
To: Casey Willis, ENGIE

From: Leslie Knapp and Tricia Pellerin, Tetra Tech, Inc.

Date: July 9, 2019

Subject: Triple H Wind Energy Project – Updated Acoustic Analysis Memorandum

In February 2019 Tetra Tech conducted an acoustic assessment on behalf of Triple H Wind Energy Project, LLC (Triple H) for the proposed Triple H Wind Energy Project (the Project) located in Hyde County, South Dakota. The proposed Project has a maximum nameplate capacity of approximately 250 megawatts (MW). The Project layout includes up to 92 General Electric (GE) 2.72-116 wind turbines, each with 3 blades, a generating capacity of 2.72 MW, a rotor diameter of 116 meters, and a 90-meter-tall hub height.

The acoustic assessment was conducted using the CadnaA acoustic modeling program according to the methodologies described in the February 2019 acoustic assessment report (*Acoustic Assessment for the Triple H Wind Energy Project*). The analysis evaluated 103 potential turbine locations, though the Project would only construct up to 92 turbines. CadnaA was used to evaluate potential noise impacts potentially occurring at 117 residences surrounding the Project. The results of the February 2019 assessment indicated that the Project would comply with the 45 dBA limit prescribed in the Hyde County Zoning Ordinance at all noise sensitive receptors (NSRs), except at three participating landowner properties which may periodically experience sound levels above the criteria threshold. Triple H obtained written waivers of the 45 dBA noise limit from participating landowners. In July 2019, Tetra Tech received updated wind turbine coordinates and was requested to update the acoustic analysis with those coordinates to confirm that potential noise impacts would not substantially increase from what was previously determined.

Acoustic modeling was completed for the updated turbine layout, which included 101 potential turbine locations. The analysis evaluated all 101 potential turbine locations, though the Project would only construct up to 92 turbines. Modeling was completed for wind turbine operation for the following conditions thereby describing the full range of expected receive sound levels at receiver locations: (1) initial cut-in wind speeds; (2) maximum rotation; and (3) maximum rotation during anomalous meteorological conditions. Sound contour plots displaying Project operational sound levels in color-coded isopleths are provided in Figures A-1, A-2, and A-3, in Attachment A. The sound contours are graphical representations of the cumulative noise associated with the Project substation and all Project wind turbines operating concurrently at the given operating condition and show how operational noise would be distributed over the surrounding area. The contour lines presented are analogous to elevation contours on a topographic map, i.e., the sound contours are continuous lines of equal noise level. Figure A-1 displays broadband operational sound levels at the wind speeds during initial cut-in, which is when the turbines engage and start producing power. Figure A-2 displays broadband operational sound levels at wind speeds sufficient to sustain wind turbine operation at maximum rotational speeds during moderate downwind propagation. Figure A-3 displays broadband operational sound levels at wind speeds sufficient to sustain wind turbine operation at maximum rotational speeds during anomalous meteorological conditions. The resultant sound contour plots are independent of the existing acoustic environment, i.e., the plots and tabulated results represent Project-generated sound levels only.

Table 1 presents the results of the Project acoustic modeling analysis and includes the NSR ID, Universal Transverse Mercator (UTM) coordinates, NSR status and the received sound levels at each NSR. Received sound levels are rounded to the nearest whole decimal for consistency with the Hyde County Zoning Ordinance noise limit

absolute value of 45 dBA. Similar to the results from the February 2019 acoustic assessment, there are three occupied NSRs (NSR IDs 11, 18, and 81) with received sound levels greater than 45 dBA. All of these residences are owned by landowners that are participating in the Project. Received sound levels at all non-participating NSRs were determined to be below the Hyde County Zoning Ordinance 45 dBA noise limit.

