2361	716070.8	4810992	Nonparticipant	45	38
2362	717633	4812080	Nonparticipant	45	41
2363	717724.3	4811916	Participant	-	42
2364	717582.2	4811721	Nonparticipant	45	41
2365	717650.7	4811418	Nonparticipant	45	42
2366	717675	4811213	Nonparticipant	45	42
2367	717681	4811150	Nonparticipant	45	42
2368	717763.3	4811081	Nonparticipant	45	43
2369	717806.3	4810765	Nonparticipant	45	41
2370	719225.6	4811976	Nonparticipant	45	39
2371	719260.4	4811651	Nonparticipant	45	38
2372	719288.3	4811293	Nonparticipant	45	38
2373	719291.6	4811168	Nonparticipant	45	38
2375	719271.5	4810945	Nonparticipant	45	37
2520	713559.5	4809527	Nonparticipant	45	31
2521	713512.8	4809517	Nonparticipant	45	31
2522	713485.5	4809568	Nonparticipant	45	31
2523	713292.4	4809583	Nonparticipant	45	30
2524	713242.5	4809567	Nonparticipant	45	30
2525	713152	4809729	Nonparticipant	45	31
2526	714614.9	4810670	Participant Agreement	-	39
2527	714260.6	4809084	Nonparticipant	45	30
2528	714293.5	4809133	Nonparticipant	45	30
2529	714479.3	4809054	Nonparticipant	45	30
2530	714497.6	4809188	Nonparticipant	45	31

RECEPTOR	EASTING (M)	NORTHING (M)	PARTICIPATION STATUS	APPLICABLE LIMIT (dBA)	EXPECTED SOUND LEVEL (dBA)
2531	716219.3	4809167	Nonparticipant	45	31
2532	716214.1	4809122	Nonparticipant	45	31
2533	717303.9	4809849	Nonparticipant	45	34
2534	717330.8	4809960	Nonparticipant	45	34
2535	717205.9	4809955	Nonparticipant	45	34
2536	718213.1	4809209	Nonparticipant	45	31
2537	718562.3	4809241	Nonparticipant	45	31
2539	719314.6	4810528	Nonparticipant	45	36
2542	719319.3	4810359	Nonparticipant	45	35
2543	718853.4	4809999	Nonparticipant	45	35
2544	718631.3	4809173	Nonparticipant	45	31
2828	714523	4808970	Nonparticipant	45	30
2837	716214.6	4809066	Nonparticipant	45	31
2969	715962.7	4817000	Nonparticipant	45	44
2970	712788.5	4816544	Participant Agreement	-	43
2982	715014.1	4809423	Nonparticipant	45	32

# Appendix D.




ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1  
 ACCREDITED by NVLAP (an ILAC MRA signatory)

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## Calibration Certificate No.41168

<p> <b>Instrument:</b> Sound Level Meter  <b>Model:</b> NA27  <b>Manufacturer:</b> Rion  <b>Serial number:</b> 01191119  <b>Tested with:</b> Microphone UC53A s/n 99858                              Preamplifier NH20 s/n 94641  <b>Type (class):</b> 1  <b>Customer:</b> Black &amp; Veatch  <b>Tel/Fax:</b> 913-458-7823 / 913-458-7823         </p>	<p> <b>Date Calibrated:</b> 7/30/2018    <b>Cal Due:</b> 7/30/2019  <b>Status:</b> <table style="display: inline-table; border-collapse: collapse;"> <tr> <td style="border: 1px solid black; padding: 2px;">Received</td> <td style="border: 1px solid black; padding: 2px;">Sent</td> </tr> <tr> <td style="border: 1px solid black; text-align: center; padding: 2px;">X</td> <td style="border: 1px solid black; text-align: center; padding: 2px;">X</td> </tr> </table> <b>In tolerance:</b>  <b>Out of tolerance:</b>  <b>See comments:</b>  <b>Contains non-accredited tests:</b> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>  <b>Calibration service:</b> Basic <input type="checkbox"/> Standard <input checked="" type="checkbox"/>  <b>Address:</b> 11401 Lamar Avenue                              Overland Park, KS 66211         </p>	Received	Sent	X	X
Received	Sent				
X	X				

Tested in accordance with the following procedures and standards:  
 Calibration of Sound Level Meters, Scantek Inc., Rev. 6/26/2015  
 SLM & Dosimeters – Acoustical Tests, Scantek Inc., Rev. 7/6/2011

