ATTACHMENT E – Shadow Flicker Analysis (Option A)

SHADOW FLICKER MODELING REPORT

Buffalo Ridge Wind Project
Lincoln County, Minnesota

Prepared for:

Buffalo Ridge Wind, LLC
700 Universe Boulevard
Juno Beach, Florida 33408

Prepared by:

Epsilon Associates, Inc.
3 Mill & Main Place, Suite 250
Maynard, MA 01754

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1.0 EXECUTIVE SUMMARY

The Buffalo Ridge Wind Project (the Project) is a proposed wind power generation facility proposed to consist of 39 wind turbines in Lincoln County, Minnesota. The Project is being developed by Buffalo Ridge Wind, LLC (Buffalo Ridge Wind), an indirect, wholly-owned subsidiary of NextEra Energy Resources, LLC (NEER). Atwell, LLC (Atwell), retained to assist in the permitting of the Project, has retained Epsilon Associates, Inc. (Epsilon) to conduct a shadow flicker assessment for the proposed wind turbines for this Project. This report presents results of the shadow flicker modeling analysis. This report supersedes the previously prepared Shadow Flicker Modeling reports that were filed with the Minnesota Public Utilities Commission dated February 20, 2020 and June 3, 2020, respectively.

Shadow flicker modeling was conservatively conducted for 44 General Electric (GE) wind turbines, which includes five (5) alternate wind turbine locations. The purpose of this analysis is to predict the expected annual durations of wind turbine shadow flicker at nearby receptors.

The maximum expected annual duration of shadow flicker at a modeling receptor resulting from the operation of the 39[1] proposed and 5 alternate wind turbines is 42 hours, 26 minutes. This is at a participating receptor. The maximum expected annual duration of flicker at a non-participating receptor is 28 hours, 56 minutes. The modeling results are conservative in that modeling receptors were treated as "greenhouses" (i.e. having windows on all sides) and the surrounding area was assumed to be without vegetation or structures ("bare earth").

[1] At the time of this analysis, the turbine array showed 39 primary turbines and 5 alternative turbines because Turbine 31 was dropped; however, the Project will construct a total of 40 turbines. Since completion of this analysis, it has been determined that alternative site turbine location Alt 3 will replace Turbine 31, leaving 4 remaining alternative turbines. The analysis in this report was conducted for all 44 turbines (primary and alternate site locations) that are currently proposed to provide conservative results supporting the construction of any of the alternative site locations if a primary is dropped due to constructability issues.

2.0 INTRODUCTION

Project infrastructure is proposed in Lincoln County, Minnesota and while no infrastructure is planned in Pipestone County, a small portion of the Project area extends into Pipestone County, Minnesota. The Project is proposed to consist of 39 wind turbines. The proposed wind turbines are a combination of GE 2.82 megawatt (MW) and GE 2.52 MW units. The GE 2.82 wind turbines have a rotor diameter of 127 meters and a hub height of 89 meters. The GE 2.52 wind turbines have a rotor diameter of 116 meters and a hub height of 90 meters. Figure 2-1 shows the locations of the 39 proposed and 5 alternate wind turbines over aerial imagery.

With respect to wind turbines, shadow flicker can be defined as an intermittent change in the intensity of light in a given area resulting from the operation of a wind turbine due to its interaction with the sun. While indoors, an observer experiences repeated changes in the brightness of the room as shadows cast from the wind turbine blades briefly pass by windows as the blades rotate. In order for this to occur, the wind turbine must be operating, the sun must be shining, and the window must be within the shadow region of the wind turbine, otherwise there is no shadow flicker. A stationary wind turbine only generates a stationary shadow similar to any other structure.

Based on the current design and operation of typical modern wind turbines, shadow flicker is not a cause of epileptic seizures. According to the Epilepsy Foundation, "Generally, flashing lights most likely to trigger seizures are between the frequency of 5 to 30 flashes per second (Hertz)."[2] The wind turbines for this Project have a maximum rotational speed of 15.7 rpm which corresponds to a shadow flicker frequency of 0.8 Hz. This frequency is well below the frequency identified by the Epilepsy Foundation; therefore, the triggering of epileptic seizures is not a concern with this Project.

This report presents the findings of a shadow flicker modeling study for the Project. The wind turbines were modeled with the WindPRO software package using information provided by Atwell. The expected annual duration of shadow flicker was calculated at modeling receptors and shadow flicker isolines for the area surrounding the Project were generated. The results of the modeling are found within this report.

[2] Epilepsy Foundation, http://www.epilepsy.com/learn/triggers-seizures/photosensitivity-and-seizures. Accessed in May 2020.

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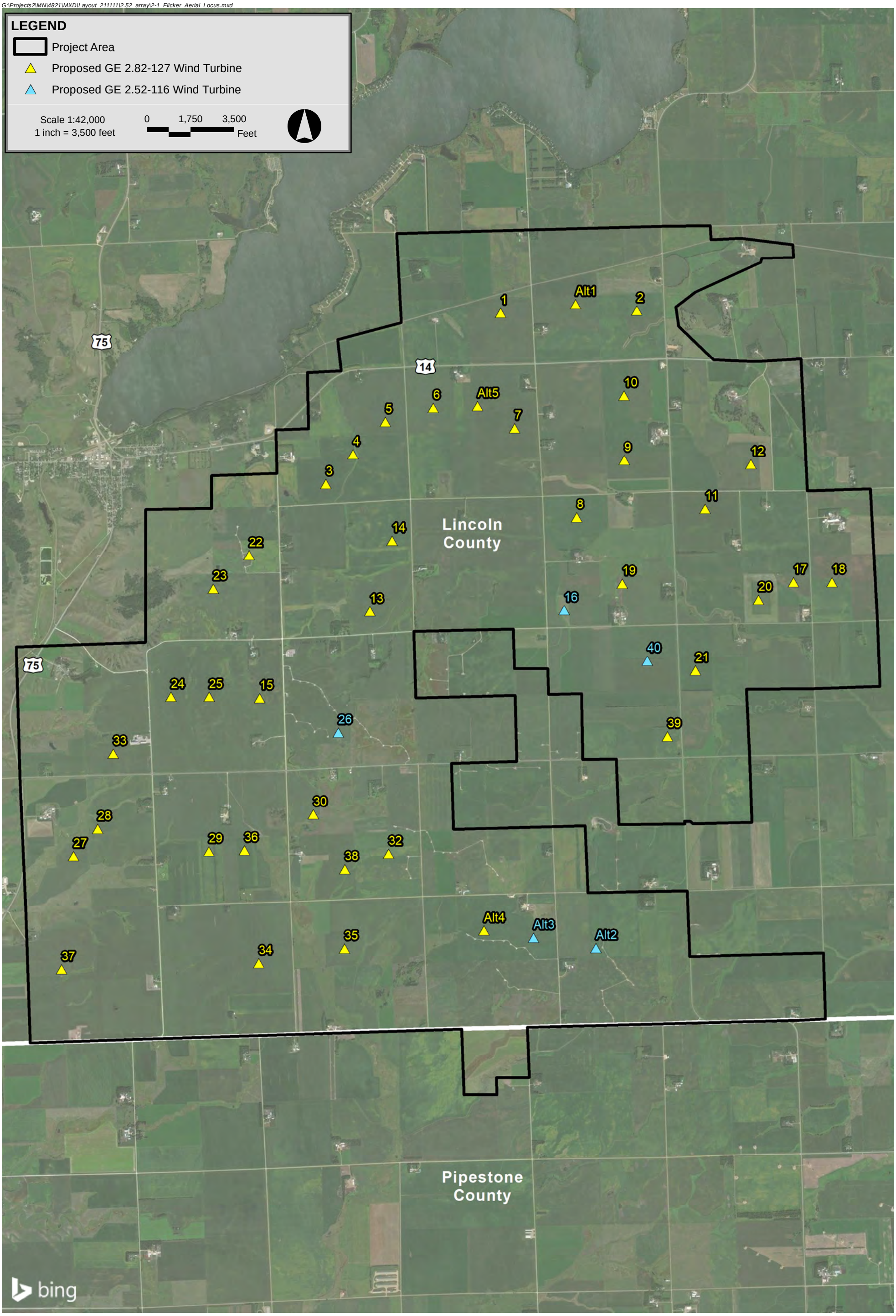

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Figure 2-1
Aerial Locus

3.0 SHADOW FLICKER MODELING

3.1 Modeling Methodology

Shadow flicker was modeled using a software package, WindPRO version 3.4. WindPRO is a software suite developed by EMD International A/S and is used for assessing potential environmental impacts from wind turbines. Using the Shadow module within WindPRO, worst-case shadow flicker in the area surrounding the wind turbines was calculated based on data inputs including: location of the wind turbines, location of discrete receptor points, wind turbine dimensions, flicker calculation limits, and terrain data. Based on these data, the model was able to incorporate the appropriate sun angle and maximum daily sunlight for this latitude into the calculations. The resulting worst-case calculations assume that the sun is always shining during daylight hours and that the wind turbine is always operating. The WindPRO Shadow module can be further refined by incorporating sunshine probabilities and wind turbine operational estimates by wind direction over the course of a year. The values produced by this further refinement are known as the "expected" shadow flicker. Both worst-case and expected annual shadow flicker durations are presented in this section.

The proposed wind turbine layout for the Project dated November 11, 2021 was provided by Buffalo Ridge Wind. Of the 44 wind turbines in the layout, 5 are alternative wind turbine locations. Locations of the turbines are shown in Figure 3-1 and the coordinates are provided in Appendix A. Five (5) wind turbines are proposed to be GE 2.52-116 wind turbines with a 116-meter rotor diameter and a hub height of 90 meters. Thirty-nine (39) are proposed to be GE 2.82-127 wind turbines with a 127-meter rotor diameter and a hub height 89 meters. Each wind turbine has the following characteristics based on the technical data provided by Atwell and/or Buffalo Ridge Wind:

		GE 2.52-116	GE 2.82-127
♦ Rated Power	=	2,520 kW	2,820 kW
♦ Hub Height	=	90 meters	89 meters
♦ Rotor Diameter	=	116.5 meters	127.2 meters
♦ Cut-in Wind Speed	=	3 m/s	3 m/s
♦ Cut-out Wind Speed	=	32 m/s	30 m/s
♦ Maximum RPM	=	15.7 rpm	15.7 rpm

To-date, there are no federal, state, or local regulations regarding the maximum radial distance from a wind turbine to which shadow flicker should be analyzed applicable to this Project. In the United States, shadow flicker is commonly evaluated out to a distance of ten times the rotor diameter. According to the Massachusetts Model Bylaw for wind energy facilities, shadow flicker impacts are minimal at and beyond a distance of ten rotor diameters.[3] Defining the shadow flicker

[3] Massachusetts Department of Energy Resources, "Model As-of-Right Zoning Ordinance or Bylaw: Allowing Use of Wind Energy Facilities" 2009.

calculation area has also been addressed in Europe where the ten times rotor diameter approach has been accepted in multiple European countries.[4] Some jurisdictions conservatively require a larger calculation area. The New Hampshire Site Evaluation Committee through rulemaking docket 2014-04 adopted rules on December 15, 2015 outlining application requirements and criteria for energy facilities, including wind energy facilities. As part of these revised regulations, Site 301.08(a)(2) requires an evaluation distance of at least 1 mile from a wind turbine.[5] Section 16-50j-94, part (g), of the Regulations of Connecticut State Agencies identifies the components required in a shadow flicker evaluation report which includes the calculation of shadow flicker from each proposed wind turbine to any off-site occupied structure within a 1.25 mile radius.[6] For this Project, ten times the largest rotor diameter of the proposed wind turbines corresponds to a distance of 0.79 miles (1,270 m). Conservatively, this analysis includes shadow flicker calculations out to 1.25 miles (2,012 m) from each wind turbine in the model for the proposed layout.

A dataset (dated November 29, 2021) containing participation status information for property parcels in the proximity of the Project was provided by Atwell. Parcels identified as leased within the dataset are participating and are indicated as such on Figure 3-1. All other parcels are considered non-participating. Participation status used throughout this analysis is shown in Figure 3-1.

A modeling receptor dataset was provided by Atwell on March 12, 2019. Receptors identified as barn, shed, garage, or silo were excluded from modeling. Therefore, the remaining 411 receptors identified as mobile home, residential, and industrial were input into the WindPRO model. Each modeling point was assumed to have a window facing all directions ("greenhouse" mode) which yields conservative results. Participation status for each modeling receptor was assigned based on the data presented in Figure 3-1. All modeling receptors are identified in Figure 3-2 and are distinguished as either participating or non-participating. The model was set to limit calculations to 2,012 meters from a wind turbine, the equivalent of 1.25 miles. Consequently, shadow flicker at any of the 411 modeling receptors greater than the corresponding limitation distance from a wind turbine was zero. In addition to modeling discrete points, shadow flicker was calculated at grid points in the area surrounding the modeled wind turbines to generate flicker isolines. A 20-meter spacing was used for this grid.

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[4] Parsons Brinckerhoff, "Update of UK Shadow Flicker Evidence Base" Prepared for Department of Energy and Climate Change, 2011.

[5] State of New Hampshire Site Evaluation Committee Site 300 Rules (2015), available at http://www.gencourt.state.nh.us/rules/state_agencies/site100-300.html Accessed in May 2020.

[6] State of Connecticut CSC Wind Regulations (2014), available at https://eregulations.ct.gov/eRegsPortal/Browse/RCSA?id=Title_16Subtitle_16-50jSection_16-50j-94&content=shadow%20flicker/ Accessed in May 2020.

The terrain height contour elevations for the modeling domain were generated from elevation information derived from the National Elevation Dataset (NED) developed by the U.S. Geological Survey. Conservatively, obstacles, i.e. buildings and vegetation, were excluded from the analysis. This is effectively a "bare earth" scenario which is conservative. When accounted for in the shadow flicker calculations, such obstacles may significantly mitigate or eliminate the flicker effect depending on their size, type, and location. In addition, shadow flicker durations were calculated only when the angle of the sun was at least 3° above the horizon.

Monthly sunshine probability values were input for each month from January to December. These numbers were obtained from a publicly available historical dataset for Sioux City, Iowa from the National Oceanic and Atmospheric Administration's (NOAA) National Centers for Environmental Information (NCEI).[7] Table 3-1 shows the percentage of sunshine hours by month used in the shadow flicker modeling. These values are the percentages that the sun is expected to be shining during daylight hours.

The number of hours the wind turbines are expected to operate for the 16 cardinal wind directions was input into the model. A 31-year hourly time series for wind speed and wind direction at 90 meters above ground level was provided by the Project. Epsilon used these data to calculate the typical annual number of operational hours per wind direction sector. These hours per wind direction sector are used by WindPRO to estimate the "wind direction" and "operation time" reduction factors. Based on this dataset, the wind turbines would operate 98% of the year. Table 3-2 shows the distribution of operational hours for the 16 wind directions.

[7] NCEI (formerly NCDC), https://www1.ncdc.noaa.gov/pub/data/ccd-data/pctpos15.dat. Accessed in May 2020.

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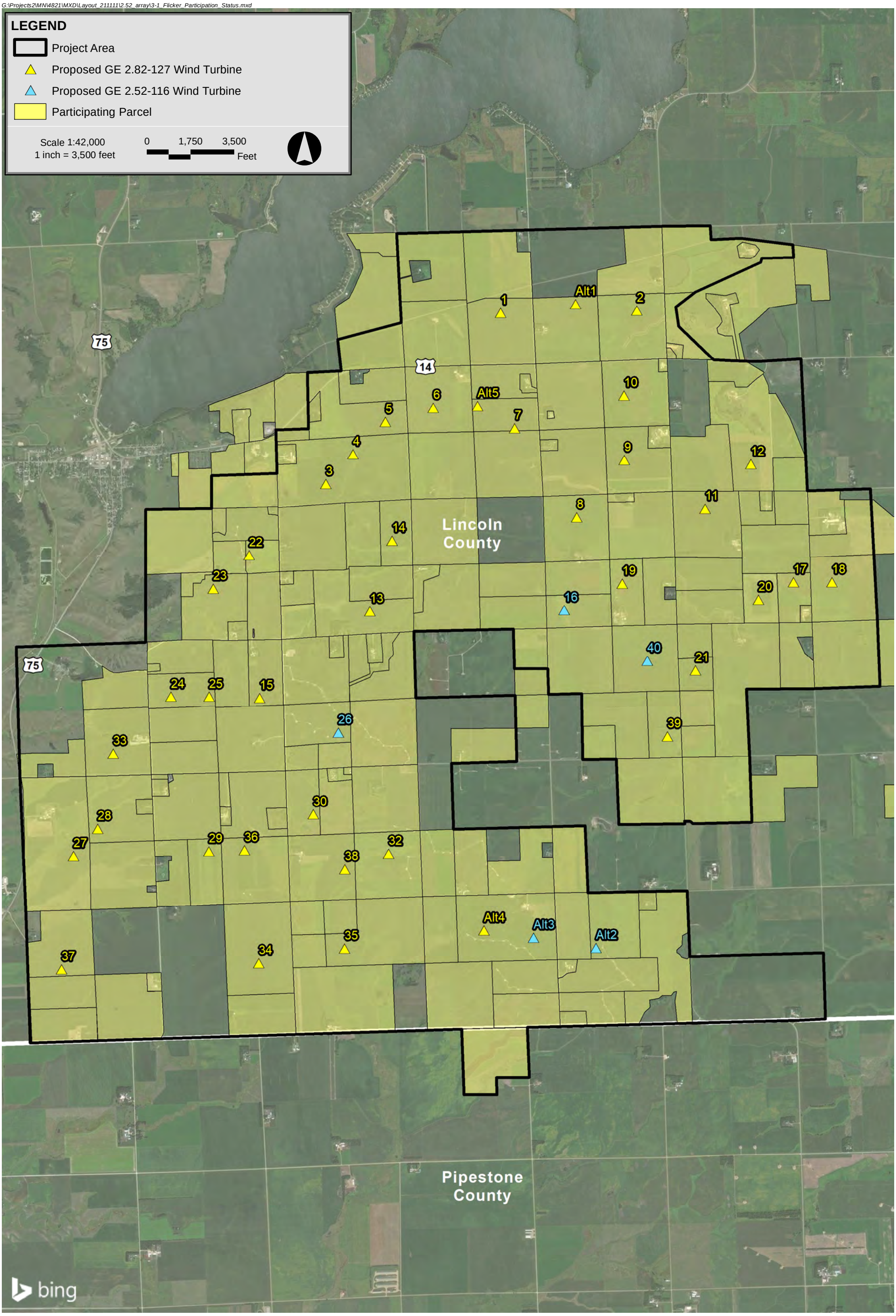

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Figure 3-1
Participation Status

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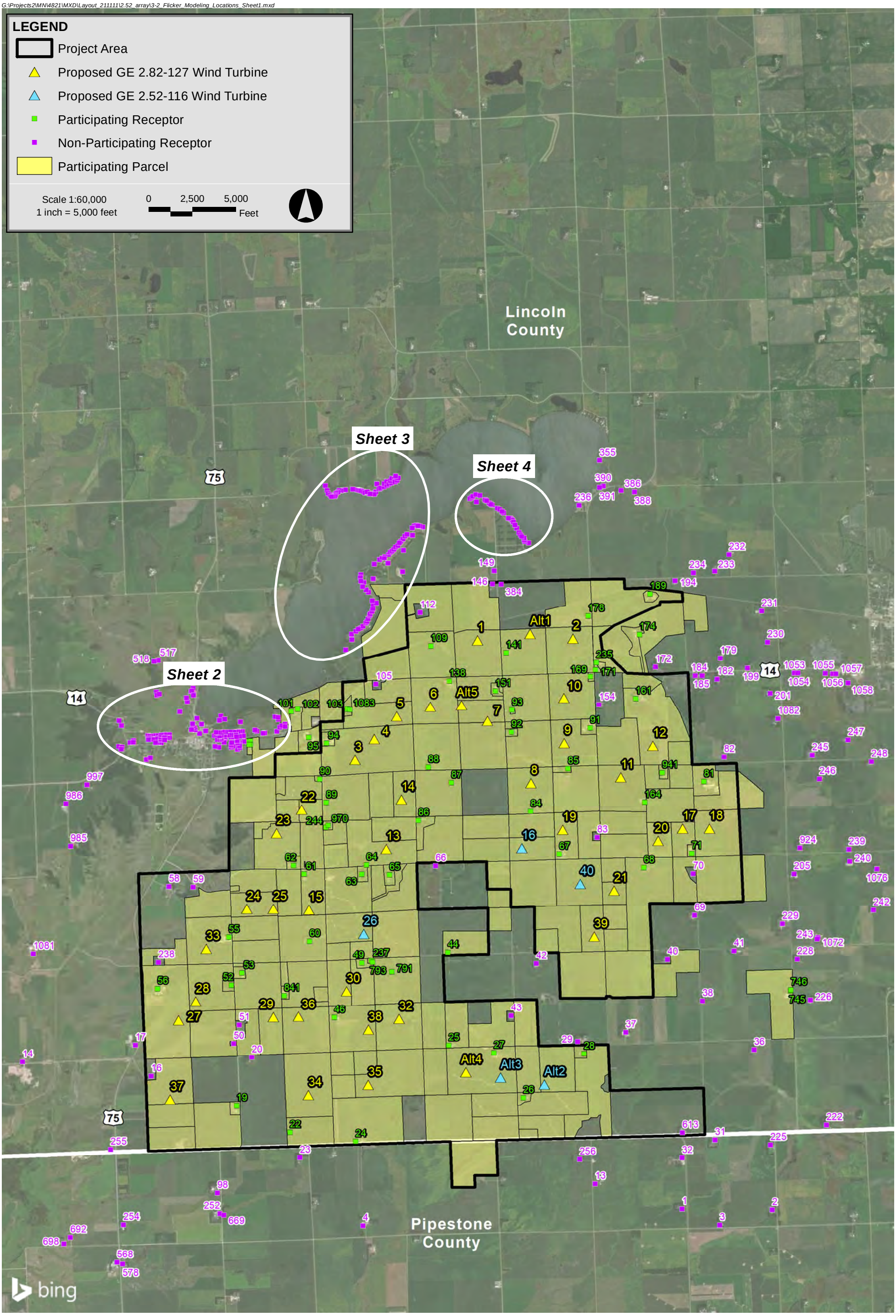