Table 1. Acoustic Modeling Results Summary

NSR ID	NSR Status	UTM Coordinates (meters)		GE 2.72-116 LNTE		
		Easting	Northing	Cut-in	Maximum Rotational	Anomalous Meteorological
1	Non-Participant	442456	4925508	9	22	24
2	Non-Participant	451309	4925851	28	40	42
3	Participant	459033	4925620	31	44	44
4	Participant	459719	4925668	26	38	40
5	Participant	452062	4924182	30	43	44
6	Participant	452075	4924501	30	43	44
7	Participant	451447	4924097	30	43	44
8	Participant	441895	4923973	9	21	24
9	Participant	444984	4923741	17	30	32
10	Non-Participant	464696	4924005	26	39	40
11	Participant	455990	4922426	36	49	49
12	Participant	446141	4922203	20	33	35
13	Participant	466431	4921923	20	34	36
14	Participant	468148	4921891	15	29	31
15	Participant	471362	4920960	4	18	21
16	Participant	467845	4920175	14	28	30
17	Participant	448828	4920034	21	34	36
18	Participant	452048	4919694	32	45	46
19	Participant	464884	4919863	26	41	42
20	Participant	464748	4919035	23	37	39
21	Participant	464203	4919234	27	40	41
22	Non-Participant	463391	4919194	28	41	42
23	Participant	461381	4919347	28	41	42
24	Non-Participant	463004	4919118	27	40	41
25	Non-Participant	445619	4918666	15	27	30
26	Participant	443100	4918874	10	23	26
27	Participant	440534	4919290	3	15	18
28	Non-Participant	440696	4922014	6	18	21
29	Non-Participant	442687	4922261	11	23	26

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NSR ID	NSR Status	UTM Coordinates (meters)		GE 2.72-116 LNTE		
		Easting	Northing	Cut-in	Maximum Rotational	Anomalous Meteorological
30	Non-Participant	440889	4923289	7	19	22
31	Non-Participant	440819	4926574	6	18	21
32	Non-Participant	440290	4924271	6	18	21
33	Non-Participant	440237	4924430	5	18	21
34	Non-Participant	442458	4928172	8	20	23
35	Non-Participant	449221	4927448	20	33	35
36	Non-Participant	460325	4926929	21	33	36
37	Non-Participant	461603	4926472	21	34	36
38	Non-Participant	462994	4927231	18	31	33
39	Non-Participant	461400	4927437	19	31	34
40	Non-Participant	461242	4927391	19	32	34
41	Non-Participant	464857	4925441	20	33	35
42	Non-Participant	463829	4927184	17	30	33
43	Non-Participant	464803	4927722	15	28	31
44	Non-Participant	464851	4927459	16	29	31
45	Non-Participant	465002	4927396	16	29	31
46	Non-Participant	468316	4927007	11	24	27
47	Non-Participant	471332	4926983	5	18	21
48	Non-Participant	471209	4924768	8	21	24
49	Non-Participant	471206	4924735	8	21	24
50	Non-Participant	440238	4928577	2	15	17
51	Non-Participant	438694	4928202	< 1	< 1	< 1
52	Non-Participant	435698	4928234	< 1	< 1	< 1
53	Non-Participant	438710	4926367	< 1	12	15
54	Non-Participant	437503	4925640	< 1	< 1	< 1
55	Non-Participant	438592	4919467	< 1	7	10
56	Participant	437526	4918519	< 1	< 1	< 1
57	Participant	437554	4918480	< 1	< 1	< 1
58	Non-Participant	435779	4916792	< 1	< 1	< 1
59	Non-Participant	436640	4914868	< 1	< 1	< 1
60	Non-Participant	435784	4915280	< 1	< 1	< 1
61	Non-Participant	440462	4914035	< 1	< 1	< 1

Table 1. Acoustic Modeling Results Summary

NSR ID	NSR Status	UTM Coordinates (meters)		GE 2.72-116 LNTE		
		Easting	Northing	Cut-in	Maximum Rotational	Anomalous Meteorological
62	Non-Participant	435967	4912462	< 1	< 1	< 1
63	Non-Participant	435919	4912203	< 1	< 1	< 1
64	Non-Participant	435242	4912250	< 1	< 1	< 1
65	Non-Participant	435423	4912001	< 1	< 1	< 1
66	Non-Participant	435331	4912501	< 1	< 1	< 1
67	Non-Participant	434868	4912262	< 1	< 1	< 1
68	Non-Participant	442662	4914507	2	15	18
69	Non-Participant	442582	4914367	4	17	20
70	Non-Participant	444337	4912679	7	19	22
71	Non-Participant	445435	4912474	5	17	20
72	Participant	445330	4915443	11	24	26
73	Participant	445448	4917655	14	27	29
74	Participant	448546	4915132	19	32	34
75	Participant	450196	4915008	24	36	38
76	Non-Participant	452106	4916110	29	42	43
77	Non-Participant	452006	4912597	16	29	31
78	Participant	453410	4917626	30	42	44
79	Participant	453397	4917705	30	42	44
80	Participant	456381	4914352	20	32	35
81	Participant	456315	4918412	33	46	47
82	Non-Participant	459068	4914217	18	30	33
83	Non-Participant	461526	4915309	15	28	31
84	Non-Participant	461567	4915598	18	31	33
85	Non-Participant	461490	4915880	17	30	33
86	Non-Participant	461668	4915110	17	30	32
87	Non-Participant	463153	4913889	14	27	29
88	Non-Participant	464660	4916997	17	30	33
89	Non-Participant	464996	4914979	13	27	29
90	Non-Participant	466480	4914752	11	24	27
91	Non-Participant	466495	4914819	9	23	25
92	Participant	467931	4916490	12	25	28
93	Non-Participant	467980	4918031	13	27	29

