

# Antrim Wind Energy, LLC SCADA Shadow Flicker Semi-Annual Report



**Period of 2020-01-01 to 2020-12-31 (inclusively)**

AWE\_SCADA\_Shadow\_Flicker\_Report\_2020-H2\_rev00

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## 1. Introduction and context

This report has been prepared by TransAlta Corporation Inc. on the behalf of Antrim Wind Energy, LLC for the Antrim Wind Energy facility (AWE). The facility is located on the Tuttle Hill ridgeline in the Town of Antrim in Hillsborough County, New Hampshire. The facility comprises 9 Siemens-Gamesa Renewable Energy SWT-3.2-113, 3.2 MW. These wind turbine generators have 113 m diameter rotor with a hub height of 92.5 m for turbines 1 to 8, and 79.5 m for turbine 9.

The facility is also equipped with a SCADA<sup>1</sup> system able to record, track and limit the shadow flicker occurring at different receptors in the vicinity of the project. The current report contains a description of the system, its year to date (YTD) results along with a comparison with AWE's conditions and obligation regarding shadow flicker control and reporting.

## 2. Shadow flicker control and reporting requirements

AWE has been approved by the NH Site Evaluation Committee (NHSEC) under some conditions.

Per NHSEC Site 102.48, shadow flicker is described as “[...] *the alternating changes in light intensity that can occur when the rotating blades of a wind turbine are back-lit by the sun and cast moving shadows on the ground or on structures.*”

Regarding shadow flicker, the facility's Certificate<sup>2</sup> has the following condition:

*“Further Ordered that, on a semi-annual basis, the Applicant shall submit to the Administrator of the Committee and to the Town of Antrim, an electronic copy and one hard copy of the report generated from the SCADA System that shows the amount of shadow flicker for each residence, learning space, workplace, health care setting, outdoor or indoor public gathering area, other occupied building, and roadway, identified by property address and/or tax identification number, within a minimum of one mile of any turbine;”*

Also, per NHSEC Site 301.14 (f) (2) b., “[...] *the shadow flicker created by the applicant's energy facility during operations shall not occur more than 8 hours per year at or within any residence, learning space, workplace, health care setting, outdoor or indoor public gathering area, or other occupied building;*”

The semi-annual reports allow to verify and confirm that each sensitive receptor within 1 mile of any turbine is subject to a maximum of 8 hours of shadow flicker per year.

## 3. AWE's Shadow Flicker Control System

AWE's SCADA system has a module called Shadow Flicker Control System (SFCS) that can record, track and limit the shadow flicker occurring at different receptors in the vicinity of the project. This system can manage up to 50 turbines and 50 zones.

The SFCS uses a precise algorithm to establish the sun's angle of elevation from the horizon, as well as its orientation from North to calculate a shadow flicker event from a turbine to a protected zone (also accounting for operational data such as the turbines' operation, yaw orientation, etc.). For each zone, the SFCS tracks the YTD duration of shadow flicker up to a certain allowance (8 hours) and has then

<sup>1</sup> Supervisory Control And Data Acquisition

<sup>2</sup> Docket 2015-15 - Order and Certificate of Site and Facility with Conditions, March 17, 2017, issued by SEC.

the ability to automatically stop the turbine(s) causing shadow flicker (and automatically resumes the turbine(s)'s operation once the shadow flicker event has ended). The system is also paired with a LIDAR (Light Detection and Ranging) system that senses cloud coverage and is capable of automatically stopping a wind turbine(s) that is causing shadow flicker on a protected zone only when sunny conditions are present.