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Figure 3-2, Sheet 1 of 4
Shadow Flicker Modeling Locations

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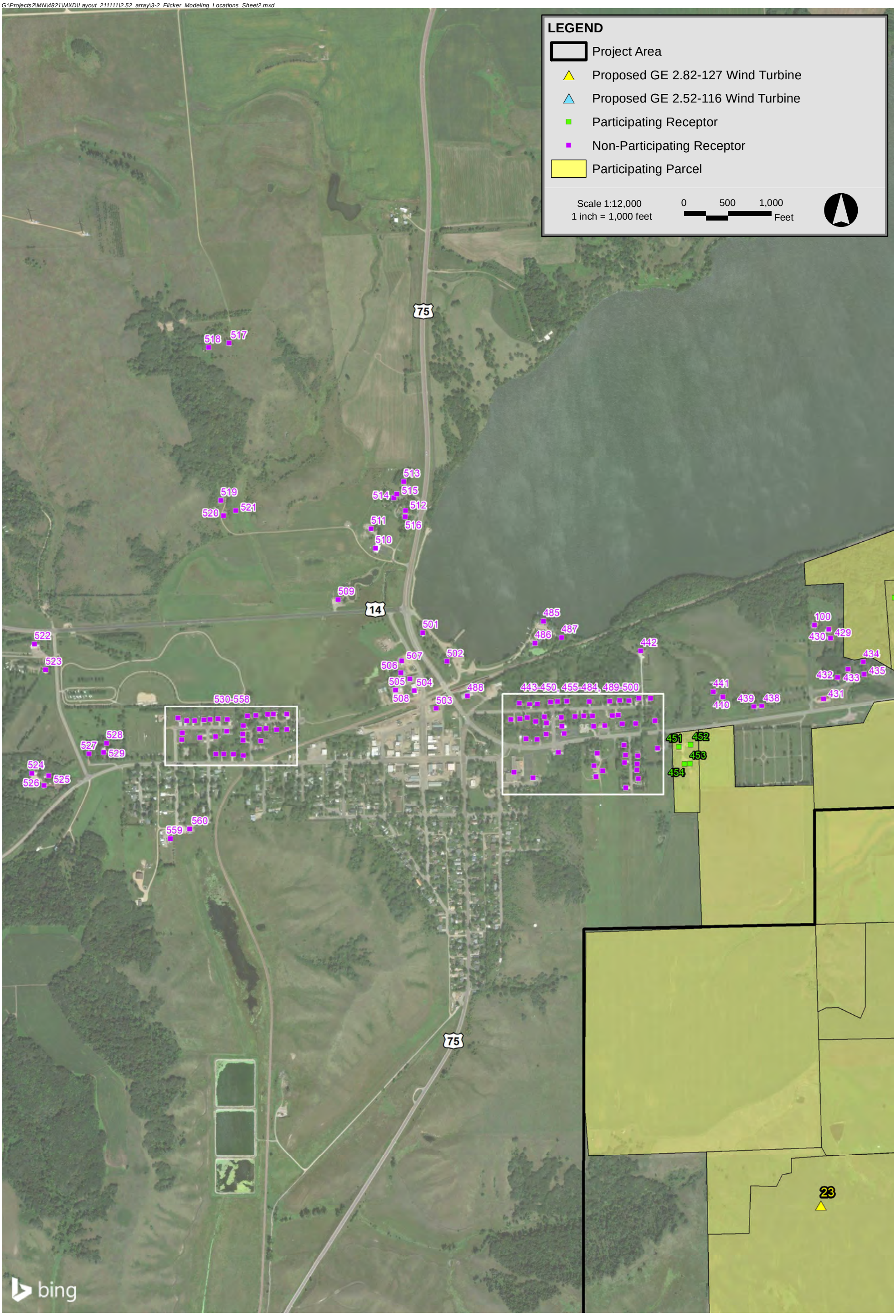

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Figure 3-2, Sheet 2 of 4
Shadow Flicker Modeling Locations

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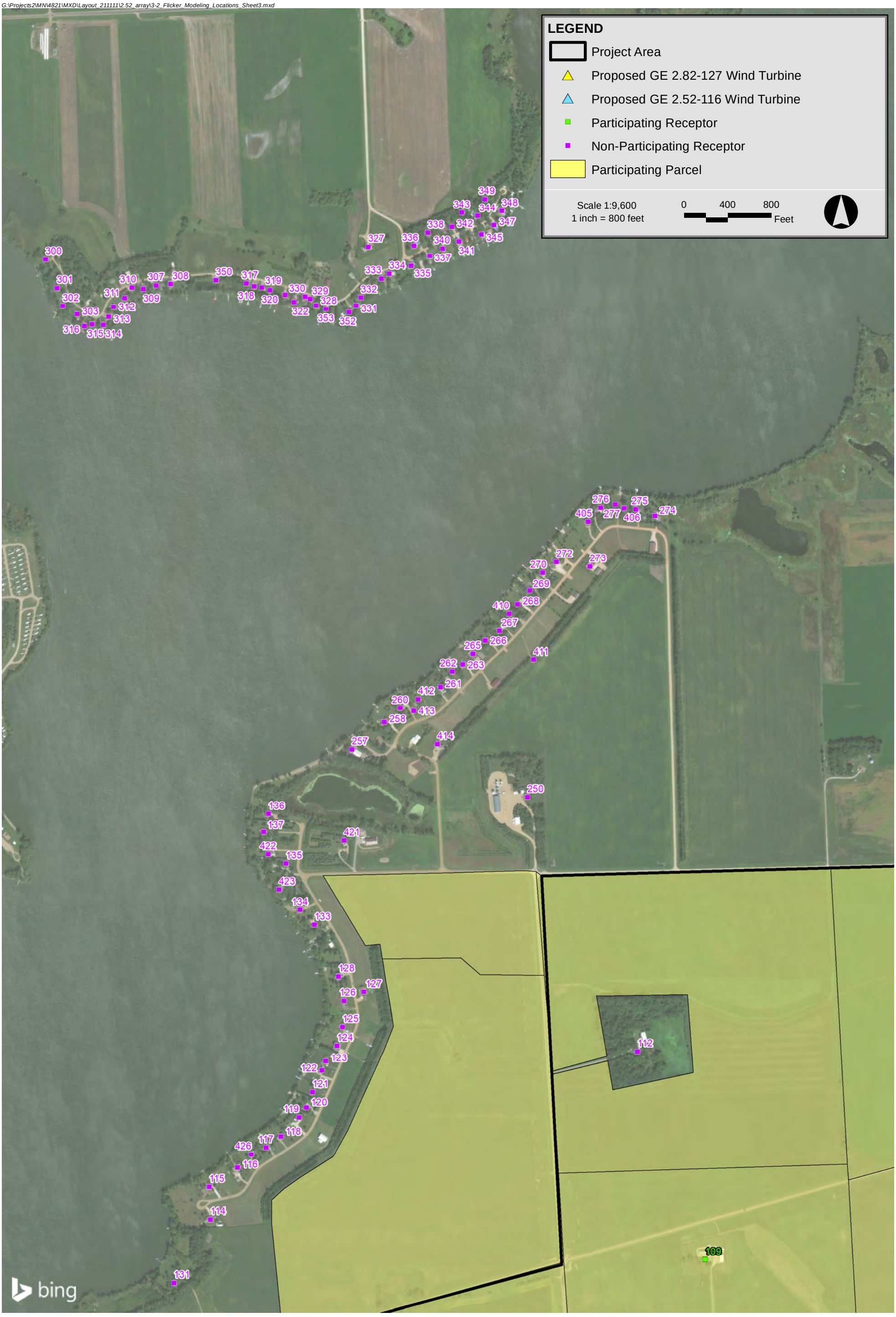

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Figure 3-2, Sheet 3 of 4
Shadow Flicker Modeling Locations

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Figure 3-2, Sheet 4 of 4
Shadow Flicker Modeling Locations

Table 3-1 Monthly Percent of Possible Sunshine

Month	Possible Sunshine
January	57%
February	57%
March	59%
April	59%
May	62%
June	70%
July	73%
August	70%
September	65%
October	60%
November	48%
December	48%

Table 3-2 Operational Hours per Wind Direction Sector

Wind Sector	Operational Hours
N	668
NNE	495
NE	401
ENE	328
E	295
ESE	263
SE	318
SSE	507
S	1,122
SSW	895
SW	495
WSW	362
W	431
WNW	587
NW	708
NNW	710
Annual	8,585

3.2 Results

Following the modeling methodology outlined in Section 3.1, WindPRO was used to calculate shadow flicker at the 411 discrete modeling receptor points in Lincoln and Pipestone Counties and generate shadow flicker isolines based on the grid calculations. Table B-1 in Appendix B presents the modeling results for the 411 modeling receptor locations. Both worst-case and expected values are presented.

The modeled worst-case annual shadow flicker duration ranged from 0 hours, 0 minutes per year to 125 hours, 12 minutes per year. The maximum flicker was at a participating receptor (#841). The maximum predicted annual flicker at a non-participating receptor (#154) is 83 hours, 15 minutes.

The predicted expected annual shadow flicker duration ranged from 0 hours, 0 minutes per year to 42 hours, 26 minutes per year. The maximum expected flicker under this model was at a participating receptor (#841). The maximum modeled expected annual flicker at a non-participating receptor (#154) is 28 hours, 56 minutes. The majority of the receptors (295) were predicted to experience no annual shadow flicker. Seventy (70) locations were predicted to experience some shadow flicker but less than 10 hours per year. The modeling results showed that 38 locations would be expected to have between 10 hours and 30 hours of shadow flicker per year. Eight (8) receptors are expected to have over 30 hours of flicker per year, none of which are non-participating receptors. Figure 3-3 displays the modeled flicker isolines (expected hrs/yr) over aerial imagery in relation to modeled wind turbines and modeling receptors.

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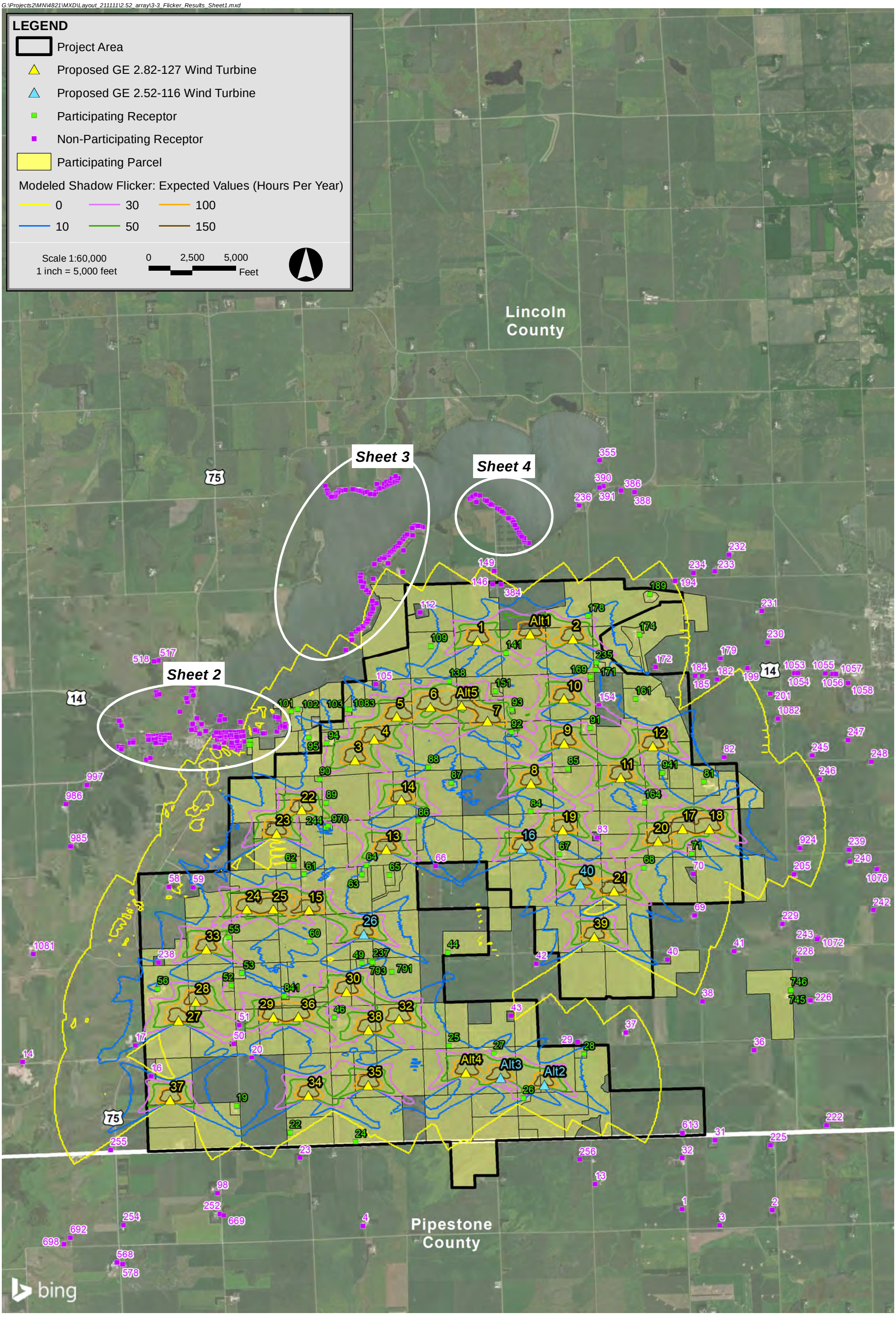

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Figure 3-3, Sheet 1 of 4

Shadow Flicker Modeling Results

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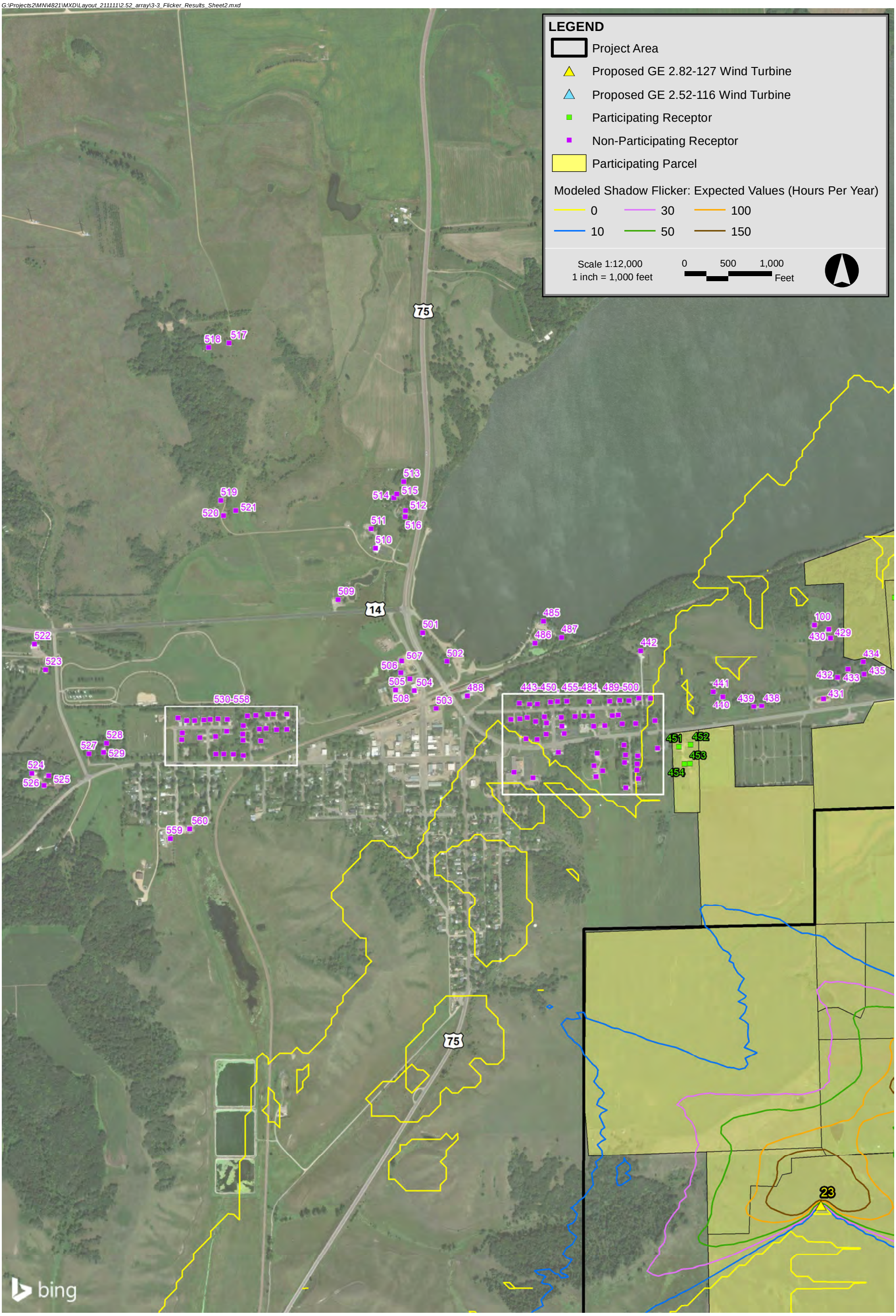

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Figure 3-3, Sheet 2 of 4
Shadow Flicker Modeling Results

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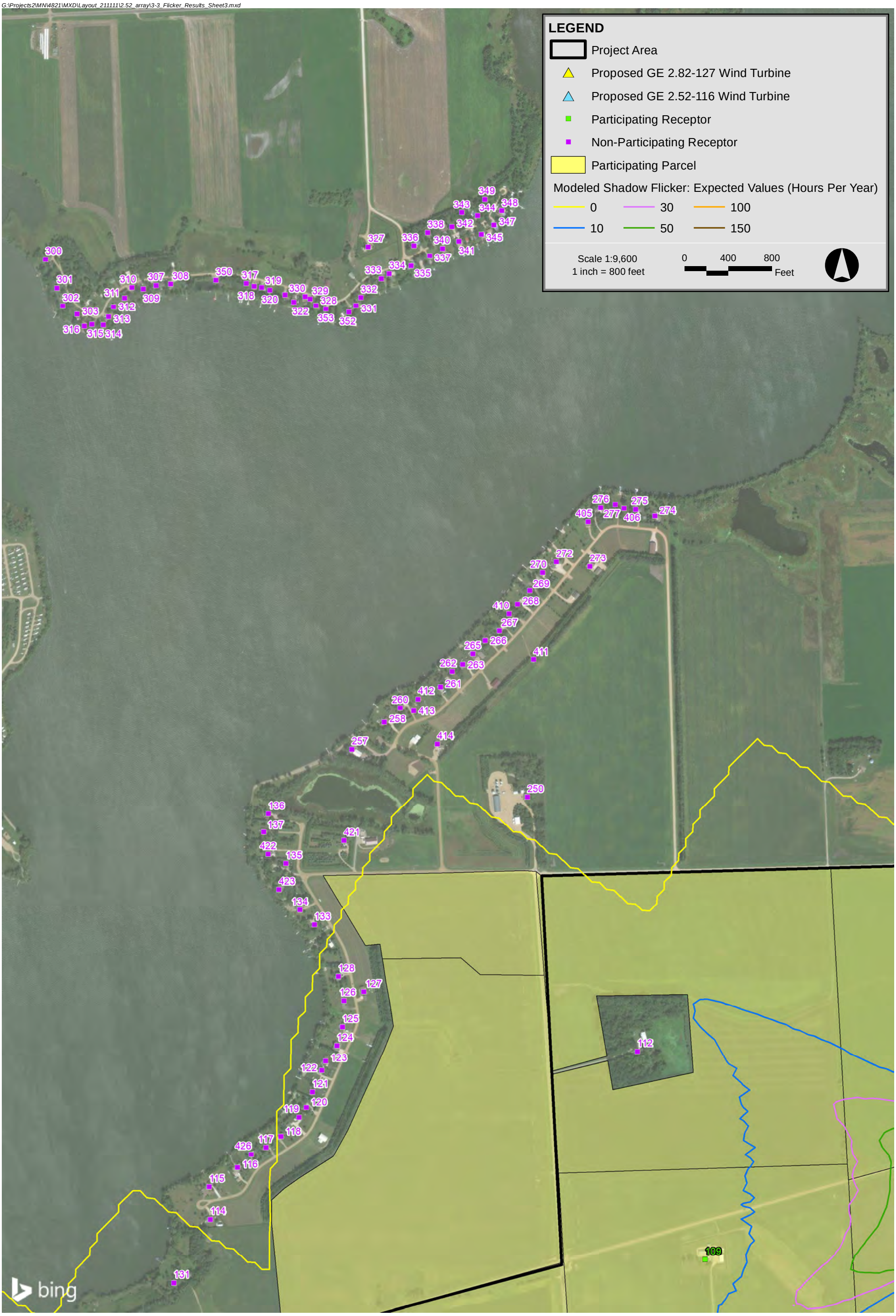