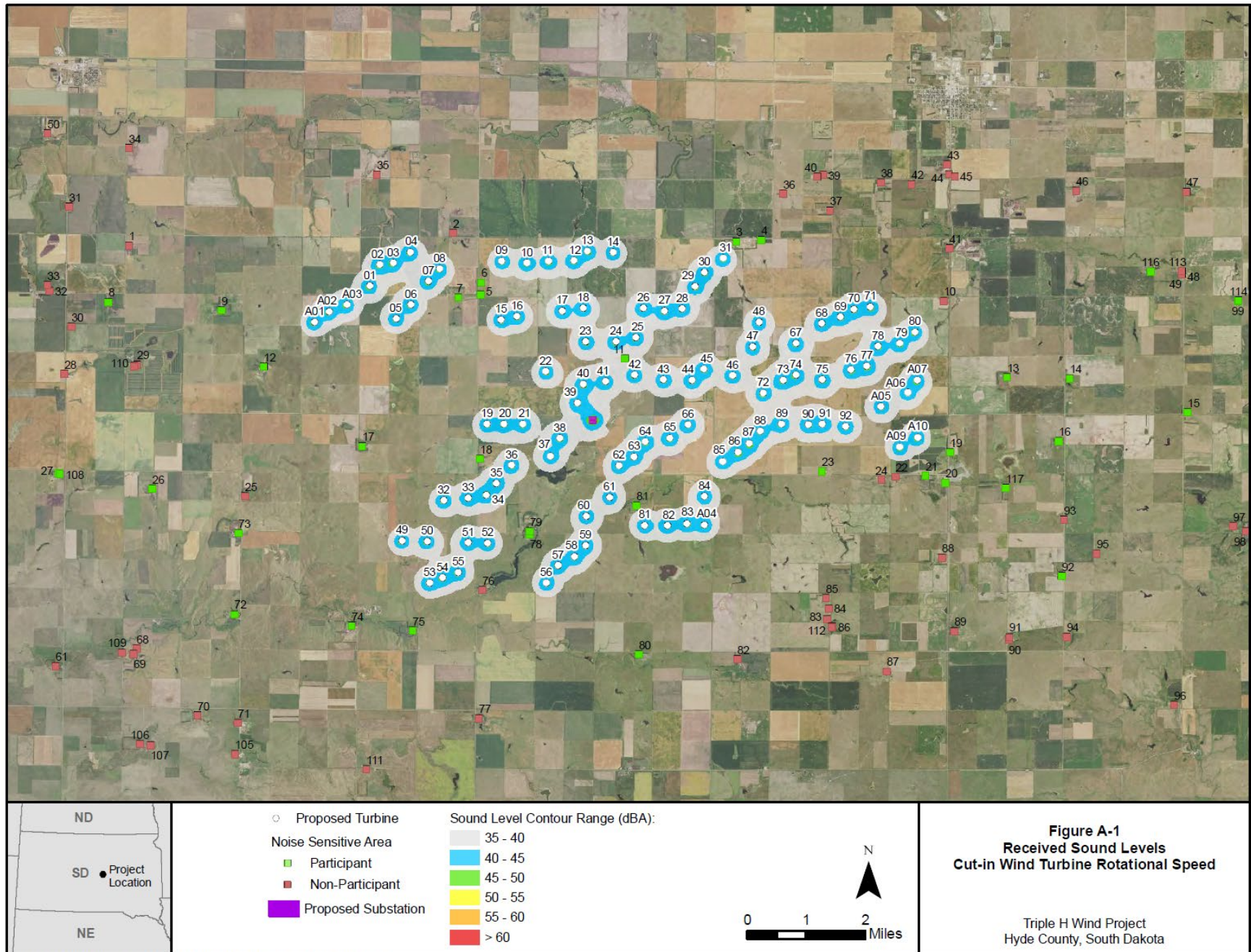
Table 1. Acoustic Modeling Results Summary