**Instrumentation used for calibration:** Nor-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence	
				Cal. Lab / Accreditation	Cal. Due
483B-Norsonic	SME Cal Unit	31052	Oct 30, 2017	Scantek, Inc./ NVLAP	Oct 30, 2018
DS-360-SRS	Function Generator	33584	Oct 24, 2017	ACR Env./ A2LA	Oct 24, 2019
34401A-Agilent Technologies	Digital Voltmeter	US36120731	Oct 25, 2017	ACR Env./ A2LA	Oct 25, 2018
HM30-Thommen	Meteo Station	1040170/39633	Oct 25, 2017	ACR Env./ A2LA	Oct 25, 2018
PC Program 1019 Norsonic	Calibration software	v. 6.1T	Validated Nov 2014	Scantek, Inc.	-
1251-Norsonic	Calibrator	30878	Nov 10, 2017	Scantek, Inc./ NVLAP	Nov 10, 2018

Instrumentation and test results are traceable to SI (International System of Units) through standards maintained by NIST (USA) and NPL (UK).

**Environmental conditions:**

Temperature (°C)	Barometric pressure (kPa)	Relative Humidity (%)
22.3	100.40	58.9

<b>Calibrated by:</b>	Lydon Dawkins	<b>Authorized signatory:</b>	Steven E. Marshall
<b>Signature</b>	<i>Lydon Dawkins</i>	<b>Signature</b>	<i>Steven E. Marshall</i>
<b>Date</b>	7/30/2018	<b>Date</b>	7/31/2018

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## Calibration Certificate No.41164

<b>Instrument:</b>	Sound Level Meter	<b>Date Calibrated:</b>	7/28/2018	<b>Cal Due:</b>	7/28/2019
<b>Model:</b>	NL32	<b>Status:</b>	Received	Sent	
<b>Manufacturer:</b>	Rion	<b>In tolerance:</b>	X	X	
<b>Serial number:</b>	00630458	<b>Out of tolerance:</b>			
<b>Tested with:</b>	Microphone UC53A s/n 321772 Preamplifier NH21 s/n 08156	<b>See comments:</b>			
<b>Type (class):</b>	1	<b>Contains non-accredited tests:</b>	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>		
<b>Customer:</b>	Black & Veatch	<b>Calibration service:</b>	Basic <input type="checkbox"/> Standard <input checked="" type="checkbox"/>		
<b>Tel/Fax:</b>	913-458-7823 / 913-458-7823	<b>Address:</b>	11401 Lamar Avenue Overland Park, KS 66211		

Tested in accordance with the following procedures and standards:  
Calibration of Sound Level Meters, Scantek Inc., Rev. 6/26/2015  
SLM & Dosimeters – Acoustical Tests, Scantek Inc., Rev. 7/6/2011

Instrumentation used for calibration: Nor-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence	Cal. Due
				Cal. Lab / Accreditation	
483B-Norsonic	SME Cal Unit	31052	Oct 30, 2017	Scantek, Inc. / NVLAP	Oct 30, 2018
DS-360-SRS	Function Generator	33584	Oct 24, 2017	ACR Env. / A2LA	Oct 24, 2019
34401A-Agilent Technologies	Digital Voltmeter	US36120731	Oct 25, 2017	ACR Env. / A2LA	Oct 25, 2018
HM30-Thommen	Meteo Station	1040170/39633	Oct 25, 2017	ACR Env. / A2LA	Oct 25, 2018
PC Program 1019 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
1251-Norsonic	Calibrator	30878	Nov 10, 2017	Scantek, Inc. / NVLAP	Nov 10, 2018

Instrumentation and test results are traceable to Si (International System of Units) through standards maintained by NIST (USA) and NPL (UK).

Environmental conditions:

Temperature (°C)	Barometric pressure (kPa)	Relative Humidity (%)
21.9	100.11	58.8

Calibrated by:	Lydon Dawkins	Authorized signatory:	Steven E. Marshall
Signature	<i>Lydon Dawkins</i>	Signature	<i>Steven E. Marshall</i>
Date	7/28/2018	Date	7/30/2018

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**Scantek, Inc.**

CALIBRATION LABORATORY

ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1  
ACCREDITED by NVLAP (an ILAC MRA signatory)

**NVLAP**<sup>®</sup>  
CALIBRATION  
NVLAP Lab Code: 200625-0

## Calibration Certificate No.41163

**Instrument:** Sound Level Meter  
**Model:** NL42  
**Manufacturer:** Rion  
**Serial number:** 00546407  
**Tested with:** Microphone UC52 s/n 158311  
Preamplifier NH24 s/n 46620  
**Type (class):** 2  
**Customer:** Black & Veatch  
**Tel/Fax:** 913-458-7823 / 913-458-7823

**Date Calibrated:** 7/28/2018 **Cal Due:** 7/28/2019  
**Status:**

Received	Sent
X	X

  
**In tolerance:**

X	X
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**Out of tolerance:**

--	--

  
**See comments:**  
**Contains non-accredited tests:** Yes  No   
**Calibration service:** Basic  Standard   
**Address:** 11401 Lamar Avenue  
Overland Park, KS 66211