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Figure 3-3, Sheet 3 of 4
Shadow Flicker Modeling Results

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Figure 3-3, Sheet 4 of 4
Shadow Flicker Modeling Results

Appendix A
Wind Turbine Coordinates

Table A-1: Wind Turbine Coordinates

Wind Turbine ID	Wind Turbine Type	Coordinates NAD83 UTM Zone 14N (meters)	
		X (Easting)	Y (Northing)
1	GE 2.82-127	721406.00	4906251.99
2	GE 2.82-127	723068.81	4906280.54
3	GE 2.82-127	719276.01	4904165.00
4	GE 2.82-127	719607.78	4904528.06
5	GE 2.82-127	720001.99	4904925.00
6	GE 2.82-127	720586.38	4905093.01
7	GE 2.82-127	721578.11	4904844.39
8	GE 2.82-127	722336.10	4903761.76
9	GE 2.82-127	722917.01	4904458.99
10	GE 2.82-127	722912.57	4905241.90
11	GE 2.82-127	723901.99	4903863.01
12	GE 2.82-127	724459.03	4904409.00
13	GE 2.82-127	719815.48	4902612.18
14	GE 2.82-127	720083.58	4903474.82
15	GE 2.82-127	718470.81	4901555.82
16	GE 2.52-116	722181.30	4902626.59
17	GE 2.82-127	724979.00	4902967.00
18	GE 2.82-127	725447.87	4902966.52
19	GE 2.82-127	722889.99	4902949.67
20	GE 2.82-127	724552.48	4902755.78
21	GE 2.82-127	723782.99	4901893.01
22	GE 2.82-127	718342.58	4903297.99
23	GE 2.82-127	717905.87	4902889.27
24	GE 2.82-127	717390.99	4901571.99
25	GE 2.82-127	717854.00	4901572.00
26	GE 2.52-116	719429.01	4901133.01
27	GE 2.82-127	716200.02	4899628.99
28	GE 2.82-127	716498.01	4899959.00
29	GE 2.82-127	717852.51	4899685.55
30	GE 2.82-127	719125.98	4900137.01
32	GE 2.82-127	720043.23	4899657.22
33	GE 2.82-127	716683.88	4900875.46
34	GE 2.82-127	718459.00	4898325.01
35	GE 2.82-127	719504.00	4898501.00
36	GE 2.82-127	718287.02	4899699.07
37	GE 2.82-127	716056.00	4898247.98
38	GE 2.82-127	719510.26	4899469.54
39	GE 2.82-127	723440.22	4901087.93
40	GE 2.52-116	723195.00	4902010.02
Alt1	GE 2.82-127	722320.99	4906361.01
Alt2	GE 2.52-116	722571.00	4898509.00
Alt3	GE 2.52-116	721808.01	4898632.01
Alt4	GE 2.82-127	721204.99	4898720.00
Alt5	GE 2.82-127	721128.13	4905117.04

Appendix B

Shadow Flicker Modeling Results: Modeling Receptors

Table B-1: Shadow Flicker Modeling Results

Receptor ID	Participation Status	Coordinates NAD83 UTM Zone 14N (meters)		Worst-Case Shadow Flicker - Annual	Worst-Case Shadow Flicker Days - Annual	Worst-Case Shadow Flicker - Daily	Expected Shadow Flicker - Annual
		X (Easting)	Y (Northing)	(HH:MM/year)	(Days/year)	(HH:MM/day)	(HH:MM/year)
1	Non-Participating	724967.32	4896341.13	0:00	0	0:00	0:00
2	Non-Participating	726537.89	4896321.29	0:00	0	0:00	0:00
3	Non-Participating	725625.32	4896059.58	0:00	0	0:00	0:00
4	Non-Participating	719410.70	4896051.41	0:00	0	0:00	0:00
13	Non-Participating	723456.49	4896774.78	0:00	0	0:00	0:00
14	Non-Participating	713480.83	4898900.44	0:00	0	0:00	0:00
16	Non-Participating	715723.31	4898648.13	56:26	71	0:58	19:38
17	Non-Participating	715447.24	4899194.95	27:51	60	0:35	10:48
19	Participating	717211.44	4898135.31	14:42	33	0:41	4:59
20	Non-Participating	717476.52	4898978.04	30:33	151	0:25	10:56
22	Participating	718141.05	4897676.55	8:20	52	0:14	3:15
23	Non-Participating	718315.29	4897230.65	0:00	0	0:00	0:00
24	Participating	719282.97	4897515.15	0:00	0	0:00	0:00
25	Participating	720904.17	4899187.90	36:05	153	0:27	13:10
26	Participating	722203.20	4898274.38	51:17	78	1:05	20:55
27	Participating	721690.13	4899054.22	78:39	123	1:13	24:21
28	Participating	723264.12	4899043.61	34:39	97	0:33	10:27
29	Non-Participating	723148.39	4899253.41	5:42	27	0:19	1:48
31	Non-Participating	725540.63	4897544.85	0:00	0	0:00	0:00
32	Non-Participating	724971.27	4897228.10	0:00	0	0:00	0:00
36	Non-Participating	726225.39	4899113.03	0:00	0	0:00	0:00
37	Non-Participating	723990.20	4899418.91	5:43	30	0:17	1:39
38	Non-Participating	725325.11	4899964.56	0:00	0	0:00	0:00
40	Non-Participating	724716.86	4900688.30	8:16	37	0:20	3:11
41	Non-Participating	725875.26	4900834.50	0:00	0	0:00	0:00
42	Non-Participating	722427.30	4900617.84	13:55	55	0:23	5:08
43	Non-Participating	721991.20	4899704.37	1:51	17	0:10	0:37
44	Participating	720889.44	4900807.13	5:55	41	0:16	2:04
46	Participating	718911.99	4899677.74	86:29	149	0:47	29:56
49	Participating	719388.68	4900626.02	12:10	67	0:16	3:33
50	Non-Participating	717161.40	4899221.14	65:53	159	0:39	24:48
51	Non-Participating	717258.54	4899542.38	80:58	151	0:58	28:53
52	Participating	717119.07	4900238.72	85:00	161	0:44	27:16
53	Participating	717301.27	4900451.69	39:30	120	0:30	12:08
55	Participating	717076.39	4901073.99	96:02	170	1:07	31:37
56	Participating	715837.07	4900177.49	30:34	57	0:43	10:33
58	Non-Participating	716032.82	4901955.98	7:28	28	0:21	2:31
59	Non-Participating	716453.80	4901946.72	21:45	89	0:30	7:33
60	Participating	718480.21	4901000.12	25:49	109	0:29	9:40
61	Participating	718385.88	4902176.53	27:29	101	0:29	8:17
62	Participating	718203.16	4902322.57	18:46	64	0:27	5:37
63	Participating	719389.44	4902171.45	30:59	136	0:28	10:44
64	Participating	719470.78	4902334.95	26:22	124	0:24	8:21
65	Participating	719873.61	4902159.54	4:44	25	0:18	1:30
66	Non-Participating	720678.38	4902318.70	28:17	90	0:34	11:05
67	Participating	722830.76	4902522.74	55:25	157	0:42	19:19
68	Participating	724305.46	4902285.98	93:50	209	0:47	30:58
69	Non-Participating	725187.55	4901454.70	8:44	50	0:18	3:09
70	Non-Participating	725160.81	4902178.69	6:03	37	0:18	1:53
71	Participating	725137.82	4902529.85	73:46	134	0:50	29:52
81	Participating	725352.22	4903786.97	4:20	24	0:16	1:28
82	Non-Participating	725699.53	4904212.19	9:32	48	0:21	3:18
83	Non-Participating	723492.59	4902812.41	74:36	152	0:49	26:59
84	Participating	722333.43	4903262.08	50:08	106	0:48	16:56
85	Participating	722982.06	4904008.09	48:28	97	1:00	15:46
86	Participating	720375.68	4903106.67	55:27	101	0:42	16:43
87	Participating	720951.07	4903766.63	25:42	119	0:32	8:37
88	Participating	720550.53	4904032.74	46:22	148	0:36	16:22
89	Participating	718770.32	4903420.97	101:26	174	1:05	32:21

Table B-1: Shadow Flicker Modeling Results

Receptor ID	Participation Status	Coordinates NAD83 UTM Zone 14N (meters)		Worst-Case Shadow Flicker - Annual	Worst-Case Shadow Flicker Days - Annual	Worst-Case Shadow Flicker - Daily	Expected Shadow Flicker - Annual
		X (Easting)	Y (Northing)	(HH:MM/year)	(Days/year)	(HH:MM/day)	(HH:MM/year)
90	Participating	718659.29	4903828.29	55:45	126	0:45	20:45
91	Participating	723368.88	4904718.11	77:40	133	1:11	24:17
92	Participating	721996.88	4904643.52	86:02	145	1:16	34:56
93	Participating	722006.38	4905029.65	123:44	238	1:03	40:56
94	Participating	718774.53	4904450.55	90:47	210	0:52	30:51
95	Participating	718467.45	4904553.41	40:22	162	0:34	13:38
98	Non-Participating	716874.05	4896617.04	0:00	0	0:00	0:00
100	Non-Participating	717883.25	4904909.85	6:28	46	0:16	2:06
101	Participating	718162.37	4905006.41	23:15	94	0:23	7:43
102	Participating	718274.26	4905044.01	10:47	65	0:18	3:37
103	Participating	719140.84	4905043.74	40:49	105	0:35	13:55
105	Non-Participating	719636.02	4905481.91	17:59	81	0:28	6:09
109	Participating	720594.55	4906146.96	20:24	49	0:36	6:47
112	Non-Participating	720406.24	4906727.10	13:30	58	0:27	4:26
114	Non-Participating	719215.91	4906259.09	0:00	0	0:00	0:00
115	Non-Participating	719213.16	4906349.80	0:00	0	0:00	0:00
116	Non-Participating	719291.50	4906403.40	0:00	0	0:00	0:00
117	Non-Participating	719371.22	4906459.76	0:00	0	0:00	0:00
118	Non-Participating	719412.46	4906490.00	1:20	14	0:08	0:26
119	Non-Participating	719463.31	4906543.60	1:34	16	0:09	0:30
120	Non-Participating	719483.93	4906571.09	1:30	14	0:09	0:29
121	Non-Participating	719500.42	4906613.70	1:38	16	0:09	0:32
122	Non-Participating	719526.54	4906674.17	1:43	16	0:10	0:34
123	Non-Participating	719537.53	4906700.29	1:45	16	0:10	0:34
124	Non-Participating	719569.14	4906742.89	1:49	17	0:10	0:36
125	Non-Participating	719584.26	4906795.12	1:55	17	0:10	0:38
126	Non-Participating	719588.39	4906869.34	1:57	17	0:10	0:40
127	Non-Participating	719643.36	4906894.08	2:08	18	0:11	0:44
128	Non-Participating	719573.27	4906936.69	1:53	18	0:10	0:38
131	Non-Participating	719114.20	4906081.78	7:33	57	0:14	2:27
133	Non-Participating	719506.22	4907080.47	0:00	0	0:00	0:00
134	Non-Participating	719465.69	4907121.78	0:00	0	0:00	0:00
135	Non-Participating	719426.72	4907251.15	0:00	0	0:00	0:00
136	Non-Participating	719377.63	4907389.09	0:00	0	0:00	0:00
137	Non-Participating	719365.16	4907339.21	0:00	0	0:00	0:00
138	Participating	720913.33	4905533.52	81:46	152	1:16	25:58
141	Participating	721904.81	4906033.39	95:43	189	0:58	37:19
146	Non-Participating	721666.16	4907223.36	7:33	57	0:14	2:27
149	Non-Participating	721695.97	4907454.30	0:00	0	0:00	0:00
151	Participating	721719.87	4905358.34	63:08	131	1:02	20:24
154	Non-Participating	723523.13	4905122.61	83:15	150	0:49	28:56
161	Participating	724163.66	4905228.63	13:10	63	0:21	4:09
164	Participating	724320.81	4903427.17	57:02	144	0:39	18:47
169	Participating	723372.30	4905615.79	78:10	119	0:52	23:31
171	Participating	723461.82	4905731.71	59:55	127	0:43	18:48
172	Non-Participating	724504.21	4905783.38	9:15	54	0:17	3:23
174	Participating	724225.15	4906343.92	17:49	75	0:26	5:36
178	Participating	723334.67	4906665.95	74:31	109	1:04	23:26
179	Non-Participating	725634.47	4905935.88	0:00	0	0:00	0:00
182	Non-Participating	725579.11	4905569.15	0:00	0	0:00	0:00
184	Non-Participating	725196.23	4905627.67	0:00	0	0:00	0:00
185	Non-Participating	725317.77	4905632.44	0:00	0	0:00	0:00
189	Participating	724410.32	4907052.07	4:43	27	0:16	1:22
194	Non-Participating	724847.86	4907280.34	0:00	0	0:00	0:00
199	Non-Participating	726107.97	4905764.29	0:00	0	0:00	0:00
201	Non-Participating	726503.06	4905320.15	0:00	0	0:00	0:00
205	Non-Participating	726919.36	4902176.15	4:46	40	0:10	2:05
218	Non-Participating	722296.75	4907945.00	0:00	0	0:00	0:00
219	Non-Participating	722230.87	4907970.76	0:00	0	0:00	0:00

Table B-1: Shadow Flicker Modeling Results

Receptor ID	Participation Status	Coordinates NAD83 UTM Zone 14N (meters)		Worst-Case Shadow Flicker - Annual	Worst-Case Shadow Flicker Days - Annual	Worst-Case Shadow Flicker - Daily	Expected Shadow Flicker - Annual
		X (Easting)	Y (Northing)	(HH:MM/year)	(Days/year)	(HH:MM/day)	(HH:MM/year)
220	Non-Participating	722220.68	4907997.11	0:00	0	0:00	0:00
222	Non-Participating	727482.24	4897801.59	0:00	0	0:00	0:00
225	Non-Participating	726508.78	4897454.26	0:00	0	0:00	0:00
226	Non-Participating	727202.86	4899979.73	0:00	0	0:00	0:00
228	Non-Participating	726976.25	4900694.01	0:00	0	0:00	0:00
229	Non-Participating	726718.52	4901305.38	0:00	0	0:00	0:00
230	Non-Participating	726456.05	4906213.42	0:00	0	0:00	0:00
231	Non-Participating	726354.15	4906752.29	0:00	0	0:00	0:00
232	Non-Participating	725787.65	4907743.68	0:00	0	0:00	0:00
233	Non-Participating	725536.82	4907446.28	0:00	0	0:00	0:00
234	Non-Participating	725169.65	4907420.70	0:00	0	0:00	0:00
235	Participating	723475.42	4905860.10	43:25	129	0:34	15:37
236	Non-Participating	723175.31	4908595.11	0:00	0	0:00	0:00
237	Participating	719557.26	4900666.24	26:18	114	0:32	8:22
238	Non-Participating	715848.85	4900637.11	31:43	103	0:35	11:17
239	Non-Participating	727874.48	4902603.59	0:00	0	0:00	0:00
240	Non-Participating	727888.73	4902392.04	0:00	0	0:00	0:00
242	Non-Participating	728301.58	4901544.64	0:00	0	0:00	0:00
243	Non-Participating	727336.17	4901068.97	0:00	0	0:00	0:00
244	Participating	718764.15	4902985.61	29:32	102	0:34	9:56
245	Non-Participating	727235.63	4904241.24	0:00	0	0:00	0:00
246	Non-Participating	727363.29	4903829.96	0:00	0	0:00	0:00
247	Non-Participating	727860.69	4904504.97	0:00	0	0:00	0:00
248	Non-Participating	728267.58	4904129.52	0:00	0	0:00	0:00
250	Non-Participating	720099.79	4907436.08	0:00	0	0:00	0:00
252	Non-Participating	716921.70	4896257.62	0:00	0	0:00	0:00
254	Non-Participating	715238.72	4896061.92	0:00	0	0:00	0:00
255	Non-Participating	715015.61	4897377.20	0:00	0	0:00	0:00
256	Non-Participating	723187.80	4897202.59	0:00	0	0:00	0:00
257	Non-Participating	719610.00	4907569.00	0:00	0	0:00	0:00
258	Non-Participating	719700.93	4907644.54	0:00	0	0:00	0:00
260	Non-Participating	719745.33	4907684.29	0:00	0	0:00	0:00
261	Non-Participating	719857.46	4907742.57	0:00	0	0:00	0:00
262	Non-Participating	719890.34	4907786.12	0:00	0	0:00	0:00
263	Non-Participating	719919.46	4907805.15	0:00	0	0:00	0:00
265	Non-Participating	719947.43	4907836.01	0:00	0	0:00	0:00
266	Non-Participating	719982.04	4907873.21	0:00	0	0:00	0:00
267	Non-Participating	720021.83	4907900.02	0:00	0	0:00	0:00
268	Non-Participating	720072.19	4907973.95	0:00	0	0:00	0:00
269	Non-Participating	720106.25	4908011.80	0:00	0	0:00	0:00
270	Non-Participating	720141.70	4908061.35	0:00	0	0:00	0:00
272	Non-Participating	720179.89	4908091.98	0:00	0	0:00	0:00
273	Non-Participating	720273.48	4908078.90	0:00	0	0:00	0:00
274	Non-Participating	720454.78	4908220.05	0:00	0	0:00	0:00
275	Non-Participating	720401.45	4908238.23	0:00	0	0:00	0:00
276	Non-Participating	720304.09	4908243.08	0:00	0	0:00	0:00
277	Non-Participating	720344.49	4908251.56	0:00	0	0:00	0:00
278	Non-Participating	721275.07	4908713.80	0:00	0	0:00	0:00
279	Non-Participating	721305.81	4908733.71	0:00	0	0:00	0:00
280	Non-Participating	721324.42	4908753.63	0:00	0	0:00	0:00
281	Non-Participating	721387.20	4908657.52	0:00	0	0:00	0:00
282	Non-Participating	721377.24	4908782.63	0:00	0	0:00	0:00
283	Non-Participating	721448.68	4908770.08	0:00	0	0:00	0:00
284	Non-Participating	721538.73	4908695.61	0:00	0	0:00	0:00
285	Non-Participating	721612.76	4908638.90	0:00	0	0:00	0:00
286	Non-Participating	721664.28	4908602.97	0:00	0	0:00	0:00
287	Non-Participating	721637.87	4908618.55	0:00	0	0:00	0:00
288	Non-Participating	721751.99	4908548.40	0:00	0	0:00	0:00
289	Non-Participating	721794.46	4908525.50	0:00	0	0:00	0:00