#### 4. Zone receptors definition

As a basis, the receptors considered in the pre-project shadow flicker assessment<sup>3</sup> were used. The 150 receptors were crosschecked with the town of Antrim's online geographic information system (GIS)<sup>4</sup>; moreover, during the GIS review, 2 receptors were added (151 and 152). The maps A1 and A2 in Appendix A show the location of each of these receptors along with the parcels' boundaries, turbines' locations and 1 mile buffer. As one can see on these maps (and also on the table in Appendix B), out of these 152 receptors, only 102 are within 1 mile of a turbine (sitting on 63 different lots/parcels). Due to the SFCS limitation to 50 zones, most receptors have been aggregated under the same zone. The coverage of all the zones, called groups 1 to 50, is shown on map A3. More specifically, the maps A4 and A5 show the different groups<sup>5</sup> that may experience shadow flicker from one or more turbines.

It is important to mention that due to the size of some groups, the shadow flicker duration for several receptors and larger zone are all aggregated; this approach is therefore very conservative as the duration of several different receptor are all accounted against the same 8 hour allowance<sup>6</sup>. From time to time, optimization of the zones/groups may be done to avoid excessive aggregation and therefore optimize the SFCS efficiency. In the meantime, a factor has been established using WindPro 3.4 to correlate the relation between the results for each specific receptor and their corresponding group/zone.

#### 5. Results

The table in Appendix B shows the shadow flicker tracking results for each receptor issued from the SCADA SFCS for the period between 2020-01-01 and 2020-12-31. Each receptor is presented with the *Lot number*, *Parcel ID* and *Location* (including if the receptor is within 1 mile of a turbine and its coordinates). The table also indicates the group receptor in which the individual receptor is located.

The column *YTD Group Shadow flicker occurred* indicates how many hours of shadow flicker occurred at a group/zone during the period when no protection was activated. The column *YTD Group Shadow flicker protection* indicates how many hours one or more turbines were stopped to avoid shadow flicker at a group/zone. The *YTD Receptor Shadow flicker occurred* corresponds to the shadow flicker occurred at specific receptor considering the correlation between the receptor-group/zone pair (as explained in Section 4 above). The last column indicates if the result for a receptor is below the 8 hours allowance.

#### 6. Conclusion

As one can see in the table of Appendix B, AWE is compliant with the NHSEC Rules and Certificate conditions as all receptors have results showing less than 8 hours of shadow flicker during the period.

<sup>3</sup> Shadow Flicker Analysis, Epsilon Associates in., revised 2016-02-17.

<sup>4</sup> <https://www.axisgis.com/AntrimNH/>

<sup>5</sup> For clarify, the groups that don't experience any shadow flicker aren't shown on map A4 and A5.