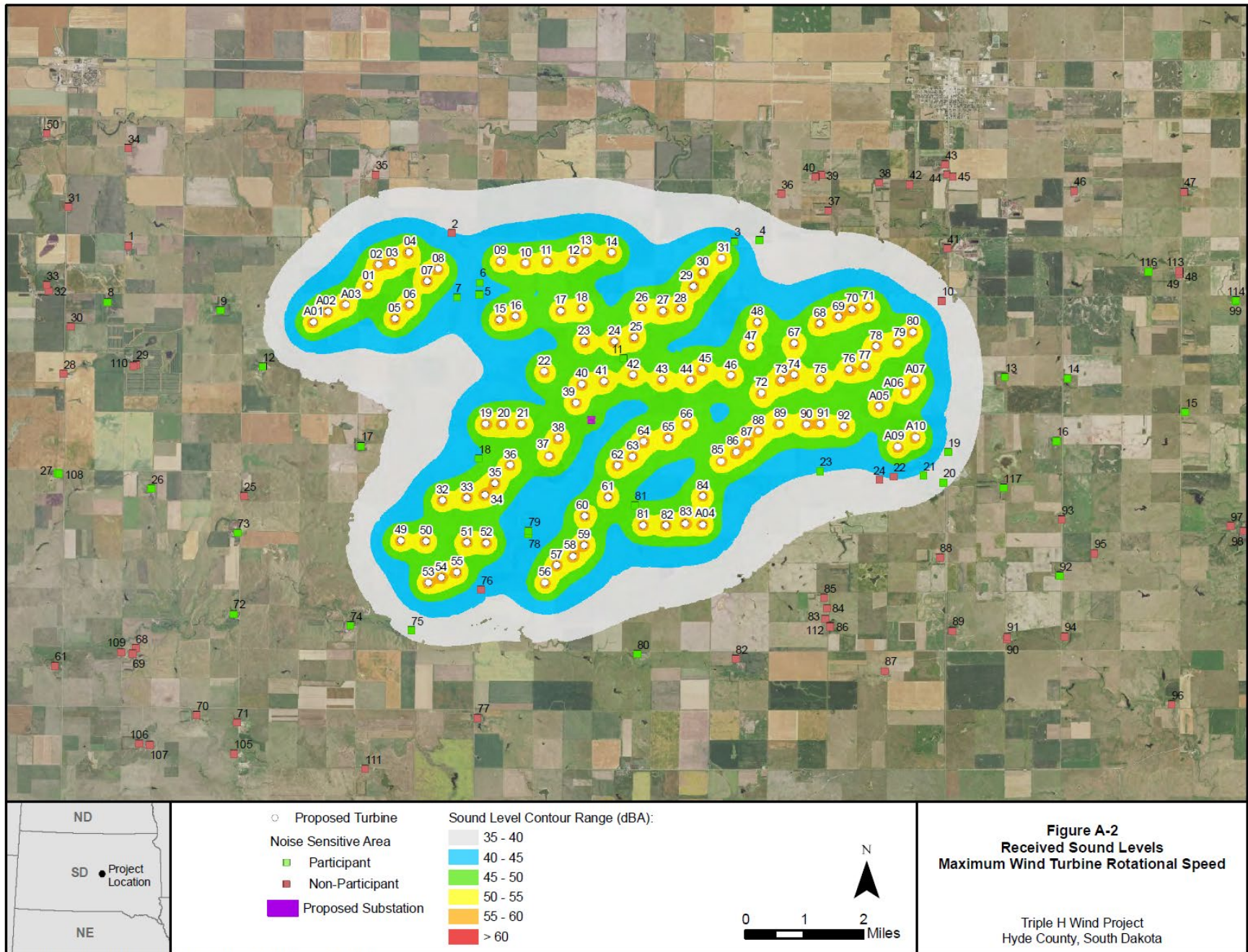
NSR ID	NSR Status	UTM Coordinates (meters)		GE 2.72-116 LNTE		
		Easting	Northing	Cut-in	Maximum Rotational	Anomalous Meteorological
94	Non-Participant	468070	4914826	8	21	24
95	Non-Participant	468886	4917101	6	20	22
96	Non-Participant	470985	4912972	< 1	< 1	< 1
97	Non-Participant	472613	4917854	< 1	11	14
98	Non-Participant	472969	4917714	< 1	13	16
99	Participant	472739	4924006	3	17	20
100	Participant	473852	4920692	< 1	13	16
101	Non-Participant	473795	4925678	< 1	< 1	< 1
102	Non-Participant	475241	4920717	< 1	< 1	< 1
103	Non-Participant	474504	4919960	< 1	< 1	< 1
104	Non-Participant	477592	4926817	< 1	< 1	< 1
105	Non-Participant	445356	4911624	7	20	22
106	Non-Participant	442769	4911898	2	15	17
107	Non-Participant	443050	4911873	2	15	18
108	Participant	440574	4919273	3	15	18
109	Non-Participant	442257	4914401	< 1	12	15
110	Non-Participant	442602	4922219	10	23	26
111	Non-Participant	448944	4911212	11	24	26
112	Non-Participant	461642	4915097	17	30	32
113	Non-Participant	471201	4924811	8	21	24
114	Participant	472755	4924016	3	17	20
115	Non-Participant	473177	4921096	< 1	12	15
116	Participant	470358	4924798	9	23	25
117	Participant	466407	4918894	18	31	34