Table B-1: Shadow Flicker Modeling Results

Receptor ID	Participation Status	Coordinates NAD83 UTM Zone 14N (meters)		Worst-Case Shadow Flicker - Annual	Worst-Case Shadow Flicker Days - Annual	Worst-Case Shadow Flicker - Daily	Expected Shadow Flicker - Annual
		X (Easting)	Y (Northing)	(HH:MM/year)	(Days/year)	(HH:MM/day)	(HH:MM/year)
290	Non-Participating	721861.07	4908467.22	0:00	0	0:00	0:00
291	Non-Participating	721835.68	4908492.61	0:00	0	0:00	0:00
292	Non-Participating	721978.07	4908374.37	0:00	0	0:00	0:00
293	Non-Participating	721992.22	4908358.55	0:00	0	0:00	0:00
294	Non-Participating	722024.70	4908323.58	0:00	0	0:00	0:00
295	Non-Participating	722011.37	4908342.31	0:00	0	0:00	0:00
296	Non-Participating	722035.11	4908307.34	0:00	0	0:00	0:00
297	Non-Participating	722089.60	4908201.94	0:00	0	0:00	0:00
298	Non-Participating	722127.86	4908126.15	0:00	0	0:00	0:00
299	Non-Participating	722153.60	4908089.69	0:00	0	0:00	0:00
300	Non-Participating	718757.08	4908934.79	0:00	0	0:00	0:00
301	Non-Participating	718789.00	4908855.07	0:00	0	0:00	0:00
302	Non-Participating	718804.77	4908805.37	0:00	0	0:00	0:00
303	Non-Participating	718844.90	4908782.13	0:00	0	0:00	0:00
307	Non-Participating	719064.83	4908862.39	0:00	0	0:00	0:00
308	Non-Participating	719105.42	4908866.46	0:00	0	0:00	0:00
309	Non-Participating	719028.86	4908852.24	0:00	0	0:00	0:00
310	Non-Participating	718997.87	4908856.18	0:00	0	0:00	0:00
311	Non-Participating	718976.83	4908827.32	0:00	0	0:00	0:00
312	Non-Participating	718946.52	4908802.66	0:00	0	0:00	0:00
313	Non-Participating	718932.81	4908775.31	0:00	0	0:00	0:00
314	Non-Participating	718917.79	4908752.12	0:00	0	0:00	0:00
315	Non-Participating	718886.39	4908753.91	0:00	0	0:00	0:00
316	Non-Participating	718864.96	4908748.89	0:00	0	0:00	0:00
317	Non-Participating	719315.87	4908867.66	0:00	0	0:00	0:00
318	Non-Participating	719338.08	4908860.01	0:00	0	0:00	0:00
319	Non-Participating	719358.98	4908856.51	0:00	0	0:00	0:00
320	Non-Participating	719382.24	4908848.92	0:00	0	0:00	0:00
321	Non-Participating	719423.86	4908836.08	0:00	0	0:00	0:00
322	Non-Participating	719448.43	4908815.84	0:00	0	0:00	0:00
327	Non-Participating	719655.92	4908969.59	0:00	0	0:00	0:00
328	Non-Participating	719510.56	4908805.86	0:00	0	0:00	0:00
329	Non-Participating	719494.17	4908824.72	0:00	0	0:00	0:00
330	Non-Participating	719480.38	4908831.06	0:00	0	0:00	0:00
331	Non-Participating	719621.89	4908806.30	0:00	0	0:00	0:00
332	Non-Participating	719635.36	4908828.68	0:00	0	0:00	0:00
333	Non-Participating	719692.62	4908881.15	0:00	0	0:00	0:00
334	Non-Participating	719714.06	4908894.66	0:00	0	0:00	0:00
335	Non-Participating	719775.28	4908916.96	0:00	0	0:00	0:00
336	Non-Participating	719783.54	4908972.62	0:00	0	0:00	0:00
337	Non-Participating	719827.18	4908944.00	0:00	0	0:00	0:00
338	Non-Participating	719821.62	4909008.89	0:00	0	0:00	0:00
340	Non-Participating	719863.03	4908964.75	0:00	0	0:00	0:00
341	Non-Participating	719908.49	4908984.50	0:00	0	0:00	0:00
342	Non-Participating	719889.00	4909025.73	0:00	0	0:00	0:00
343	Non-Participating	719916.82	4909065.08	0:00	0	0:00	0:00
344	Non-Participating	719960.33	4909056.08	0:00	0	0:00	0:00
345	Non-Participating	719970.89	4909004.75	0:00	0	0:00	0:00
347	Non-Participating	720006.42	4909030.79	0:00	0	0:00	0:00
348	Non-Participating	720028.40	4909070.31	0:00	0	0:00	0:00
349	Non-Participating	719981.33	4909102.97	0:00	0	0:00	0:00
350	Non-Participating	719231.68	4908876.50	0:00	0	0:00	0:00
352	Non-Participating	719602.30	4908788.46	0:00	0	0:00	0:00
353	Non-Participating	719538.13	4908797.13	0:00	0	0:00	0:00
355	Non-Participating	723529.44	4909379.33	0:00	0	0:00	0:00
384	Non-Participating	721820.17	4907219.46	9:43	40	0:17	3:08
386	Non-Participating	723908.08	4908855.30	0:00	0	0:00	0:00
388	Non-Participating	724139.90	4908828.11	0:00	0	0:00	0:00
390	Non-Participating	723596.89	4908931.73	0:00	0	0:00	0:00

Table B-1: Shadow Flicker Modeling Results

Receptor ID	Participation Status	Coordinates NAD83 UTM Zone 14N (meters)		Worst-Case Shadow Flicker - Annual	Worst-Case Shadow Flicker Days - Annual	Worst-Case Shadow Flicker - Daily	Expected Shadow Flicker - Annual
		X (Easting)	Y (Northing)	(HH:MM/year)	(Days/year)	(HH:MM/day)	(HH:MM/year)
391	Non-Participating	723532.73	4908905.53	0:00	0	0:00	0:00
393	Non-Participating	722215.45	4908035.25	0:00	0	0:00	0:00
394	Non-Participating	722177.41	4908058.91	0:00	0	0:00	0:00
395	Non-Participating	722056.64	4908256.22	0:00	0	0:00	0:00
396	Non-Participating	721948.07	4908375.27	0:00	0	0:00	0:00
400	Non-Participating	721565.91	4908675.92	0:00	0	0:00	0:00
405	Non-Participating	720268.50	4908203.65	0:00	0	0:00	0:00
406	Non-Participating	720369.09	4908241.09	0:00	0	0:00	0:00
410	Non-Participating	720048.78	4907946.28	0:00	0	0:00	0:00
411	Non-Participating	720116.92	4907819.45	0:00	0	0:00	0:00
412	Non-Participating	719794.95	4907709.10	0:00	0	0:00	0:00
413	Non-Participating	719782.62	4907676.53	0:00	0	0:00	0:00
414	Non-Participating	719848.76	4907583.53	0:00	0	0:00	0:00
421	Non-Participating	719588.35	4907315.19	0:00	0	0:00	0:00
422	Non-Participating	719376.99	4907276.82	0:00	0	0:00	0:00
423	Non-Participating	719406.83	4907178.95	0:00	0	0:00	0:00
426	Non-Participating	719330.01	4906440.32	0:00	0	0:00	0:00
429	Non-Participating	717938.68	4904865.30	7:50	49	0:17	2:33
430	Non-Participating	717932.82	4904896.09	7:36	49	0:17	2:29
431	Non-Participating	717915.15	4904653.73	7:07	44	0:18	2:26
432	Non-Participating	717963.00	4904727.58	8:30	48	0:19	2:50
433	Non-Participating	718000.35	4904756.38	10:16	64	0:20	3:21
434	Non-Participating	718053.13	4904782.14	12:13	70	0:21	3:59
435	Non-Participating	718055.75	4904739.22	11:56	69	0:21	3:54
438	Non-Participating	717699.27	4904628.61	3:52	32	0:13	1:18
439	Non-Participating	717671.57	4904626.25	3:28	32	0:12	1:10
440	Non-Participating	717564.02	4904661.44	2:27	19	0:12	0:49
441	Non-Participating	717530.49	4904678.61	2:14	18	0:11	0:45
442	Non-Participating	717277.82	4904821.59	0:00	0	0:00	0:00
443	Non-Participating	717311.81	4904655.97	0:00	0	0:00	0:00
444	Non-Participating	717272.02	4904656.19	0:00	0	0:00	0:00
445	Non-Participating	717237.39	4904648.11	0:00	0	0:00	0:00
446	Non-Participating	717204.21	4904648.73	0:00	0	0:00	0:00
447	Non-Participating	717169.91	4904645.97	0:00	0	0:00	0:00
448	Non-Participating	717099.04	4904644.95	0:00	0	0:00	0:00
449	Non-Participating	717327.26	4904576.71	1:22	16	0:08	0:27
450	Non-Participating	717260.30	4904565.99	0:00	0	0:00	0:00
451	Participating	717411.00	4904486.37	1:42	16	0:09	0:33
452	Participating	717451.66	4904493.50	1:53	16	0:10	0:37
453	Participating	717449.05	4904427.71	1:49	16	0:10	0:35
454	Participating	717429.94	4904425.88	1:44	16	0:10	0:34
455	Non-Participating	717336.41	4904481.15	1:22	15	0:08	0:26
456	Non-Participating	717225.45	4904344.45	0:00	0	0:00	0:00
457	Non-Participating	717269.99	4904375.01	0:00	0	0:00	0:00
458	Non-Participating	717222.15	4904431.08	0:00	0	0:00	0:00
459	Non-Participating	717267.74	4904455.08	0:00	0	0:00	0:00
460	Non-Participating	717265.56	4904425.78	0:00	0	0:00	0:00
461	Non-Participating	717264.21	4904404.49	0:00	0	0:00	0:00
462	Non-Participating	717224.49	4904457.74	0:00	0	0:00	0:00
463	Non-Participating	717219.75	4904491.92	0:00	0	0:00	0:00
464	Non-Participating	717121.71	4904382.52	0:00	0	0:00	0:00
465	Non-Participating	717145.67	4904402.55	0:00	0	0:00	0:00
466	Non-Participating	717115.41	4904420.58	0:00	0	0:00	0:00
467	Non-Participating	717126.03	4904463.65	0:00	0	0:00	0:00
468	Non-Participating	717011.84	4904531.58	0:00	0	0:00	0:00
469	Non-Participating	717114.32	4904557.73	0:00	0	0:00	0:00
470	Non-Participating	717152.66	4904559.41	0:00	0	0:00	0:00
471	Non-Participating	717179.04	4904594.16	0:00	0	0:00	0:00
472	Non-Participating	717199.47	4904596.07	0:00	0	0:00	0:00

Table B-1: Shadow Flicker Modeling Results

Receptor ID	Participation Status	Coordinates NAD83 UTM Zone 14N (meters)		Worst-Case Shadow Flicker - Annual	Worst-Case Shadow Flicker Days - Annual	Worst-Case Shadow Flicker - Daily	Expected Shadow Flicker - Annual
		X (Easting)	Y (Northing)	(HH:MM/year)	(Days/year)	(HH:MM/day)	(HH:MM/year)
473	Non-Participating	717213.29	4904565.10	0:00	0	0:00	0:00
474	Non-Participating	717110.15	4904593.27	0:00	0	0:00	0:00
475	Non-Participating	717079.66	4904593.39	0:00	0	0:00	0:00
476	Non-Participating	717049.32	4904590.87	0:00	0	0:00	0:00
477	Non-Participating	717003.01	4904556.89	0:00	0	0:00	0:00
478	Non-Participating	717001.77	4904587.97	0:00	0	0:00	0:00
479	Non-Participating	717020.75	4904646.13	0:00	0	0:00	0:00
480	Non-Participating	716988.35	4904644.82	0:00	0	0:00	0:00
481	Non-Participating	716963.30	4904642.62	0:00	0	0:00	0:00
482	Non-Participating	716991.24	4904467.35	0:00	0	0:00	0:00
483	Non-Participating	716903.21	4904378.45	11:17	45	0:18	3:39
484	Non-Participating	716837.08	4904397.61	11:19	49	0:17	3:40
485	Non-Participating	716939.50	4904923.55	0:00	0	0:00	0:00
486	Non-Participating	716909.64	4904848.14	0:00	0	0:00	0:00
487	Non-Participating	717001.95	4904867.04	0:00	0	0:00	0:00
488	Non-Participating	716674.31	4904664.07	0:00	0	0:00	0:00
489	Non-Participating	716825.86	4904581.19	0:00	0	0:00	0:00
490	Non-Participating	716856.90	4904583.09	0:00	0	0:00	0:00
491	Non-Participating	716882.54	4904586.65	0:00	0	0:00	0:00
492	Non-Participating	716878.39	4904513.48	0:00	0	0:00	0:00
493	Non-Participating	716916.94	4904511.86	0:00	0	0:00	0:00
494	Non-Participating	716948.95	4904530.39	0:00	0	0:00	0:00
495	Non-Participating	716949.29	4904568.19	0:00	0	0:00	0:00
496	Non-Participating	716942.67	4904589.66	0:00	0	0:00	0:00
497	Non-Participating	716911.86	4904573.19	0:00	0	0:00	0:00
498	Non-Participating	716917.97	4904635.88	0:00	0	0:00	0:00
499	Non-Participating	716890.24	4904634.18	0:00	0	0:00	0:00
500	Non-Participating	716854.83	4904638.65	0:00	0	0:00	0:00
501	Non-Participating	716518.40	4904883.23	0:00	0	0:00	0:00
502	Non-Participating	716602.70	4904783.65	0:00	0	0:00	0:00
503	Non-Participating	716565.00	4904619.61	0:00	0	0:00	0:00
504	Non-Participating	716489.56	4904682.61	0:00	0	0:00	0:00
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507	Non-Participating	716445.50	4904785.31	0:00	0	0:00	0:00
508	Non-Participating	716424.48	4904684.60	0:00	0	0:00	0:00
509	Non-Participating	716223.64	4904999.11	0:00	0	0:00	0:00
510	Non-Participating	716354.23	4905179.04	0:00	0	0:00	0:00
511	Non-Participating	716338.97	4905246.51	0:00	0	0:00	0:00
512	Non-Participating	716459.20	4905309.54	0:00	0	0:00	0:00
513	Non-Participating	716453.10	4905409.39	0:00	0	0:00	0:00
514	Non-Participating	716418.30	4905353.97	0:00	0	0:00	0:00
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518	Non-Participating	715773.02	4905877.69	0:00	0	0:00	0:00
519	Non-Participating	715815.13	4905344.94	0:00	0	0:00	0:00
520	Non-Participating	715824.71	4905292.24	0:00	0	0:00	0:00
521	Non-Participating	715867.43	4905309.16	0:00	0	0:00	0:00
522	Non-Participating	715166.41	4904844.74	0:00	0	0:00	0:00
523	Non-Participating	715205.36	4904754.06	0:00	0	0:00	0:00
524	Non-Participating	715157.37	4904393.98	0:00	0	0:00	0:00
525	Non-Participating	715215.94	4904385.63	0:00	0	0:00	0:00
526	Non-Participating	715199.70	4904352.03	0:00	0	0:00	0:00
527	Non-Participating	715356.05	4904461.80	0:00	0	0:00	0:00
528	Non-Participating	715417.46	4904498.17	0:00	0	0:00	0:00
529	Non-Participating	715407.47	4904466.54	0:00	0	0:00	0:00
530	Non-Participating	715666.65	4904585.78	0:00	0	0:00	0:00
531	Non-Participating	715696.65	4904576.48	0:00	0	0:00	0:00

Table B-1: Shadow Flicker Modeling Results

Receptor ID	Participation Status	Coordinates NAD83 UTM Zone 14N (meters)		Worst-Case Shadow Flicker - Annual	Worst-Case Shadow Flicker Days - Annual	Worst-Case Shadow Flicker - Daily	Expected Shadow Flicker - Annual
		X (Easting)	Y (Northing)	(HH:MM/year)	(Days/year)	(HH:MM/day)	(HH:MM/year)
532	Non-Participating	715724.48	4904576.59	0:00	0	0:00	0:00
533	Non-Participating	715756.97	4904578.58	0:00	0	0:00	0:00
534	Non-Participating	715778.32	4904580.68	0:00	0	0:00	0:00
535	Non-Participating	715805.26	4904582.32	0:00	0	0:00	0:00
536	Non-Participating	715837.95	4904581.14	0:00	0	0:00	0:00
537	Non-Participating	715835.66	4904540.43	0:00	0	0:00	0:00
538	Non-Participating	715797.01	4904522.16	0:00	0	0:00	0:00
539	Non-Participating	715742.38	4904518.03	0:00	0	0:00	0:00
540	Non-Participating	715681.73	4904534.21	0:00	0	0:00	0:00
541	Non-Participating	715679.22	4904510.19	0:00	0	0:00	0:00
542	Non-Participating	715894.13	4904455.71	0:00	0	0:00	0:00
543	Non-Participating	715859.67	4904459.97	0:00	0	0:00	0:00
544	Non-Participating	715826.19	4904461.11	0:00	0	0:00	0:00
545	Non-Participating	715798.36	4904461.00	0:00	0	0:00	0:00
546	Non-Participating	715893.31	4904508.16	0:00	0	0:00	0:00
547	Non-Participating	715892.01	4904529.56	0:00	0	0:00	0:00
548	Non-Participating	715893.34	4904559.87	0:00	0	0:00	0:00
549	Non-Participating	715908.04	4904592.58	0:00	0	0:00	0:00
550	Non-Participating	715937.31	4904595.17	0:00	0	0:00	0:00
551	Non-Participating	715977.73	4904597.64	0:00	0	0:00	0:00
552	Non-Participating	715998.33	4904598.89	0:00	0	0:00	0:00
553	Non-Participating	716045.23	4904599.37	0:00	0	0:00	0:00
554	Non-Participating	716045.31	4904546.09	0:00	0	0:00	0:00
555	Non-Participating	716009.60	4904544.70	0:00	0	0:00	0:00
556	Non-Participating	715972.76	4904548.81	0:00	0	0:00	0:00
557	Non-Participating	715949.78	4904547.41	0:00	0	0:00	0:00
558	Non-Participating	715954.67	4904506.34	0:00	0	0:00	0:00
559	Non-Participating	715639.77	4904166.54	0:00	0	0:00	0:00
560	Non-Participating	715706.97	4904199.28	0:00	0	0:00	0:00
568	Non-Participating	715127.65	4895407.57	0:00	0	0:00	0:00
578	Non-Participating	715224.57	4895378.18	0:00	0	0:00	0:00
613	Non-Participating	724975.11	4897668.13	0:00	0	0:00	0:00
669	Non-Participating	716989.84	4896233.57	0:00	0	0:00	0:00
692	Non-Participating	714314.71	4895847.22	0:00	0	0:00	0:00
698	Non-Participating	714205.06	4895733.41	0:00	0	0:00	0:00
745	Participating	726858.39	4900143.28	0:00	0	0:00	0:00
746	Participating	726865.43	4900158.30	0:00	0	0:00	0:00
791	Participating	719916.57	4900476.21	17:44	49	0:34	5:38
793	Participating	719578.52	4900642.43	39:37	118	0:42	12:23
841	Participating	718039.49	4900059.75	125:12	149	2:07	42:26
924	Non-Participating	727022.24	4902627.29	3:49	24	0:15	1:22
941	Participating	724623.73	4903937.11	29:40	93	0:41	9:51
970	Participating	718804.83	4903017.02	30:26	113	0:33	10:16
985	Non-Participating	714318.77	4902656.83	0:00	0	0:00	0:00
986	Non-Participating	714237.97	4903398.65	0:00	0	0:00	0:00
997	Non-Participating	714603.77	4903727.73	0:00	0	0:00	0:00
1053	Non-Participating	726925.43	4905673.26	0:00	0	0:00	0:00
1054	Non-Participating	726986.94	4905673.30	0:00	0	0:00	0:00
1055	Non-Participating	727460.91	4905672.52	0:00	0	0:00	0:00
1056	Non-Participating	727588.03	4905661.99	0:00	0	0:00	0:00
1057	Non-Participating	727648.51	4905661.71	0:00	0	0:00	0:00
1058	Non-Participating	727857.79	4905504.27	0:00	0	0:00	0:00
1072	Non-Participating	727319.90	4901042.05	0:00	0	0:00	0:00
1076	Non-Participating	728362.36	4902262.86	0:00	0	0:00	0:00
1081	Non-Participating	713673.07	4900785.04	0:00	0	0:00	0:00
1082	Non-Participating	726638.58	4904876.28	0:00	0	0:00	0:00
1083	Participating	719182.87	4905036.07	37:32	99	0:36	12:46

ATTACHMENT F – Shadow Flicker Analysis (Option B)

SHADOW FLICKER MODELING REPORT

Buffalo Ridge Wind Project
Lincoln County, Minnesota

Prepared for:

Buffalo Ridge Wind, LLC
700 Universe Boulevard
Juno Beach, Florida 33408

Prepared by:

Epsilon Associates, Inc.
3 Mill & Main Place, Suite 250
Maynard, MA 01754

January 25, 2022

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1.0 EXECUTIVE SUMMARY

The Buffalo Ridge Wind Project (the Project) is a proposed wind power generation facility proposed to consist of 39 wind turbines in Lincoln County, Minnesota. The Project is being developed by Buffalo Ridge Wind, LLC (Buffalo Ridge Wind), an indirect, wholly-owned subsidiary of NextEra Energy Resources, LLC (NEER). Atwell, LLC (Atwell), retained to assist in the permitting of the Project, has retained Epsilon Associates, Inc. (Epsilon) to conduct a shadow flicker assessment for the proposed wind turbines for this Project. This report presents results of the shadow flicker modeling analysis. This report supersedes the previously prepared Shadow Flicker Modeling reports that were filed with the Minnesota Public Utilities Commission dated February 20, 2020 and June 3, 2020, respectively.