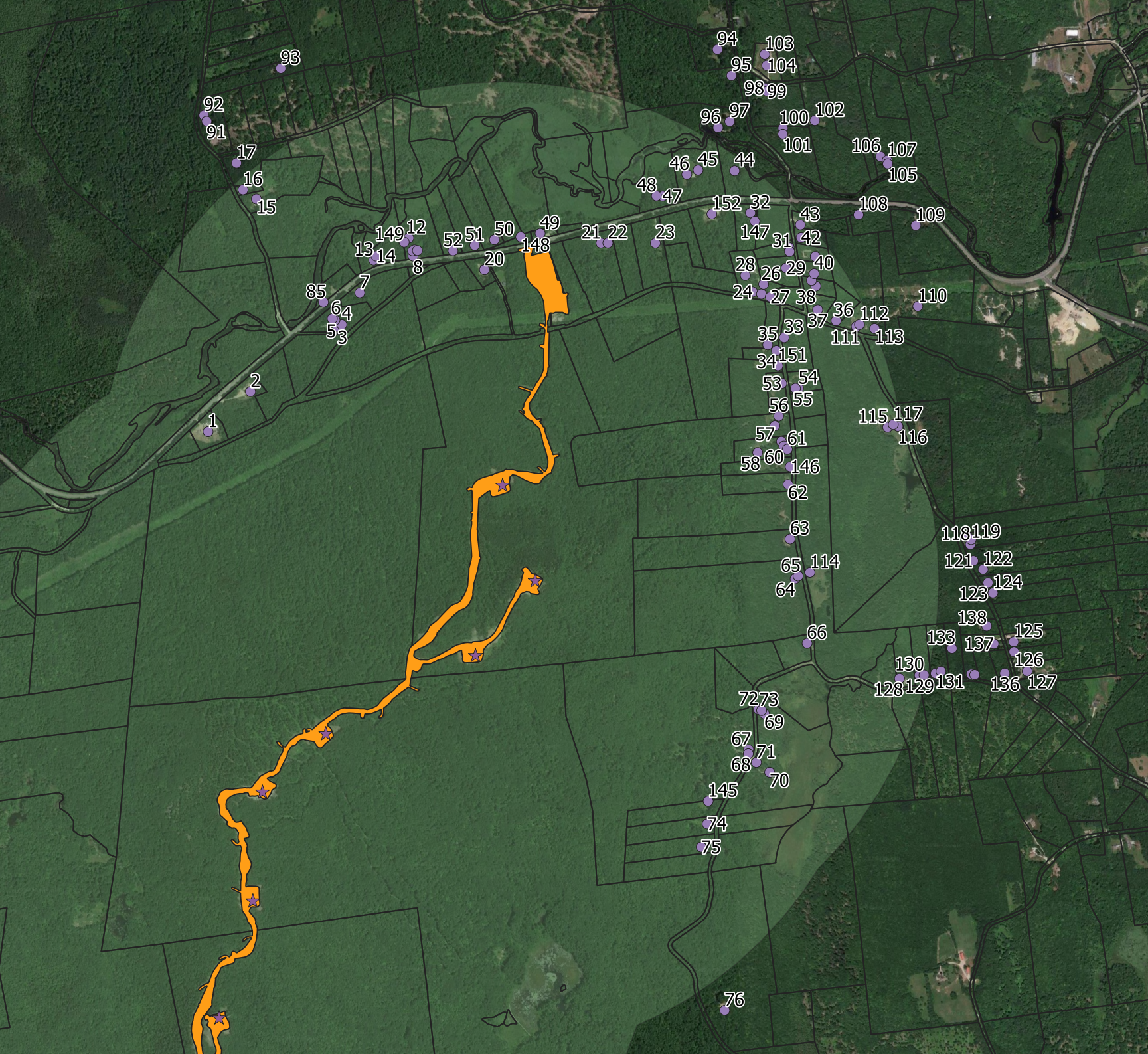
<sup>6</sup> As a group containing larger zone and/or several receptors is limited to an 8 hours allowance, any zone or receptors contained inside such group will inevitably be limited to less than 8 hours of shadow flicker per year.

## Appendix A - Maps

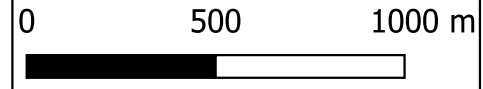
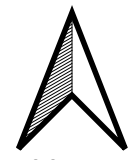
# Map A01