Tested in accordance with the following procedures and standards:  
Calibration of Sound Level Meters, Scantek Inc., Rev. 6/26/2015  
SLM & Dosimeters – Acoustical Tests, Scantek Inc., Rev. 7/6/2011

Instrumentation used for calibration: Nor-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence	Cal. Due
				Cal. Lab / Accreditation	
483B-Norsonic	SME Cal Unit	31052	Oct 30, 2017	Scantek, Inc. / NVLAP	Oct 30, 2018
DS-360-SRS	Function Generator	33584	Oct 24, 2017	ACR Env. / A2LA	Oct 24, 2019
34401A-Agilent Technologies	Digital Voltmeter	US36120731	Oct 25, 2017	ACR Env. / A2LA	Oct 25, 2018
HM30-Thommen	Meteo Station	1040170/39633	Oct 25, 2017	ACR Env. / A2LA	Oct 25, 2018
PC Program 1019 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
1251-Norsonic	Calibrator	30878	Nov 10, 2017	Scantek, Inc. / NVLAP	Nov 10, 2018
4226-Brüel&Kjær	Multifunction calibrator	2305103	Sep 5, 2017	B&K / A2LA	Sep 5, 2018

Instrumentation and test results are traceable to SI (International System of Units) through standards maintained by NIST (USA) and NPL (UK).

Environmental conditions:

Temperature (°C)	Barometric pressure (kPa)	Relative Humidity (%)
21.7	100.15	58.3

<b>Calibrated by:</b>	Lydon Dawkins	<b>Authorized signatory:</b>	Steven E. Marshall
Signature	<i>Lydon Dawkins</i>	Signature	<i>Steven E. Marshall</i>
Date	7/28/2018	Date	7/30/2018

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**Scantek, Inc.**

CALIBRATION LABORATORY

ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1  
ACCREDITED by NVLAP (an ILAC MRA signatory)

**NVLAP**<sup>®</sup>  
CALIBRATION  
NVLAP Lab Code: 200625-0

## Calibration Certificate No.41161

**Instrument:** Sound Level Meter  
**Model:** NL52  
**Manufacturer:** Rion  
**Serial number:** 01232541  
**Tested with:** Microphone UC-59 s/n 05979  
Preamplifier NH25 s/n 32569  
**Type (class):** 1  
**Customer:** Black & Veatch  
**Tel/Fax:** 913-458-7823 / 913-458-7823

**Date Calibrated:** 7/28/2018 **Cal Due:** 7/28/2019  
**Status:**

Received	Sent
X	X

  
**In tolerance:**

X	X
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**Out of tolerance:**

--	--

  
**See comments:**  
**Contains non-accredited tests:** Yes  No  
**Calibration service:**  Basic  Standard  
**Address:** 11401 Lamar Avenue  
Overland Park, KS 66211

Tested in accordance with the following procedures and standards:  
Calibration of Sound Level Meters, Scantek Inc., Rev. 6/26/2015  
SLM & Dosimeters – Acoustical Tests, Scantek Inc., Rev. 7/6/2011

Instrumentation used for calibration: Nor-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence	Cal. Due
				Cal. Lab / Accreditation	
483B-Norsonic	SME Cal Unit	31052	Oct 30, 2017	Scantek, Inc. / NVLAP	Oct 30, 2018
D5-360-SRS	Function Generator	33584	Oct 24, 2017	ACR Env. / A2LA	Oct 24, 2019
34401A-Agilent Technologies	Digital Voltmeter	US36120731	Oct 25, 2017	ACR Env. / A2LA	Oct 25, 2018
HM30-Thommen	Meteo Station	1040170/39633	Oct 25, 2017	ACR Env. / A2LA	Oct 25, 2018
PC Program 1019 Norsonic	Calibration software	v.6.1T	Validated Nov 2014	Scantek, Inc.	-
1251-Norsonic	Calibrator	30878	Nov 10, 2017	Scantek, Inc. / NVLAP	Nov 10, 2018

Instrumentation and test results are traceable to SI (International System of Units) through standards maintained by NIST (USA) and NPL (UK).

Environmental conditions:

Temperature (°C)	Barometric pressure (kPa)	Relative Humidity (%)
21.9	100.09	52.2

<b>Calibrated by:</b>	Lydon Dawkins	<b>Authorized signatory:</b>	Steven E. Marshall
Signature	<i>Lydon Dawkins</i>	Signature	<i>Steven E. Marshall</i>
Date	7/23/2018	Date	7/30/2018

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## Appendix E.