Shadow flicker modeling was conservatively conducted for 44 General Electric (GE) wind turbines, which includes five (5) alternate wind turbine locations. The purpose of this analysis is to predict the expected annual durations of wind turbine shadow flicker at nearby receptors.

The maximum expected annual duration of shadow flicker at a modeling receptor resulting from the operation of the 39[1] proposed and 5 alternate wind turbines is 42 hours, 26 minutes. This is at a participating receptor. The maximum expected annual duration of flicker at a non-participating receptor is 28 hours, 56 minutes. The modeling results are conservative in that modeling receptors were treated as "greenhouses" (i.e. having windows on all sides) and the surrounding area was assumed to be without vegetation or structures ("bare earth").

[1] At the time of this analysis, the turbine array showed 39 primary turbines and 5 alternative turbines because Turbine 31 was dropped; however, the Project will construct a total of 40 turbines. Since completion of this analysis, it has been determined that alternative site turbine location Alt 3 will replace Turbine 31, leaving 4 remaining alternative turbines. The analysis in this report was conducted for all 44 turbines (primary and alternate site locations) that are currently proposed to provide conservative results supporting the construction of any of the alternative site locations if a primary is dropped due to constructability issues.

2.0 INTRODUCTION

Project infrastructure is proposed in Lincoln County, Minnesota and while no infrastructure is planned in Pipestone County, a small portion of the Project area extends into Pipestone County, Minnesota. The Project is proposed to consist of 39 wind turbines. The proposed wind turbines are a combination of GE 2.82 megawatt (MW) and GE 2.32 MW units. The GE 2.82 wind turbines have a rotor diameter of 127 meters and a hub height of 89 meters. The GE 2.32 wind turbines have a rotor diameter of 116 meters and a hub height of 80 meters. Figure 2-1 shows the locations of the 39 proposed and 5 alternate wind turbines over aerial imagery.

With respect to wind turbines, shadow flicker can be defined as an intermittent change in the intensity of light in a given area resulting from the operation of a wind turbine due to its interaction with the sun. While indoors, an observer experiences repeated changes in the brightness of the room as shadows cast from the wind turbine blades briefly pass by windows as the blades rotate. In order for this to occur, the wind turbine must be operating, the sun must be shining, and the window must be within the shadow region of the wind turbine, otherwise there is no shadow flicker. A stationary wind turbine only generates a stationary shadow similar to any other structure.

Based on the current design and operation of typical modern wind turbines, shadow flicker is not a cause of epileptic seizures. According to the Epilepsy Foundation, "Generally, flashing lights most likely to trigger seizures are between the frequency of 5 to 30 flashes per second (Hertz)."[2] The wind turbines for this Project have a maximum rotational speed of 15.7 rpm which corresponds to a shadow flicker frequency of 0.8 Hz. This frequency is well below the frequency identified by the Epilepsy Foundation; therefore, the triggering of epileptic seizures is not a concern with this Project.

This report presents the findings of a shadow flicker modeling study for the Project. The wind turbines were modeled with the WindPRO software package using information provided by Atwell. The expected annual duration of shadow flicker was calculated at modeling receptors and shadow flicker isolines for the area surrounding the Project were generated. The results of the modeling are found within this report.

[2] Epilepsy Foundation, http://www.epilepsy.com/learn/triggers-seizures/photosensitivity-and-seizures. Accessed in May 2020.

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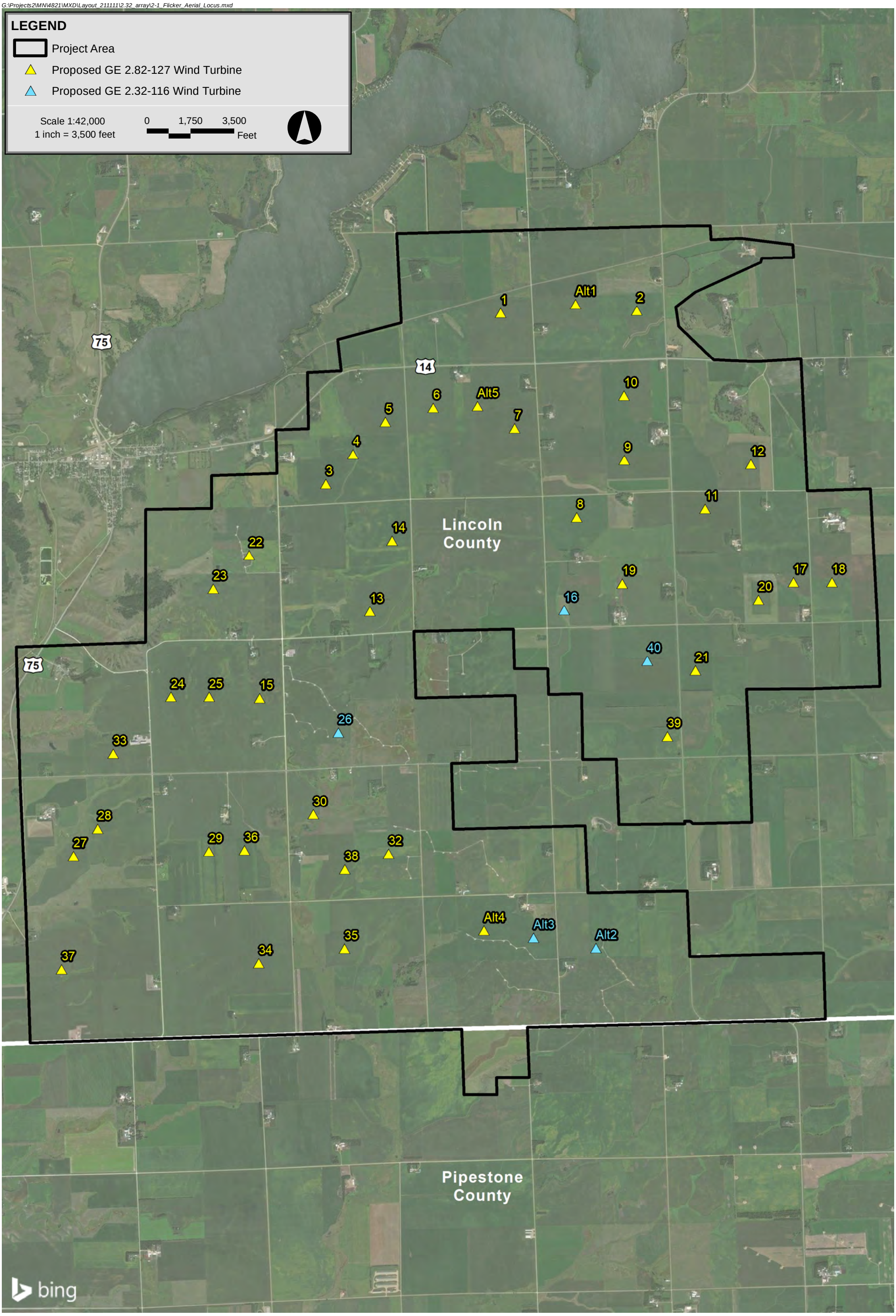

Buffalo Ridge Wind Project **Lincoln County, Minnesota**

Epsilon Associates Inc.

Figure 2-1
Aerial Locus

3.0 SHADOW FLICKER MODELING

3.1 Modeling Methodology

Shadow flicker was modeled using a software package, WindPRO version 3.4. WindPRO is a software suite developed by EMD International A/S and is used for assessing potential environmental impacts from wind turbines. Using the Shadow module within WindPRO, worst-case shadow flicker in the area surrounding the wind turbines was calculated based on data inputs including: location of the wind turbines, location of discrete receptor points, wind turbine dimensions, flicker calculation limits, and terrain data. Based on these data, the model was able to incorporate the appropriate sun angle and maximum daily sunlight for this latitude into the calculations. The resulting worst-case calculations assume that the sun is always shining during daylight hours and that the wind turbine is always operating. The WindPRO Shadow module can be further refined by incorporating sunshine probabilities and wind turbine operational estimates by wind direction over the course of a year. The values produced by this further refinement are known as the "expected" shadow flicker. Both worst-case and expected annual shadow flicker durations are presented in this section.

The proposed wind turbine layout for the Project dated November 11, 2021 was provided by Buffalo Ridge Wind. Of the 44 wind turbines in the layout, 5 are alternative wind turbine locations. Locations of the turbines are shown in Figure 3-1 and the coordinates are provided in Appendix A. Five (5) wind turbines are proposed to be GE 2.32-116 wind turbines with a 116-meter rotor diameter and a hub height of 80 meters. Thirty-nine (39) are proposed to be GE 2.82-127 wind turbines with a 127-meter rotor diameter and a hub height 89 meters. Each wind turbine has the following characteristics based on the technical data provided by Atwell and/or Buffalo Ridge Wind:

		GE 2.32-116	GE 2.82-127
♦ Rated Power	=	2,320 kW	2,820 kW
♦ Hub Height	=	80 meters	89 meters
♦ Rotor Diameter	=	116.5 meters	127.2 meters
♦ Cut-in Wind Speed	=	3 m/s	3 m/s
♦ Cut-out Wind Speed	=	32 m/s	30 m/s
♦ Maximum RPM	=	15.7 rpm	15.7 rpm

To-date, there are no federal, state, or local regulations regarding the maximum radial distance from a wind turbine to which shadow flicker should be analyzed applicable to this Project. In the United States, shadow flicker is commonly evaluated out to a distance of ten times the rotor diameter. According to the Massachusetts Model Bylaw for wind energy facilities, shadow flicker impacts are minimal at and beyond a distance of ten rotor diameters.[3] Defining the shadow flicker

[3] Massachusetts Department of Energy Resources, "Model As-of-Right Zoning Ordinance or Bylaw: Allowing Use of Wind Energy Facilities" 2009.

calculation area has also been addressed in Europe where the ten times rotor diameter approach has been accepted in multiple European countries.[4] Some jurisdictions conservatively require a larger calculation area. The New Hampshire Site Evaluation Committee through rulemaking docket 2014-04 adopted rules on December 15, 2015 outlining application requirements and criteria for energy facilities, including wind energy facilities. As part of these revised regulations, Site 301.08(a)(2) requires an evaluation distance of at least 1 mile from a wind turbine.[5] Section 16-50j-94, part (g), of the Regulations of Connecticut State Agencies identifies the components required in a shadow flicker evaluation report which includes the calculation of shadow flicker from each proposed wind turbine to any off-site occupied structure within a 1.25 mile radius.[6] For this Project, ten times the largest rotor diameter of the proposed wind turbines corresponds to a distance of 0.79 miles (1,270 m). Conservatively, this analysis includes shadow flicker calculations out to 1.25 miles (2,012 m) from each wind turbine in the model for the proposed layout.

A dataset (dated November 29, 2021) containing participation status information for property parcels in the proximity of the Project was provided by Atwell. Parcels identified as leased within the dataset are participating and are indicated as such on Figure 3-1. All other parcels are considered non-participating. Participation status used throughout this analysis is shown in Figure 3-1.

A modeling receptor dataset was provided by Atwell on March 12, 2019. Receptors identified as barn, shed, garage, or silo were excluded from modeling. Therefore, the remaining 411 receptors identified as mobile home, residential, and industrial were input into the WindPRO model. Each modeling point was assumed to have a window facing all directions ("greenhouse" mode) which yields conservative results. Participation status for each modeling receptor was assigned based on the data presented in Figure 3-1. All modeling receptors are identified in Figure 3-2 and are distinguished as either participating or non-participating. The model was set to limit calculations to 2,012 meters from a wind turbine, the equivalent of 1.25 miles. Consequently, shadow flicker at any of the 411 modeling receptors greater than the corresponding limitation distance from a wind turbine was zero. In addition to modeling discrete points, shadow flicker was calculated at grid points in the area surrounding the modeled wind turbines to generate flicker isolines. A 20-meter spacing was used for this grid.

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[4] Parsons Brinckerhoff, "Update of UK Shadow Flicker Evidence Base" Prepared for Department of Energy and Climate Change, 2011.

[5] State of New Hampshire Site Evaluation Committee Site 300 Rules (2015), available at http://www.gencourt.state.nh.us/rules/state_agencies/site100-300.html Accessed in May 2020.

[6] State of Connecticut CSC Wind Regulations (2014), available at https://eregulations.ct.gov/eRegsPortal/Browse/RCSA?id=Title_16Subtitle_16-50jSection_16-50j-94&content=shadow%20flicker/ Accessed in May 2020.

The terrain height contour elevations for the modeling domain were generated from elevation information derived from the National Elevation Dataset (NED) developed by the U.S. Geological Survey. Conservatively, obstacles, i.e. buildings and vegetation, were excluded from the analysis. This is effectively a "bare earth" scenario which is conservative. When accounted for in the shadow flicker calculations, such obstacles may significantly mitigate or eliminate the flicker effect depending on their size, type, and location. In addition, shadow flicker durations were calculated only when the angle of the sun was at least 3° above the horizon.

Monthly sunshine probability values were input for each month from January to December. These numbers were obtained from a publicly available historical dataset for Sioux City, Iowa from the National Oceanic and Atmospheric Administration's (NOAA) National Centers for Environmental Information (NCEI).[7] Table 3-1 shows the percentage of sunshine hours by month used in the shadow flicker modeling. These values are the percentages that the sun is expected to be shining during daylight hours.

The number of hours the wind turbines are expected to operate for the 16 cardinal wind directions was input into the model. A 31-year hourly time series for wind speed and wind direction at 90 meters above ground level was provided by the Project. Epsilon used these data to calculate the typical annual number of operational hours per wind direction sector. These hours per wind direction sector are used by WindPRO to estimate the "wind direction" and "operation time" reduction factors. Based on this dataset, the wind turbines would operate 98% of the year. Table 3-2 shows the distribution of operational hours for the 16 wind directions.

[7] NCEI (formerly NCDC), https://www1.ncdc.noaa.gov/pub/data/ccd-data/pctpos15.dat. Accessed in May 2020.

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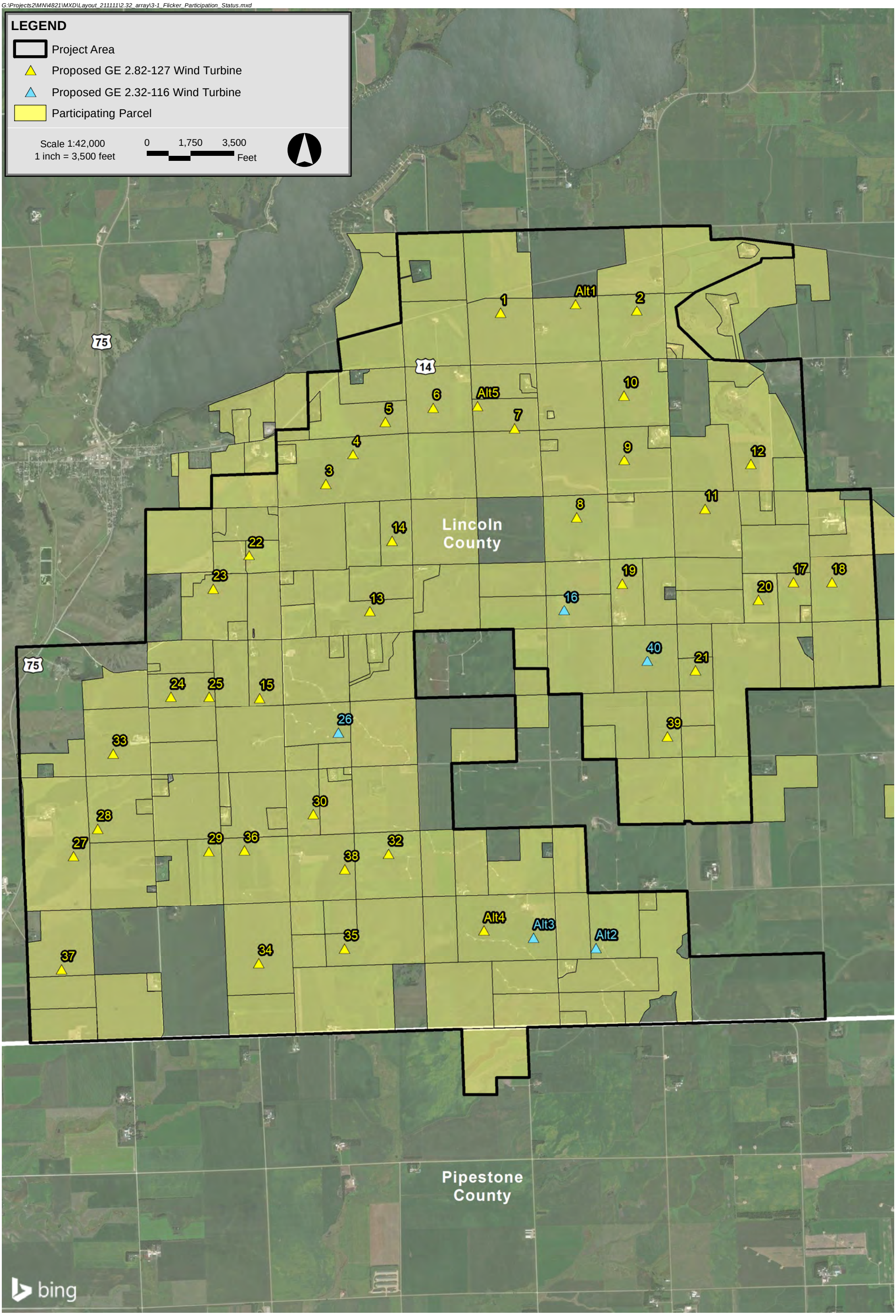

Buffalo Ridge Wind Project **Lincoln County, Minnesota**

Epsilon Associates Inc.

Figure 3-1
Participation Status

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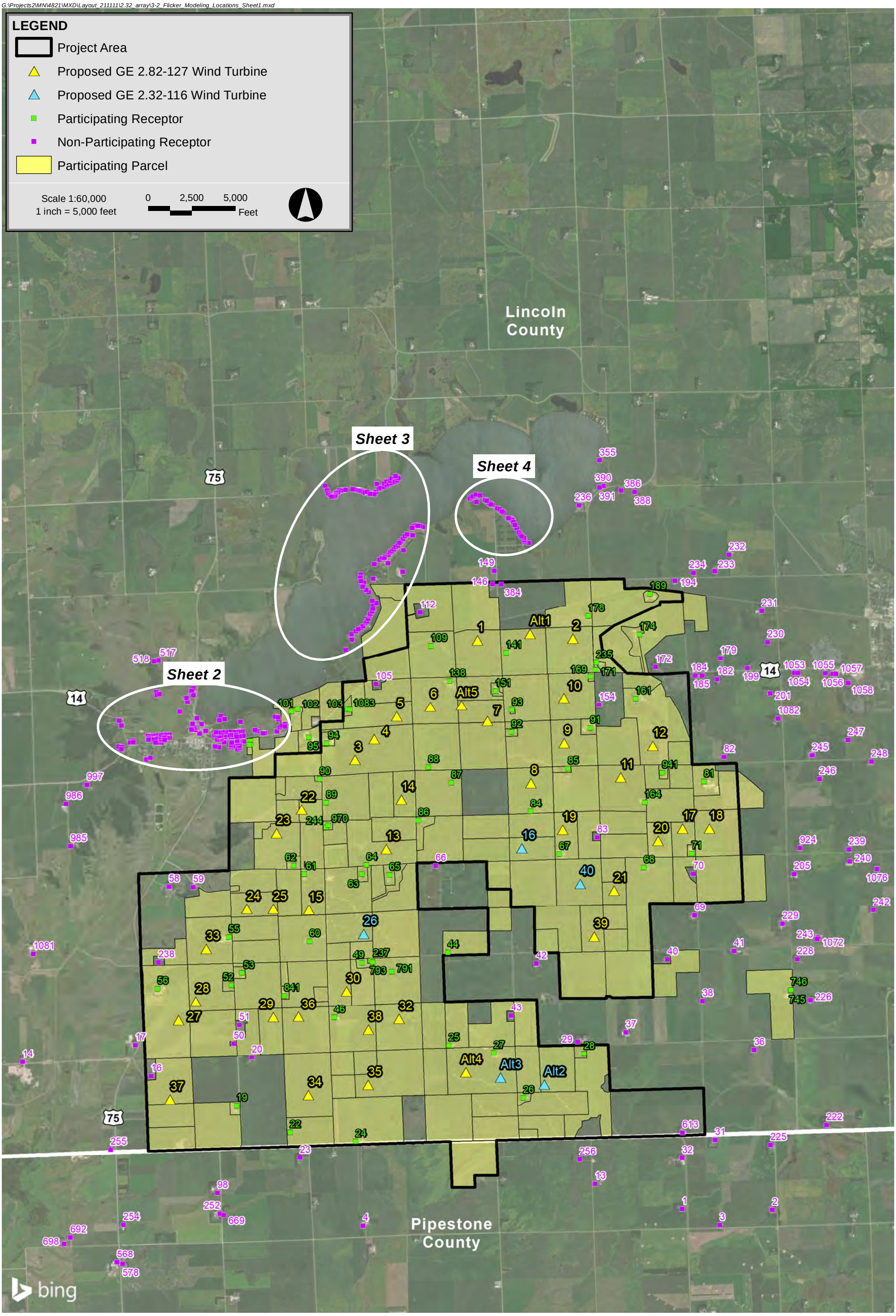

Buffalo Ridge Wind Project **Lincoln County, Minnesota**

Epsilon Associates Inc.