## Legend

- ★ Turbines
- Project zone
- Parcels boundary
- Buffer (1 mile)
- Receptors



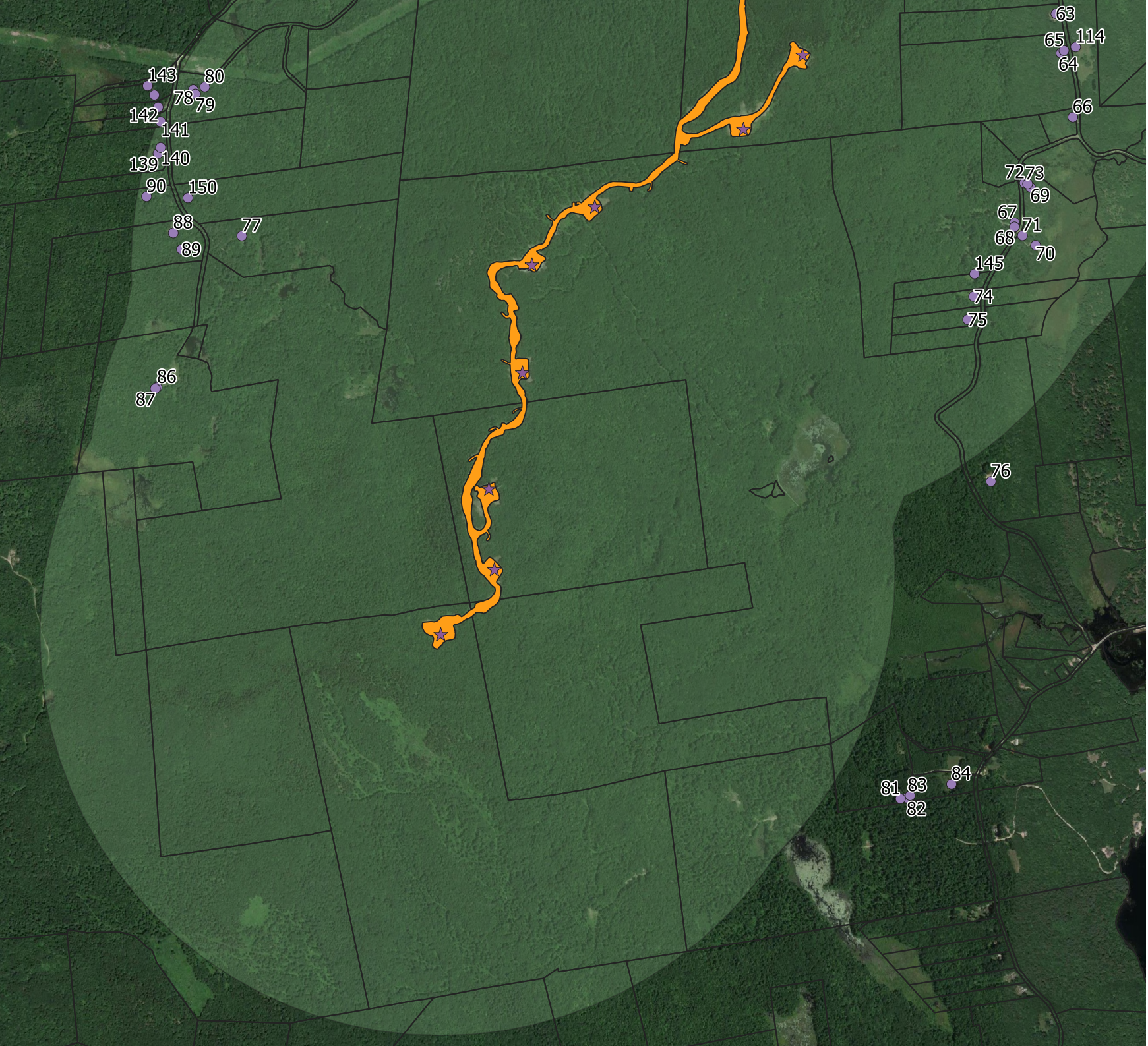
Antrim Wind Energy  
Shadow flicker receptors



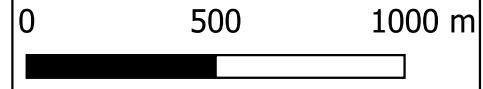
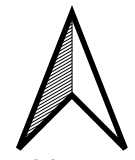
# Map A02