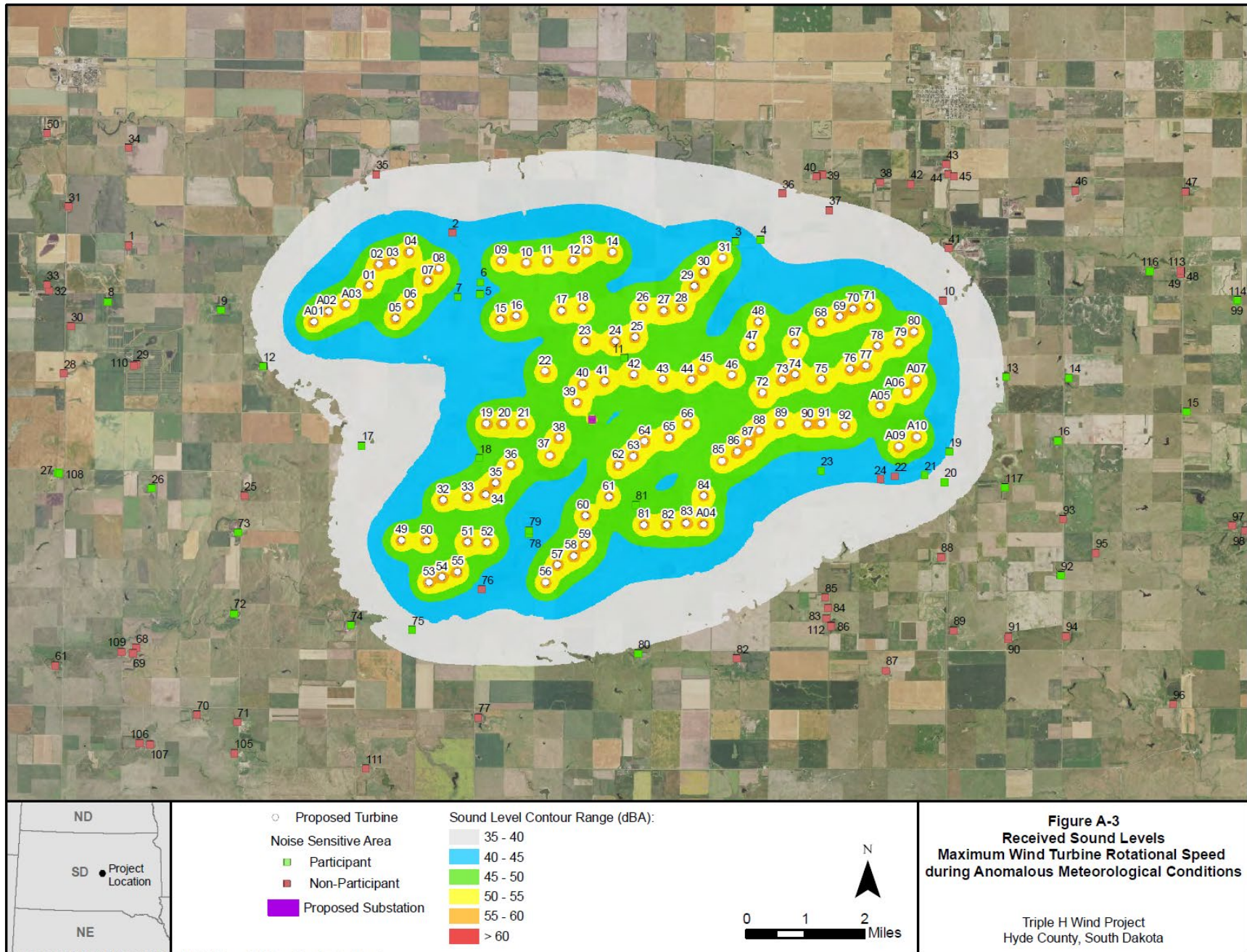
Note: Predicted sound levels greater than the 45 dBA threshold criteria are identified in red.

Attachment A

Sound Contour Figures







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