Figure 3-2, Sheet 1 of 4

Shadow Flicker Modeling Locations

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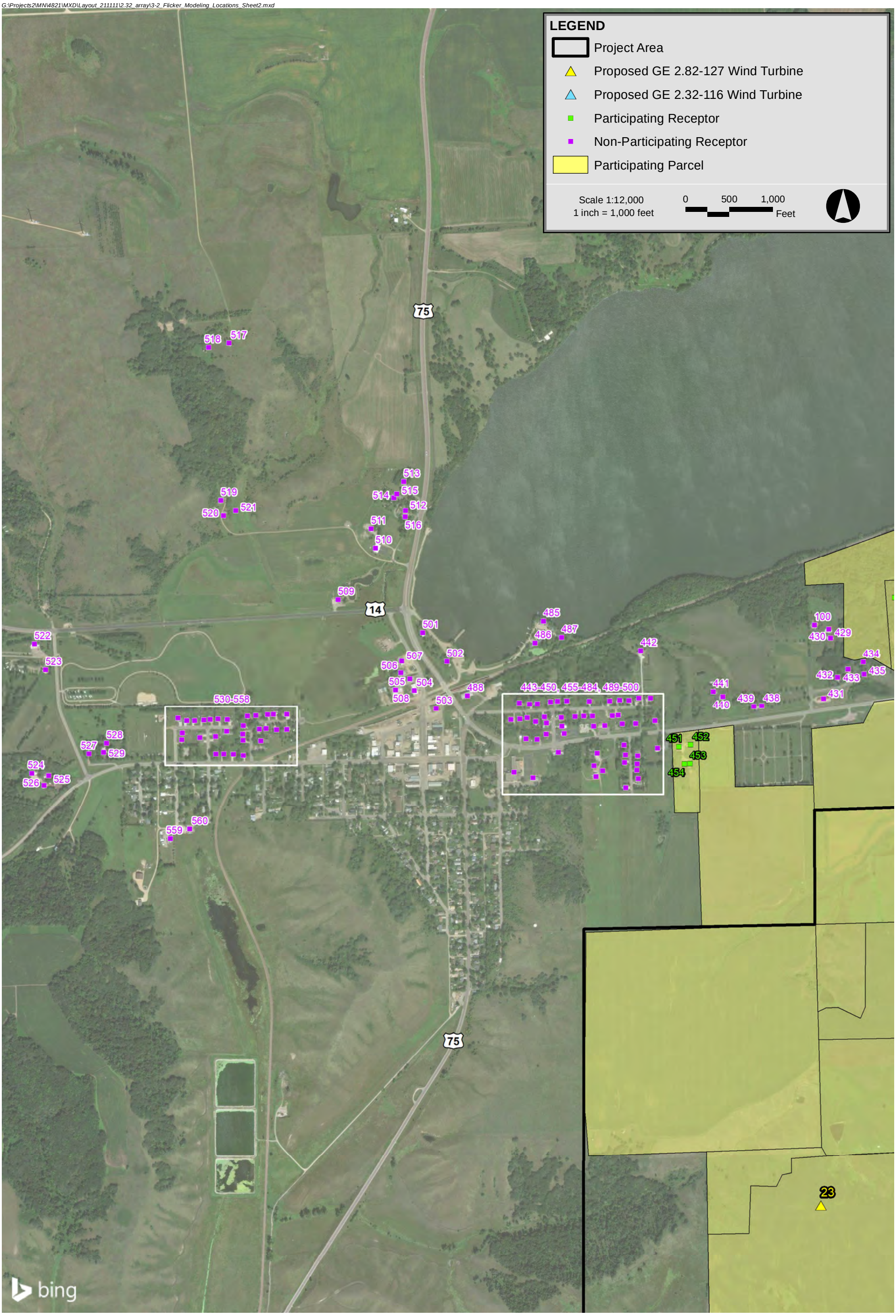
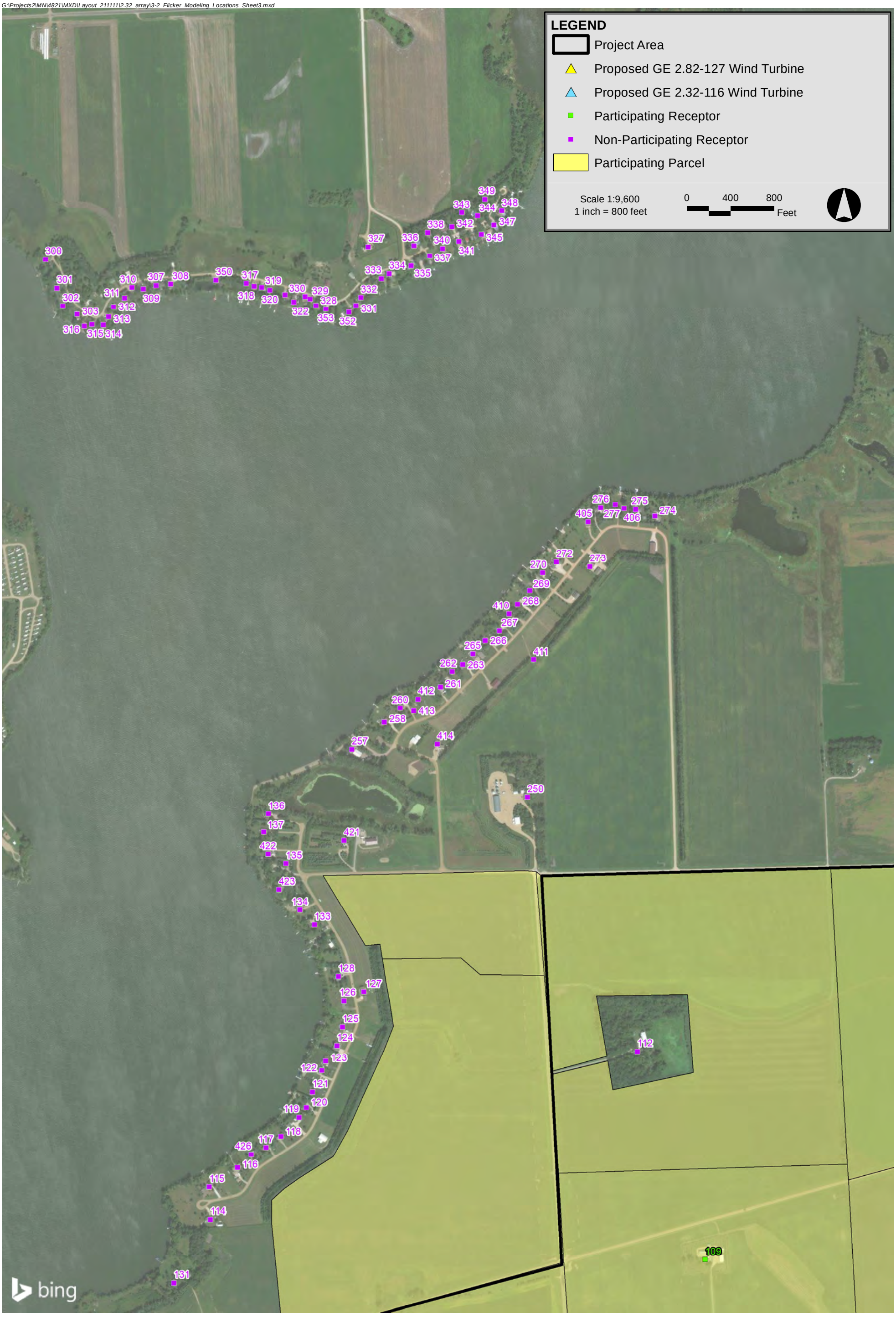


Buffalo Ridge Wind Project **Lincoln County, Minnesota**

Epsilon Associates Inc.

Figure 3-2, Sheet 2 of 4
Shadow Flicker Modeling Locations

G:\Projects2\MN\4821\MXD\Layout_211111\2.32_array\3-2_Flicker_Modeling_Locations_Sheet3.mxd



Buffalo Ridge Wind Project **Lincoln County, Minnesota**

Epsilon Associates Inc.

Figure 3-2, Sheet 3 of 4
Shadow Flicker Modeling Locations

G:\Projects2\MN\4821\MXD\Layout_211111\2.32_array\3-2_Flicker_Modeling_Locations_Sheet4.mxd

Buffalo Ridge Wind Project **Lincoln County, Minnesota**

Figure 3-2, Sheet 4 of 4
Shadow Flicker Modeling Locations

Table 3-1 Monthly Percent of Possible Sunshine

Month	Possible Sunshine
January	57%
February	57%
March	59%
April	59%
May	62%
June	70%
July	73%
August	70%
September	65%
October	60%
November	48%
December	48%

Table 3-2 Operational Hours per Wind Direction Sector

Wind Sector	Operational Hours
N	668
NNE	495
NE	401
ENE	328
E	295
ESE	263
SE	318
SSE	507
S	1,122
SSW	895
SW	495
WSW	362
W	431
WNW	587
NW	708
NNW	710
Annual	8,585

3.2 Results

Following the modeling methodology outlined in Section 3.1, WindPRO was used to calculate shadow flicker at the 411 discrete modeling receptor points in Lincoln and Pipestone Counties and generate shadow flicker isolines based on the grid calculations. Table B-1 in Appendix B presents the modeling results for the 411 modeling receptor locations. Both worst-case and expected values are presented.

The modeled worst-case annual shadow flicker duration ranged from 0 hours, 0 minutes per year to 125 hours, 12 minutes per year. The maximum flicker was at a participating receptor (#841). The maximum predicted annual flicker at a non-participating receptor (#154) is 83 hours, 15 minutes.

The predicted expected annual shadow flicker duration ranged from 0 hours, 0 minutes per year to 42 hours, 26 minutes per year. The maximum expected flicker under this model was at a participating receptor (#841). The maximum modeled expected annual flicker at a non-participating receptor (#154) is 28 hours, 56 minutes. The majority of the receptors (295) were predicted to experience no annual shadow flicker. Seventy (70) locations were predicted to experience some shadow flicker but less than 10 hours per year. The modeling results showed that 38 locations would be expected to have between 10 hours and 30 hours of shadow flicker per year. Eight (8) receptors are expected to have over 30 hours of flicker per year, none of which are non-participating receptors. Figure 3-3 displays the modeled flicker isolines (expected hrs/yr) over aerial imagery in relation to modeled wind turbines and modeling receptors.

G:\Projects2\MN\4821\MXD\Layout_211111\2.32_array\3-3_Flicker_Results_Sheet1.mxd

LEGEND

- Project Area
- Proposed GE 2.82-127 Wind Turbine
- Proposed GE 2.32-116 Wind Turbine
- Participating Receptor
- Non-Participating Receptor
- Participating Parcel

Modeled Shadow Flicker: Expected Values (Hours Per Year)

0 30 100
10 50 150

Scale 1:60,000
1 inch = 5,000 feet

0 2,500 5,000 Feet

Sheet 2

Sheet 3

Sheet 4

Lincoln County

Pipestone County

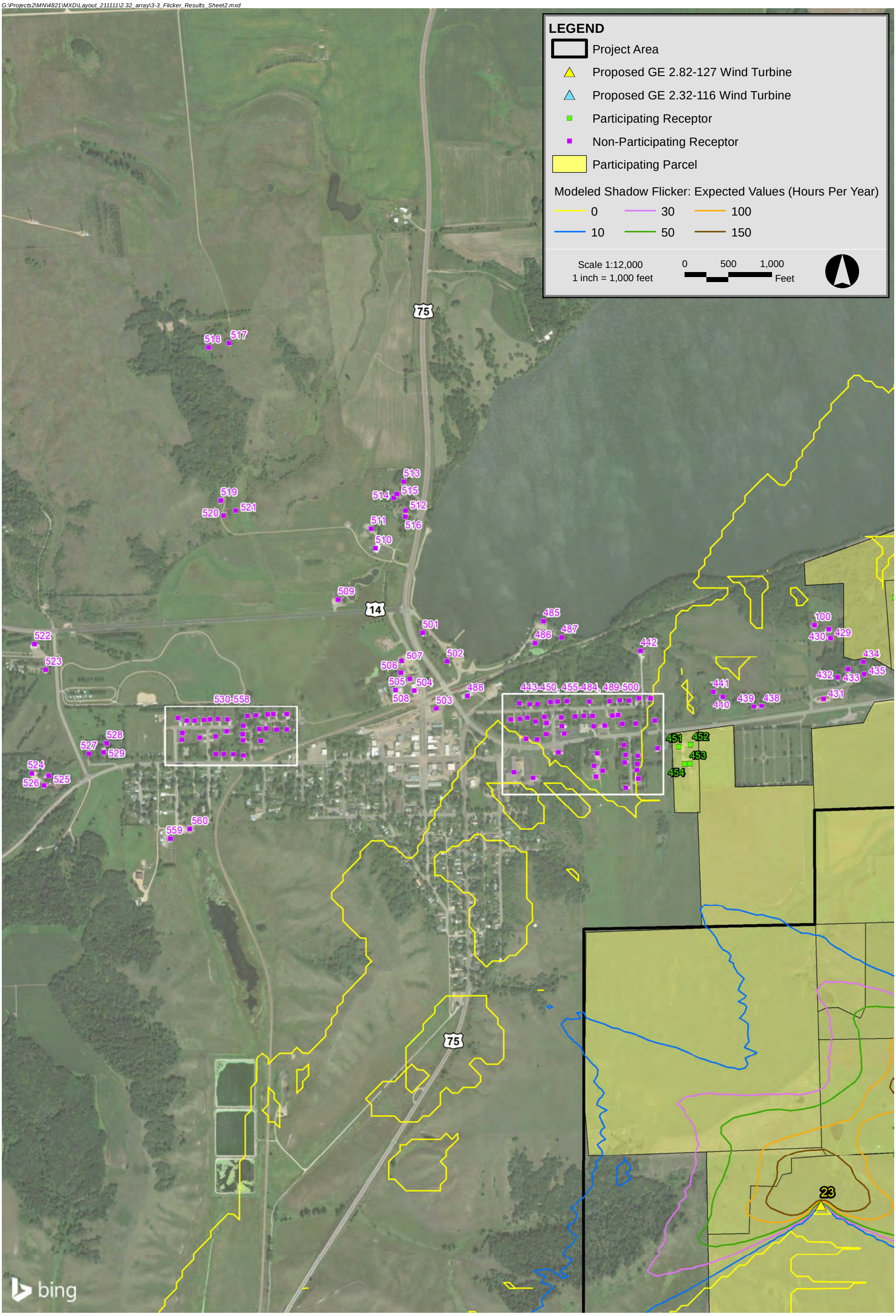
bing

Buffalo Ridge Wind Project **Lincoln County, Minnesota**

Epsilon Associates Inc.

Figure 3-3, Sheet 1 of 4
Shadow Flicker Modeling Results

G:\Projects2\MN\4821\MXD\Layout_211111\2.32_array\3-3_Flicker_Results_Sheet2.mxd

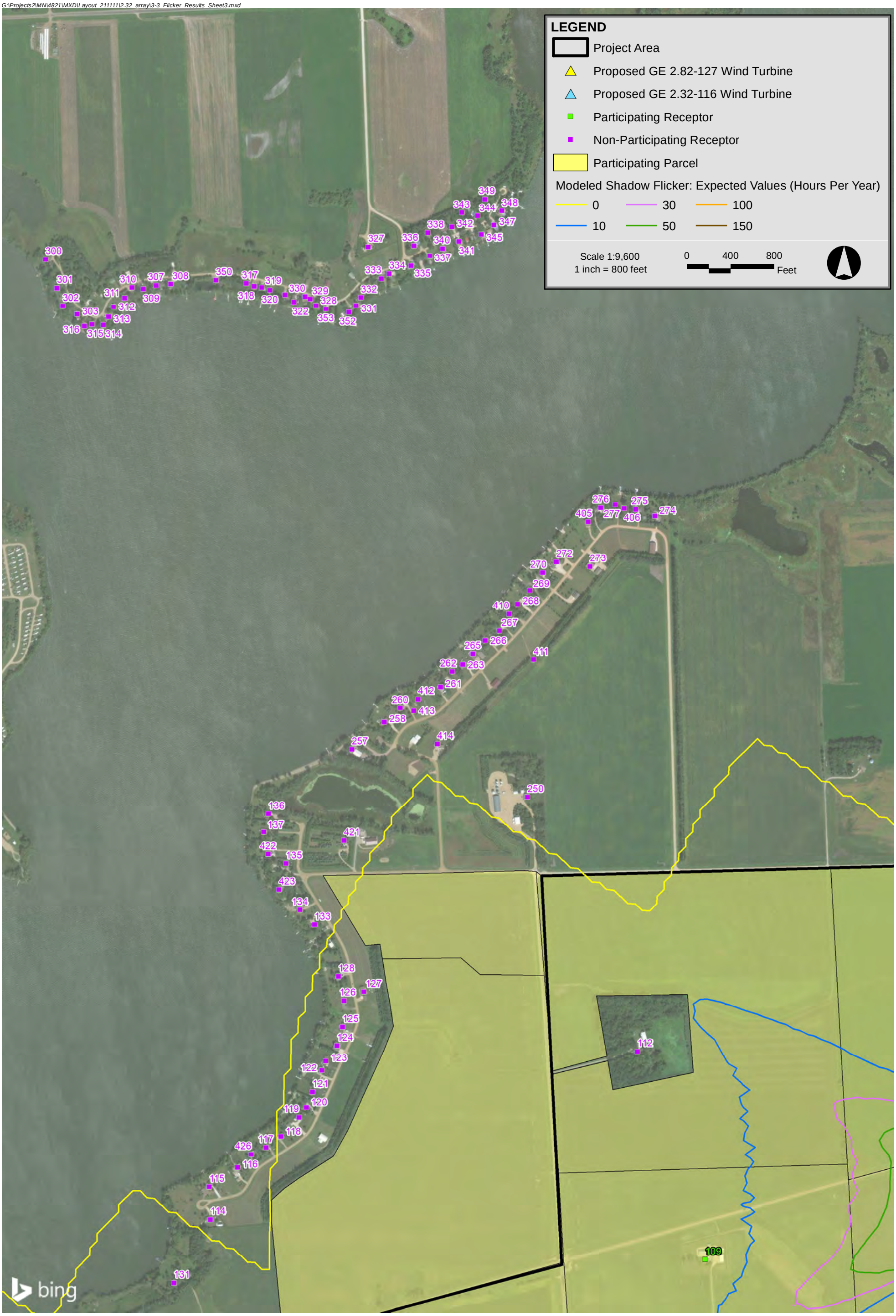


Buffalo Ridge Wind Project **Lincoln County, Minnesota**

Epsilon Associates Inc.

Figure 3-3, Sheet 2 of 4
Shadow Flicker Modeling Results

G:\Projects2\MN\4821\MXD\Layout_211111\2.32_array\3-3_Flicker_Results_Sheet3.mxd

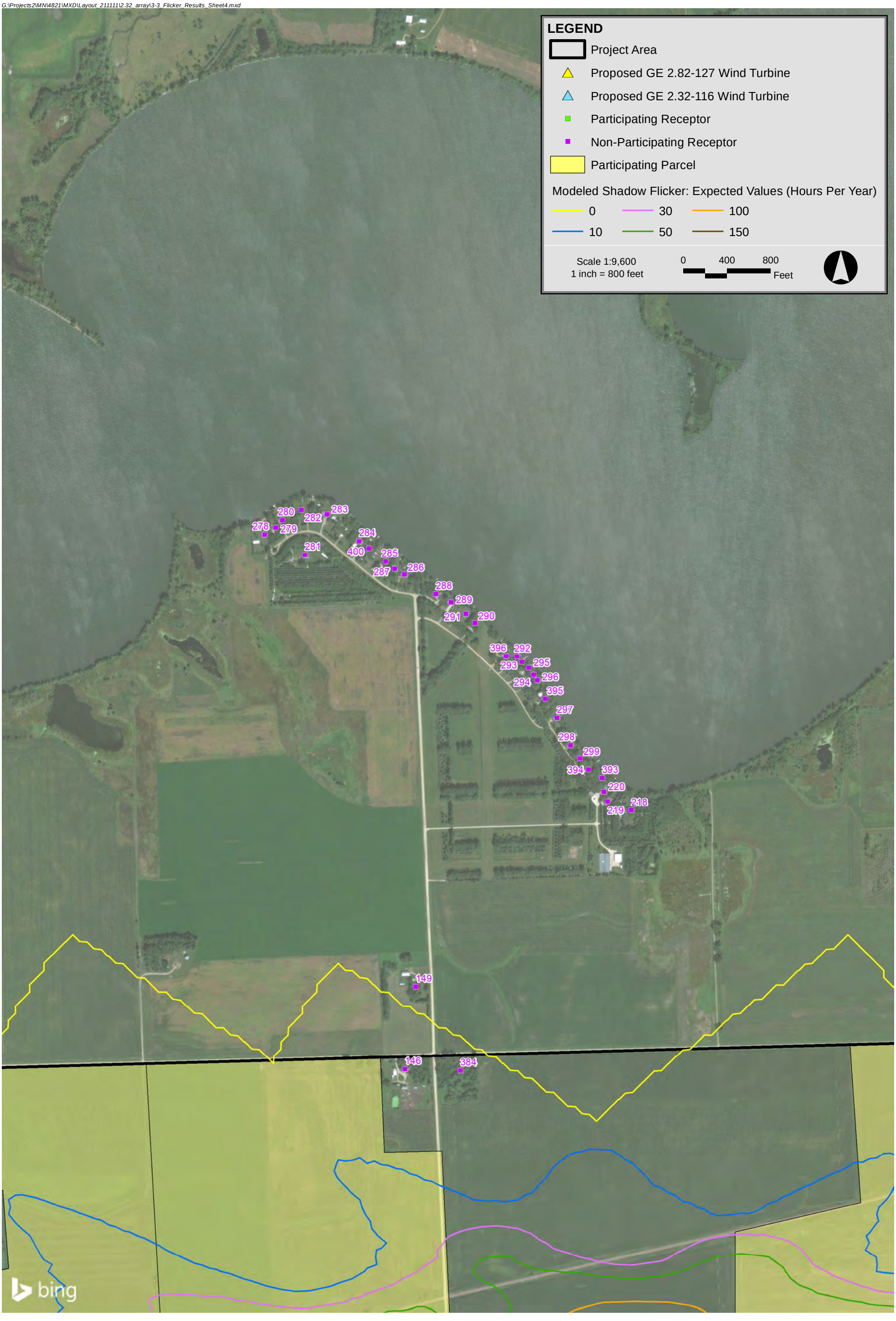


Buffalo Ridge Wind Project **Lincoln County, Minnesota**

Epsilon Associates Inc.

Figure 3-3, Sheet 3 of 4
Shadow Flicker Modeling Results

G:\Projects2\MN\4821\MXD\Layout_211111\2.32_array\3-3_Flicker_Results_Sheet4.mxd



Buffalo Ridge Wind Project **Lincoln County, Minnesota**

Epsilon Associates Inc.

Figure 3-3, Sheet 4 of 4
Shadow Flicker Modeling Results

Appendix A
Wind Turbine Coordinates

Table A-1: Wind Turbine Coordinates

Wind Turbine ID	Wind Turbine Type	Coordinates NAD83 UTM Zone 14N (meters)	
		X (Easting)	Y (Northing)
1	GE 2.82-127	721406.00	4906251.99
2	GE 2.82-127	723068.81	4906280.54
3	GE 2.82-127	719276.01	4904165.00
4	GE 2.82-127	719607.78	4904528.06
5	GE 2.82-127	720001.99	4904925.00
6	GE 2.82-127	720586.38	4905093.01
7	GE 2.82-127	721578.11	4904844.39
8	GE 2.82-127	722336.10	4903761.76
9	GE 2.82-127	722917.01	4904458.99
10	GE 2.82-127	722912.57	4905241.90
11	GE 2.82-127	723901.99	4903863.01
12	GE 2.82-127	724459.03	4904409.00
13	GE 2.82-127	719815.48	4902612.18
14	GE 2.82-127	720083.58	4903474.82
15	GE 2.82-127	718470.81	4901555.82
16	GE 2.32-116	722181.30	4902626.59
17	GE 2.82-127	724979.00	4902967.00
18	GE 2.82-127	725447.87	4902966.52
19	GE 2.82-127	722889.99	4902949.67
20	GE 2.82-127	724552.48	4902755.78
21	GE 2.82-127	723782.99	4901893.01
22	GE 2.82-127	718342.58	4903297.99
23	GE 2.82-127	717905.87	4902889.27
24	GE 2.82-127	717390.99	4901571.99
25	GE 2.82-127	717854.00	4901572.00
26	GE 2.32-116	719429.01	4901133.01
27	GE 2.82-127	716200.02	4899628.99
28	GE 2.82-127	716498.01	4899959.00
29	GE 2.82-127	717852.51	4899685.55
30	GE 2.82-127	719125.98	4900137.01
32	GE 2.82-127	720043.23	4899657.22
33	GE 2.82-127	716683.88	4900875.46
34	GE 2.82-127	718459.00	4898325.01
35	GE 2.82-127	719504.00	4898501.00
36	GE 2.82-127	718287.02	4899699.07
37	GE 2.82-127	716056.00	4898247.98
38	GE 2.82-127	719510.26	4899469.54
39	GE 2.82-127	723440.22	4901087.93
40	GE 2.32-116	723195.00	4902010.02
Alt1	GE 2.82-127	722320.99	4906361.01
Alt2	GE 2.32-116	722571.00	4898509.00
Alt3	GE 2.32-116	721808.01	4898632.01
Alt4	GE 2.82-127	721204.99	4898720.00
Alt5	GE 2.82-127	721128.13	4905117.04

Appendix B

Shadow Flicker Modeling Results: Modeling Receptors

Table B-1: Shadow Flicker Modeling Results

Receptor ID	Participation Status	Coordinates NAD83 UTM Zone 14N (meters)		Worst-Case Shadow Flicker - Annual	Worst-Case Shadow Flicker Days - Annual	Worst-Case Shadow Flicker - Daily	Expected Shadow Flicker - Annual
		X (Easting)	Y (Northing)	(HH:MM/year)	(Days/year)	(HH:MM/day)	(HH:MM/year)
1	Non-Participating	724967.32	4896341.13	0:00	0	0:00	0:00
2	Non-Participating	726537.89	4896321.29	0:00	0	0:00	0:00
3	Non-Participating	725625.32	4896059.58	0:00	0	0:00	0:00
4	Non-Participating	719410.70	4896051.41	0:00	0	0:00	0:00
13	Non-Participating	723456.49	4896774.78	0:00	0	0:00	0:00
14	Non-Participating	713480.83	4898900.44	0:00	0	0:00	0:00
16	Non-Participating	715723.31	4898648.13	56:26	71	0:58	19:38
17	Non-Participating	715447.24	4899194.95	27:51	60	0:35	10:48
19	Participating	717211.44	4898135.31	14:42	33	0:41	4:59
20	Non-Participating	717476.52	4898978.04	30:33	151	0:25	10:56
22	Participating	718141.05	4897676.55	8:20	52	0:14	3:15
23	Non-Participating	718315.29	4897230.65	0:00	0	0:00	0:00
24	Participating	719282.97	4897515.15	0:00	0	0:00	0:00
25	Participating	720904.17	4899187.90	34:14	154	0:26	12:34
26	Participating	722203.20	4898274.38	59:18	78	1:08	23:58
27	Participating	721690.13	4899054.22	77:12	127	1:11	23:53
28	Participating	723264.12	4899043.61	37:18	113	0:33	11:09
29	Non-Participating	723148.39	4899253.41	5:16	27	0:18	1:39
31	Non-Participating	725540.63	4897544.85	0:00	0	0:00	0:00
32	Non-Participating	724971.27	4897228.10	0:00	0	0:00	0:00
36	Non-Participating	726225.39	4899113.03	0:00	0	0:00	0:00
37	Non-Participating	723990.20	4899418.91	5:11	30	0:16	1:30
38	Non-Participating	725325.11	4899964.56	0:00	0	0:00	0:00
40	Non-Participating	724716.86	4900688.30	8:16	37	0:20	3:11
41	Non-Participating	725875.26	4900834.50	0:00	0	0:00	0:00
42	Non-Participating	722427.30	4900617.84	13:55	55	0:23	5:08
43	Non-Participating	721991.20	4899704.37	1:51	17	0:10	0:37
44	Participating	720889.44	4900807.13	5:12	39	0:14	1:49
46	Participating	718911.99	4899677.74	86:29	149	0:47	29:56
49	Participating	719388.68	4900626.02	12:10	67	0:16	3:33
50	Non-Participating	717161.40	4899221.14	65:53	159	0:39	24:48
51	Non-Participating	717258.54	4899542.38	80:58	151	0:58	28:53
52	Participating	717119.07	4900238.72	85:00	161	0:44	27:16
53	Participating	717301.27	4900451.69	39:30	120	0:30	12:08
55	Participating	717076.39	4901073.99	96:02	170	1:07	31:37
56	Participating	715837.07	4900177.49	30:34	57	0:43	10:33
58	Non-Participating	716032.82	4901955.98	7:28	28	0:21	2:31
59	Non-Participating	716453.80	4901946.72	21:45	89	0:30	7:33
60	Participating	718480.21	4901000.12	24:38	108	0:28	9:16
61	Participating	718385.88	4902176.53	27:29	101	0:29	8:17
62	Participating	718203.16	4902322.57	18:46	64	0:27	5:37
63	Participating	719389.44	4902171.45	30:59	136	0:28	10:44
64	Participating	719470.78	4902334.95	26:22	124	0:24	8:21
65	Participating	719873.61	4902159.54	4:44	25	0:18	1:30
66	Non-Participating	720678.38	4902318.70	27:42	87	0:34	10:53
67	Participating	722830.76	4902522.74	52:43	153	0:42	18:19
68	Participating	724305.46	4902285.98	93:06	208	0:47	30:44
69	Non-Participating	725187.55	4901454.70	8:44	50	0:18	3:09
70	Non-Participating	725160.81	4902178.69	5:49	37	0:18	1:49
71	Participating	725137.82	4902529.85	73:27	132	0:50	29:46
81	Participating	725352.22	4903786.97	4:20	24	0:16	1:28
82	Non-Participating	725699.53	4904212.19	9:32	48	0:21	3:18
83	Non-Participating	723492.59	4902812.41	73:57	152	0:49	26:46
84	Participating	722333.43	4903262.08	50:08	106	0:48	16:56
85	Participating	722982.06	4904008.09	48:28	97	1:00	15:46
86	Participating	720375.68	4903106.67	55:11	101	0:42	16:38
87	Participating	720951.07	4903766.63	25:42	119	0:32	8:37
88	Participating	720550.53	4904032.74	46:22	148	0:36	16:22
89	Participating	718770.32	4903420.97	101:26	174	1:05	32:21

Table B-1: Shadow Flicker Modeling Results

Receptor ID	Participation Status	Coordinates NAD83 UTM Zone 14N (meters)		Worst-Case Shadow Flicker - Annual	Worst-Case Shadow Flicker Days - Annual	Worst-Case Shadow Flicker - Daily	Expected Shadow Flicker - Annual
		X (Easting)	Y (Northing)	(HH:MM/year)	(Days/year)	(HH:MM/day)	(HH:MM/year)
90	Participating	718659.29	4903828.29	55:45	126	0:45	20:45
91	Participating	723368.88	4904718.11	77:40	133	1:11	24:17
92	Participating	721996.88	4904643.52	86:02	145	1:16	34:56
93	Participating	722006.38	4905029.65	123:44	238	1:03	40:56
94	Participating	718774.53	4904450.55	90:47	210	0:52	30:51
95	Participating	718467.45	4904553.41	40:22	162	0:34	13:38
98	Non-Participating	716874.05	4896617.04	0:00	0	0:00	0:00
100	Non-Participating	717883.25	4904909.85	6:28	46	0:16	2:06
101	Participating	718162.37	4905006.41	23:15	94	0:23	7:43
102	Participating	718274.26	4905044.01	10:47	65	0:18	3:37
103	Participating	719140.84	4905043.74	40:49	105	0:35	13:55
105	Non-Participating	719636.02	4905481.91	17:59	81	0:28	6:09
109	Participating	720594.55	4906146.96	20:24	49	0:36	6:47
112	Non-Participating	720406.24	4906727.10	13:30	58	0:27	4:26
114	Non-Participating	719215.91	4906259.09	0:00	0	0:00	0:00
115	Non-Participating	719213.16	4906349.80	0:00	0	0:00	0:00
116	Non-Participating	719291.50	4906403.40	0:00	0	0:00	0:00
117	Non-Participating	719371.22	4906459.76	0:00	0	0:00	0:00
118	Non-Participating	719412.46	4906490.00	1:20	14	0:08	0:26
119	Non-Participating	719463.31	4906543.60	1:34	16	0:09	0:30
120	Non-Participating	719483.93	4906571.09	1:30	14	0:09	0:29
121	Non-Participating	719500.42	4906613.70	1:38	16	0:09	0:32
122	Non-Participating	719526.54	4906674.17	1:43	16	0:10	0:34
123	Non-Participating	719537.53	4906700.29	1:45	16	0:10	0:34
124	Non-Participating	719569.14	4906742.89	1:49	17	0:10	0:36
125	Non-Participating	719584.26	4906795.12	1:55	17	0:10	0:38
126	Non-Participating	719588.39	4906869.34	1:57	17	0:10	0:40
127	Non-Participating	719643.36	4906894.08	2:08	18	0:11	0:44
128	Non-Participating	719573.27	4906936.69	1:53	18	0:10	0:38
131	Non-Participating	719114.20	4906081.78	7:33	57	0:14	2:27
133	Non-Participating	719506.22	4907080.47	0:00	0	0:00	0:00
134	Non-Participating	719465.69	4907121.78	0:00	0	0:00	0:00
135	Non-Participating	719426.72	4907251.15	0:00	0	0:00	0:00
136	Non-Participating	719377.63	4907389.09	0:00	0	0:00	0:00
137	Non-Participating	719365.16	4907339.21	0:00	0	0:00	0:00
138	Participating	720913.33	4905533.52	81:46	152	1:16	25:58
141	Participating	721904.81	4906033.39	95:43	189	0:58	37:19
146	Non-Participating	721666.16	4907223.36	7:33	57	0:14	2:27
149	Non-Participating	721695.97	4907454.30	0:00	0	0:00	0:00
151	Participating	721719.87	4905358.34	63:08	131	1:02	20:24
154	Non-Participating	723523.13	4905122.61	83:15	150	0:49	28:56
161	Participating	724163.66	4905228.63	13:10	63	0:21	4:09
164	Participating	724320.81	4903427.17	57:02	144	0:39	18:47
169	Participating	723372.30	4905615.79	78:10	119	0:52	23:31
171	Participating	723461.82	4905731.71	59:55	127	0:43	18:48
172	Non-Participating	724504.21	4905783.38	9:15	54	0:17	3:23
174	Participating	724225.15	4906343.92	17:49	75	0:26	5:36
178	Participating	723334.67	4906665.95	74:31	109	1:04	23:26
179	Non-Participating	725634.47	4905935.88	0:00	0	0:00	0:00
182	Non-Participating	725579.11	4905569.15	0:00	0	0:00	0:00
184	Non-Participating	725196.23	4905627.67	0:00	0	0:00	0:00
185	Non-Participating	725317.77	4905632.44	0:00	0	0:00	0:00
189	Participating	724410.32	4907052.07	4:43	27	0:16	1:22
194	Non-Participating	724847.86	4907280.34	0:00	0	0:00	0:00
199	Non-Participating	726107.97	4905764.29	0:00	0	0:00	0:00
201	Non-Participating	726503.06	4905320.15	0:00	0	0:00	0:00
205	Non-Participating	726919.36	4902176.15	4:46	40	0:10	2:05
218	Non-Participating	722296.75	4907945.00	0:00	0	0:00	0:00
219	Non-Participating	722230.87	4907970.76	0:00	0	0:00	0:00

Table B-1: Shadow Flicker Modeling Results

Receptor ID	Participation Status	Coordinates NAD83 UTM Zone 14N (meters)		Worst-Case Shadow Flicker - Annual	Worst-Case Shadow Flicker Days - Annual	Worst-Case Shadow Flicker - Daily	Expected Shadow Flicker - Annual
		X (Easting)	Y (Northing)	(HH:MM/year)	(Days/year)	(HH:MM/day)	(HH:MM/year)
220	Non-Participating	722220.68	4907997.11	0:00	0	0:00	0:00
222	Non-Participating	727482.24	4897801.59	0:00	0	0:00	0:00
225	Non-Participating	726508.78	4897454.26	0:00	0	0:00	0:00
226	Non-Participating	727202.86	4899979.73	0:00	0	0:00	0:00
228	Non-Participating	726976.25	4900694.01	0:00	0	0:00	0:00
229	Non-Participating	726718.52	4901305.38	0:00	0	0:00	0:00
230	Non-Participating	726456.05	4906213.42	0:00	0	0:00	0:00
231	Non-Participating	726354.15	4906752.29	0:00	0	0:00	0:00
232	Non-Participating	725787.65	4907743.68	0:00	0	0:00	0:00
233	Non-Participating	725536.82	4907446.28	0:00	0	0:00	0:00
234	Non-Participating	725169.65	4907420.70	0:00	0	0:00	0:00
235	Participating	723475.42	4905860.10	43:25	129	0:34	15:37
236	Non-Participating	723175.31	4908595.11	0:00	0	0:00	0:00
237	Participating	719557.26	4900666.24	26:18	114	0:32	8:22
238	Non-Participating	715848.85	4900637.11	31:43	103	0:35	11:17
239	Non-Participating	727874.48	4902603.59	0:00	0	0:00	0:00
240	Non-Participating	727888.73	4902392.04	0:00	0	0:00	0:00
242	Non-Participating	728301.58	4901544.64	0:00	0	0:00	0:00
243	Non-Participating	727336.17	4901068.97	0:00	0	0:00	0:00
244	Participating	718764.15	4902985.61	29:32	102	0:34	9:56
245	Non-Participating	727235.63	4904241.24	0:00	0	0:00	0:00
246	Non-Participating	727363.29	4903829.96	0:00	0	0:00	0:00
247	Non-Participating	727860.69	4904504.97	0:00	0	0:00	0:00
248	Non-Participating	728267.58	4904129.52	0:00	0	0:00	0:00
250	Non-Participating	720099.79	4907436.08	0:00	0	0:00	0:00
252	Non-Participating	716921.70	4896257.62	0:00	0	0:00	0:00
254	Non-Participating	715238.72	4896061.92	0:00	0	0:00	0:00
255	Non-Participating	715015.61	4897377.20	0:00	0	0:00	0:00
256	Non-Participating	723187.80	4897202.59	0:00	0	0:00	0:00
257	Non-Participating	719610.00	4907569.00	0:00	0	0:00	0:00
258	Non-Participating	719700.93	4907644.54	0:00	0	0:00	0:00
260	Non-Participating	719745.33	4907684.29	0:00	0	0:00	0:00
261	Non-Participating	719857.46	4907742.57	0:00	0	0:00	0:00
262	Non-Participating	719890.34	4907786.12	0:00	0	0:00	0:00
263	Non-Participating	719919.46	4907805.15	0:00	0	0:00	0:00
265	Non-Participating	719947.43	4907836.01	0:00	0	0:00	0:00
266	Non-Participating	719982.04	4907873.21	0:00	0	0:00	0:00
267	Non-Participating	720021.83	4907900.02	0:00	0	0:00	0:00
268	Non-Participating	720072.19	4907973.95	0:00	0	0:00	0:00
269	Non-Participating	720106.25	4908011.80	0:00	0	0:00	0:00
270	Non-Participating	720141.70	4908061.35	0:00	0	0:00	0:00
272	Non-Participating	720179.89	4908091.98	0:00	0	0:00	0:00
273	Non-Participating	720273.48	4908078.90	0:00	0	0:00	0:00
274	Non-Participating	720454.78	4908220.05	0:00	0	0:00	0:00
275	Non-Participating	720401.45	4908238.23	0:00	0	0:00	0:00
276	Non-Participating	720304.09	4908243.08	0:00	0	0:00	0:00
277	Non-Participating	720344.49	4908251.56	0:00	0	0:00	0:00
278	Non-Participating	721275.07	4908713.80	0:00	0	0:00	0:00
279	Non-Participating	721305.81	4908733.71	0:00	0	0:00	0:00
280	Non-Participating	721324.42	4908753.63	0:00	0	0:00	0:00
281	Non-Participating	721387.20	4908657.52	0:00	0	0:00	0:00
282	Non-Participating	721377.24	4908782.63	0:00	0	0:00	0:00
283	Non-Participating	721448.68	4908770.08	0:00	0	0:00	0:00
284	Non-Participating	721538.73	4908695.61	0:00	0	0:00	0:00
285	Non-Participating	721612.76	4908638.90	0:00	0	0:00	0:00
286	Non-Participating	721664.28	4908602.97	0:00	0	0:00	0:00
287	Non-Participating	721637.87	4908618.55	0:00	0	0:00	0:00
288	Non-Participating	721751.99	4908548.40	0:00	0	0:00	0:00
289	Non-Participating	721794.46	4908525.50	0:00	0	0:00	0:00

Table B-1: Shadow Flicker Modeling Results

Receptor ID	Participation Status	Coordinates NAD83 UTM Zone 14N (meters)		Worst-Case Shadow Flicker - Annual	Worst-Case Shadow Flicker Days - Annual	Worst-Case Shadow Flicker - Daily	Expected Shadow Flicker - Annual
		X (Easting)	Y (Northing)	(HH:MM/year)	(Days/year)	(HH:MM/day)	(HH:MM/year)
290	Non-Participating	721861.07	4908467.22	0:00	0	0:00	0:00
291	Non-Participating	721835.68	4908492.61	0:00	0	0:00	0:00
292	Non-Participating	721978.07	4908374.37	0:00	0	0:00	0:00
293	Non-Participating	721992.22	4908358.55	0:00	0	0:00	0:00
294	Non-Participating	722024.70	4908323.58	0:00	0	0:00	0:00
295	Non-Participating	722011.37	4908342.31	0:00	0	0:00	0:00
296	Non-Participating	722035.11	4908307.34	0:00	0	0:00	0:00
297	Non-Participating	722089.60	4908201.94	0:00	0	0:00	0:00
298	Non-Participating	722127.86	4908126.15	0:00	0	0:00	0:00
299	Non-Participating	722153.60	4908089.69	0:00	0	0:00	0:00
300	Non-Participating	718757.08	4908934.79	0:00	0	0:00	0:00
301	Non-Participating	718789.00	4908855.07	0:00	0	0:00	0:00
302	Non-Participating	718804.77	4908805.37	0:00	0	0:00	0:00
303	Non-Participating	718844.90	4908782.13	0:00	0	0:00	0:00
307	Non-Participating	719064.83	4908862.39	0:00	0	0:00	0:00
308	Non-Participating	719105.42	4908866.46	0:00	0	0:00	0:00
309	Non-Participating	719028.86	4908852.24	0:00	0	0:00	0:00
310	Non-Participating	718997.87	4908856.18	0:00	0	0:00	0:00
311	Non-Participating	718976.83	4908827.32	0:00	0	0:00	0:00
312	Non-Participating	718946.52	4908802.66	0:00	0	0:00	0:00
313	Non-Participating	718932.81	4908775.31	0:00	0	0:00	0:00
314	Non-Participating	718917.79	4908752.12	0:00	0	0:00	0:00
315	Non-Participating	718886.39	4908753.91	0:00	0	0:00	0:00
316	Non-Participating	718864.96	4908748.89	0:00	0	0:00	0:00
317	Non-Participating	719315.87	4908867.66	0:00	0	0:00	0:00
318	Non-Participating	719338.08	4908860.01	0:00	0	0:00	0:00
319	Non-Participating	719358.98	4908856.51	0:00	0	0:00	0:00
320	Non-Participating	719382.24	4908848.92	0:00	0	0:00	0:00
321	Non-Participating	719423.86	4908836.08	0:00	0	0:00	0:00
322	Non-Participating	719448.43	4908815.84	0:00	0	0:00	0:00
327	Non-Participating	719655.92	4908969.59	0:00	0	0:00	0:00
328	Non-Participating	719510.56	4908805.86	0:00	0	0:00	0:00
329	Non-Participating	719494.17	4908824.72	0:00	0	0:00	0:00
330	Non-Participating	719480.38	4908831.06	0:00	0	0:00	0:00
331	Non-Participating	719621.89	4908806.30	0:00	0	0:00	0:00
332	Non-Participating	719635.36	4908828.68	0:00	0	0:00	0:00
333	Non-Participating	719692.62	4908881.15	0:00	0	0:00	0:00
334	Non-Participating	719714.06	4908894.66	0:00	0	0:00	0:00
335	Non-Participating	719775.28	4908916.96	0:00	0	0:00	0:00
336	Non-Participating	719783.54	4908972.62	0:00	0	0:00	0:00
337	Non-Participating	719827.18	4908944.00	0:00	0	0:00	0:00
338	Non-Participating	719821.62	4909008.89	0:00	0	0:00	0:00
340	Non-Participating	719863.03	4908964.75	0:00	0	0:00	0:00
341	Non-Participating	719908.49	4908984.50	0:00	0	0:00	0:00
342	Non-Participating	719889.00	4909025.73	0:00	0	0:00	0:00
343	Non-Participating	719916.82	4909065.08	0:00	0	0:00	0:00
344	Non-Participating	719960.33	4909056.08	0:00	0	0:00	0:00
345	Non-Participating	719970.89	4909004.75	0:00	0	0:00	0:00
347	Non-Participating	720006.42	4909030.79	0:00	0	0:00	0:00
348	Non-Participating	720028.40	4909070.31	0:00	0	0:00	0:00
349	Non-Participating	719981.33	4909102.97	0:00	0	0:00	0:00
350	Non-Participating	719231.68	4908876.50	0:00	0	0:00	0:00
352	Non-Participating	719602.30	4908788.46	0:00	0	0:00	0:00
353	Non-Participating	719538.13	4908797.13	0:00	0	0:00	0:00
355	Non-Participating	723529.44	4909379.33	0:00	0	0:00	0:00
384	Non-Participating	721820.17	4907219.46	9:43	40	0:17	3:08
386	Non-Participating	723908.08	4908855.30	0:00	0	0:00	0:00
388	Non-Participating	724139.90	4908828.11	0:00	0	0:00	0:00
390	Non-Participating	723596.89	4908931.73	0:00	0	0:00	0:00

Table B-1: Shadow Flicker Modeling Results

Receptor ID	Participation Status	Coordinates NAD83 UTM Zone 14N (meters)		Worst-Case Shadow Flicker - Annual	Worst-Case Shadow Flicker Days - Annual	Worst-Case Shadow Flicker - Daily	Expected Shadow Flicker - Annual
		X (Easting)	Y (Northing)	(HH:MM/year)	(Days/year)	(HH:MM/day)	(HH:MM/year)
391	Non-Participating	723532.73	4908905.53	0:00	0	0:00	0:00
393	Non-Participating	722215.45	4908035.25	0:00	0	0:00	0:00
394	Non-Participating	722177.41	4908058.91	0:00	0	0:00	0:00
395	Non-Participating	722056.64	4908256.22	0:00	0	0:00	0:00
396	Non-Participating	721948.07	4908375.27	0:00	0	0:00	0:00
400	Non-Participating	721565.91	4908675.92	0:00	0	0:00	0:00
405	Non-Participating	720268.50	4908203.65	0:00	0	0:00	0:00
406	Non-Participating	720369.09	4908241.09	0:00	0	0:00	0:00
410	Non-Participating	720048.78	4907946.28	0:00	0	0:00	0:00
411	Non-Participating	720116.92	4907819.45	0:00	0	0:00	0:00
412	Non-Participating	719794.95	4907709.10	0:00	0	0:00	0:00
413	Non-Participating	719782.62	4907676.53	0:00	0	0:00	0:00
414	Non-Participating	719848.76	4907583.53	0:00	0	0:00	0:00
421	Non-Participating	719588.35	4907315.19	0:00	0	0:00	0:00
422	Non-Participating	719376.99	4907276.82	0:00	0	0:00	0:00
423	Non-Participating	719406.83	4907178.95	0:00	0	0:00	0:00
426	Non-Participating	719330.01	4906440.32	0:00	0	0:00	0:00
429	Non-Participating	717938.68	4904865.30	7:50	49	0:17	2:33
430	Non-Participating	717932.82	4904896.09	7:36	49	0:17	2:29
431	Non-Participating	717915.15	4904653.73	7:07	44	0:18	2:26
432	Non-Participating	717963.00	4904727.58	8:30	48	0:19	2:50
433	Non-Participating	718000.35	4904756.38	10:16	64	0:20	3:21
434	Non-Participating	718053.13	4904782.14	12:13	70	0:21	3:59
435	Non-Participating	718055.75	4904739.22	11:56	69	0:21	3:54
438	Non-Participating	717699.27	4904628.61	3:52	32	0:13	1:18
439	Non-Participating	717671.57	4904626.25	3:28	32	0:12	1:10
440	Non-Participating	717564.02	4904661.44	2:27	19	0:12	0:49
441	Non-Participating	717530.49	4904678.61	2:14	18	0:11	0:45
442	Non-Participating	717277.82	4904821.59	0:00	0	0:00	0:00
443	Non-Participating	717311.81	4904655.97	0:00	0	0:00	0:00
444	Non-Participating	717272.02	4904656.19	0:00	0	0:00	0:00
445	Non-Participating	717237.39	4904648.11	0:00	0	0:00	0:00
446	Non-Participating	717204.21	4904648.73	0:00	0	0:00	0:00
447	Non-Participating	717169.91	4904645.97	0:00	0	0:00	0:00
448	Non-Participating	717099.04	4904644.95	0:00	0	0:00	0:00
449	Non-Participating	717327.26	4904576.71	1:22	16	0:08	0:27
450	Non-Participating	717260.30	4904565.99	0:00	0	0:00	0:00
451	Participating	717411.00	4904486.37	1:42	16	0:09	0:33
452	Participating	717451.66	4904493.50	1:53	16	0:10	0:37
453	Participating	717449.05	4904427.71	1:49	16	0:10	0:35
454	Participating	717429.94	4904425.88	1:44	16	0:10	0:34
455	Non-Participating	717336.41	4904481.15	1:22	15	0:08	0:26
456	Non-Participating	717225.45	4904344.45	0:00	0	0:00	0:00
457	Non-Participating	717269.99	4904375.01	0:00	0	0:00	0:00
458	Non-Participating	717222.15	4904431.08	0:00	0	0:00	0:00
459	Non-Participating	717267.74	4904455.08	0:00	0	0:00	0:00
460	Non-Participating	717265.56	4904425.78	0:00	0	0:00	0:00
461	Non-Participating	717264.21	4904404.49	0:00	0	0:00	0:00
462	Non-Participating	717224.49	4904457.74	0:00	0	0:00	0:00
463	Non-Participating	717219.75	4904491.92	0:00	0	0:00	0:00
464	Non-Participating	717121.71	4904382.52	0:00	0	0:00	0:00
465	Non-Participating	717145.67	4904402.55	0:00	0	0:00	0:00
466	Non-Participating	717115.41	4904420.58	0:00	0	0:00	0:00
467	Non-Participating	717126.03	4904463.65	0:00	0	0:00	0:00
468	Non-Participating	717011.84	4904531.58	0:00	0	0:00	0:00
469	Non-Participating	717114.32	4904557.73	0:00	0	0:00	0:00
470	Non-Participating	717152.66	4904559.41	0:00	0	0:00	0:00
471	Non-Participating	717179.04	4904594.16	0:00	0	0:00	0:00
472	Non-Participating	717199.47	4904596.07	0:00	0	0:00	0:00

Table B-1: Shadow Flicker Modeling Results

Receptor ID	Participation Status	Coordinates NAD83 UTM Zone 14N (meters)		Worst-Case Shadow Flicker - Annual	Worst-Case Shadow Flicker Days - Annual	Worst-Case Shadow Flicker - Daily	Expected Shadow Flicker - Annual
		X (Easting)	Y (Northing)	(HH:MM/year)	(Days/year)	(HH:MM/day)	(HH:MM/year)
473	Non-Participating	717213.29	4904565.10	0:00	0	0:00	0:00
474	Non-Participating	717110.15	4904593.27	0:00	0	0:00	0:00
475	Non-Participating	717079.66	4904593.39	0:00	0	0:00	0:00
476	Non-Participating	717049.32	4904590.87	0:00	0	0:00	0:00
477	Non-Participating	717003.01	4904556.89	0:00	0	0:00	0:00
478	Non-Participating	717001.77	4904587.97	0:00	0	0:00	0:00
479	Non-Participating	717020.75	4904646.13	0:00	0	0:00	0:00
480	Non-Participating	716988.35	4904644.82	0:00	0	0:00	0:00
481	Non-Participating	716963.30	4904642.62	0:00	0	0:00	0:00
482	Non-Participating	716991.24	4904467.35	0:00	0	0:00	0:00
483	Non-Participating	716903.21	4904378.45	11:17	45	0:18	3:39
484	Non-Participating	716837.08	4904397.61	11:19	49	0:17	3:40
485	Non-Participating	716939.50	4904923.55	0:00	0	0:00	0:00
486	Non-Participating	716909.64	4904848.14	0:00	0	0:00	0:00
487	Non-Participating	717001.95	4904867.04	0:00	0	0:00	0:00
488	Non-Participating	716674.31	4904664.07	0:00	0	0:00	0:00
489	Non-Participating	716825.86	4904581.19	0:00	0	0:00	0:00
490	Non-Participating	716856.90	4904583.09	0:00	0	0:00	0:00
491	Non-Participating	716882.54	4904586.65	0:00	0	0:00	0:00
492	Non-Participating	716878.39	4904513.48	0:00	0	0:00	0:00
493	Non-Participating	716916.94	4904511.86	0:00	0	0:00	0:00
494	Non-Participating	716948.95	4904530.39	0:00	0	0:00	0:00
495	Non-Participating	716949.29	4904568.19	0:00	0	0:00	0:00
496	Non-Participating	716942.67	4904589.66	0:00	0	0:00	0:00
497	Non-Participating	716911.86	4904573.19	0:00	0	0:00	0:00
498	Non-Participating	716917.97	4904635.88	0:00	0	0:00	0:00
499	Non-Participating	716890.24	4904634.18	0:00	0	0:00	0:00
500	Non-Participating	716854.83	4904638.65	0:00	0	0:00	0:00
501	Non-Participating	716518.40	4904883.23	0:00	0	0:00	0:00
502	Non-Participating	716602.70	4904783.65	0:00	0	0:00	0:00
503	Non-Participating	716565.00	4904619.61	0:00	0	0:00	0:00
504	Non-Participating	716489.56	4904682.61	0:00	0	0:00	0:00
505	Non-Participating	716473.85	4904722.74	0:00	0	0:00	0:00
506	Non-Participating	716442.68	4904744.70	0:00	0	0:00	0:00
507	Non-Participating	716445.50	4904785.31	0:00	0	0:00	0:00
508	Non-Participating	716424.48	4904684.60	0:00	0	0:00	0:00
509	Non-Participating	716223.64	4904999.11	0:00	0	0:00	0:00
510	Non-Participating	716354.23	4905179.04	0:00	0	0:00	0:00
511	Non-Participating	716338.97	4905246.51	0:00	0	0:00	0:00
512	Non-Participating	716459.20	4905309.54	0:00	0	0:00	0:00
513	Non-Participating	716453.10	4905409.39	0:00	0	0:00	0:00
514	Non-Participating	716418.30	4905353.97	0:00	0	0:00	0:00
515	Non-Participating	716427.83	4905367.28	0:00	0	0:00	0:00
516	Non-Participating	716458.13	4905288.00	0:00	0	0:00	0:00
517	Non-Participating	715843.66	4905893.14	0:00	0	0:00	0:00
518	Non-Participating	715773.02	4905877.69	0:00	0	0:00	0:00
519	Non-Participating	715815.13	4905344.94	0:00	0	0:00	0:00
520	Non-Participating	715824.71	4905292.24	0:00	0	0:00	0:00
521	Non-Participating	715867.43	4905309.16	0:00	0	0:00	0:00
522	Non-Participating	715166.41	4904844.74	0:00	0	0:00	0:00
523	Non-Participating	715205.36	4904754.06	0:00	0	0:00	0:00
524	Non-Participating	715157.37	4904393.98	0:00	0	0:00	0:00
525	Non-Participating	715215.94	4904385.63	0:00	0	0:00	0:00
526	Non-Participating	715199.70	4904352.03	0:00	0	0:00	0:00
527	Non-Participating	715356.05	4904461.80	0:00	0	0:00	0:00
528	Non-Participating	715417.46	4904498.17	0:00	0	0:00	0:00
529	Non-Participating	715407.47	4904466.54	0:00	0	0:00	0:00
530	Non-Participating	715666.65	4904585.78	0:00	0	0:00	0:00
531	Non-Participating	715696.65	4904576.48	0:00	0	0:00	0:00

Table B-1: Shadow Flicker Modeling Results

Receptor ID	Participation Status	Coordinates NAD83 UTM Zone 14N (meters)		Worst-Case Shadow Flicker - Annual	Worst-Case Shadow Flicker Days - Annual	Worst-Case Shadow Flicker - Daily	Expected Shadow Flicker - Annual
		X (Easting)	Y (Northing)	(HH:MM/year)	(Days/year)	(HH:MM/day)	(HH:MM/year)
532	Non-Participating	715724.48	4904576.59	0:00	0	0:00	0:00
533	Non-Participating	715756.97	4904578.58	0:00	0	0:00	0:00
534	Non-Participating	715778.32	4904580.68	0:00	0	0:00	0:00
535	Non-Participating	715805.26	4904582.32	0:00	0	0:00	0:00
536	Non-Participating	715837.95	4904581.14	0:00	0	0:00	0:00
537	Non-Participating	715835.66	4904540.43	0:00	0	0:00	0:00
538	Non-Participating	715797.01	4904522.16	0:00	0	0:00	0:00
539	Non-Participating	715742.38	4904518.03	0:00	0	0:00	0:00
540	Non-Participating	715681.73	4904534.21	0:00	0	0:00	0:00
541	Non-Participating	715679.22	4904510.19	0:00	0	0:00	0:00
542	Non-Participating	715894.13	4904455.71	0:00	0	0:00	0:00
543	Non-Participating	715859.67	4904459.97	0:00	0	0:00	0:00
544	Non-Participating	715826.19	4904461.11	0:00	0	0:00	0:00
545	Non-Participating	715798.36	4904461.00	0:00	0	0:00	0:00
546	Non-Participating	715893.31	4904508.16	0:00	0	0:00	0:00
547	Non-Participating	715892.01	4904529.56	0:00	0	0:00	0:00
548	Non-Participating	715893.34	4904559.87	0:00	0	0:00	0:00
549	Non-Participating	715908.04	4904592.58	0:00	0	0:00	0:00
550	Non-Participating	715937.31	4904595.17	0:00	0	0:00	0:00
551	Non-Participating	715977.73	4904597.64	0:00	0	0:00	0:00
552	Non-Participating	715998.33	4904598.89	0:00	0	0:00	0:00
553	Non-Participating	716045.23	4904599.37	0:00	0	0:00	0:00
554	Non-Participating	716045.31	4904546.09	0:00	0	0:00	0:00
555	Non-Participating	716009.60	4904544.70	0:00	0	0:00	0:00
556	Non-Participating	715972.76	4904548.81	0:00	0	0:00	0:00
557	Non-Participating	715949.78	4904547.41	0:00	0	0:00	0:00
558	Non-Participating	715954.67	4904506.34	0:00	0	0:00	0:00
559	Non-Participating	715639.77	4904166.54	0:00	0	0:00	0:00
560	Non-Participating	715706.97	4904199.28	0:00	0	0:00	0:00
568	Non-Participating	715127.65	4895407.57	0:00	0	0:00	0:00
578	Non-Participating	715224.57	4895378.18	0:00	0	0:00	0:00
613	Non-Participating	724975.11	4897668.13	0:00	0	0:00	0:00
669	Non-Participating	716989.84	4896233.57	0:00	0	0:00	0:00
692	Non-Participating	714314.71	4895847.22	0:00	0	0:00	0:00
698	Non-Participating	714205.06	4895733.41	0:00	0	0:00	0:00
745	Participating	726858.39	4900143.28	0:00	0	0:00	0:00
746	Participating	726865.43	4900158.30	0:00	0	0:00	0:00
791	Participating	719916.57	4900476.21	17:44	49	0:34	5:38
793	Participating	719578.52	4900642.43	39:37	118	0:42	12:23
841	Participating	718039.49	4900059.75	125:12	149	2:07	42:26
924	Non-Participating	727022.24	4902627.29	3:49	24	0:15	1:22
941	Participating	724623.73	4903937.11	29:40	93	0:41	9:51
970	Participating	718804.83	4903017.02	30:26	113	0:33	10:16
985	Non-Participating	714318.77	4902656.83	0:00	0	0:00	0:00
986	Non-Participating	714237.97	4903398.65	0:00	0	0:00	0:00
997	Non-Participating	714603.77	4903727.73	0:00	0	0:00	0:00
1053	Non-Participating	726925.43	4905673.26	0:00	0	0:00	0:00
1054	Non-Participating	726986.94	4905673.30	0:00	0	0:00	0:00
1055	Non-Participating	727460.91	4905672.52	0:00	0	0:00	0:00
1056	Non-Participating	727588.03	4905661.99	0:00	0	0:00	0:00
1057	Non-Participating	727648.51	4905661.71	0:00	0	0:00	0:00
1058	Non-Participating	727857.79	4905504.27	0:00	0	0:00	0:00
1072	Non-Participating	727319.90	4901042.05	0:00	0	0:00	0:00
1076	Non-Participating	728362.36	4902262.86	0:00	0	0:00	0:00
1081	Non-Participating	713673.07	4900785.04	0:00	0	0:00	0:00
1082	Non-Participating	726638.58	4904876.28	0:00	0	0:00	0:00
1083	Participating	719182.87	4905036.07	37:32	99	0:36	12:46