## Legend

- ★ Turbines
- Project zone
- Parcels boundary
- Buffer (1 mile)
- Receptors



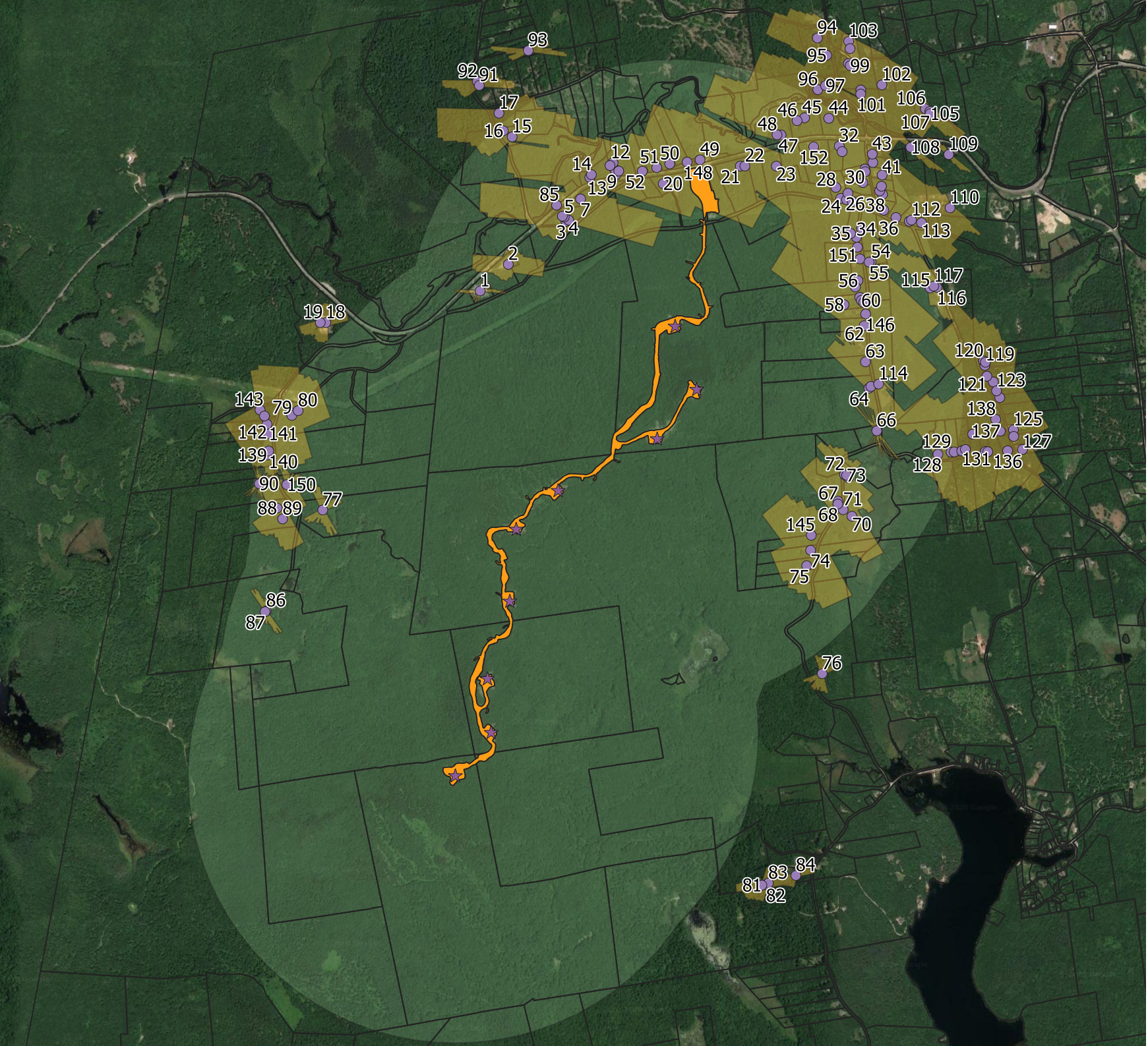
Antrim Wind Energy  
Shadow flicker receptors



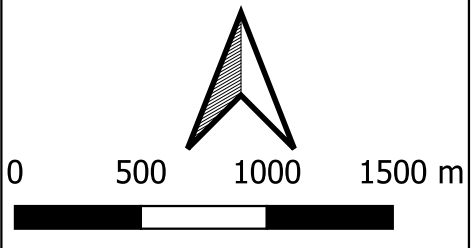
# Map A03

## Legend

- ★ Turbines
- Project zone
- Parcels boundary
- Buffer (1 mile)
- Receptors
- SF tracking coverage



Antrim Wind Energy  
Shadow flicker tracking coverage

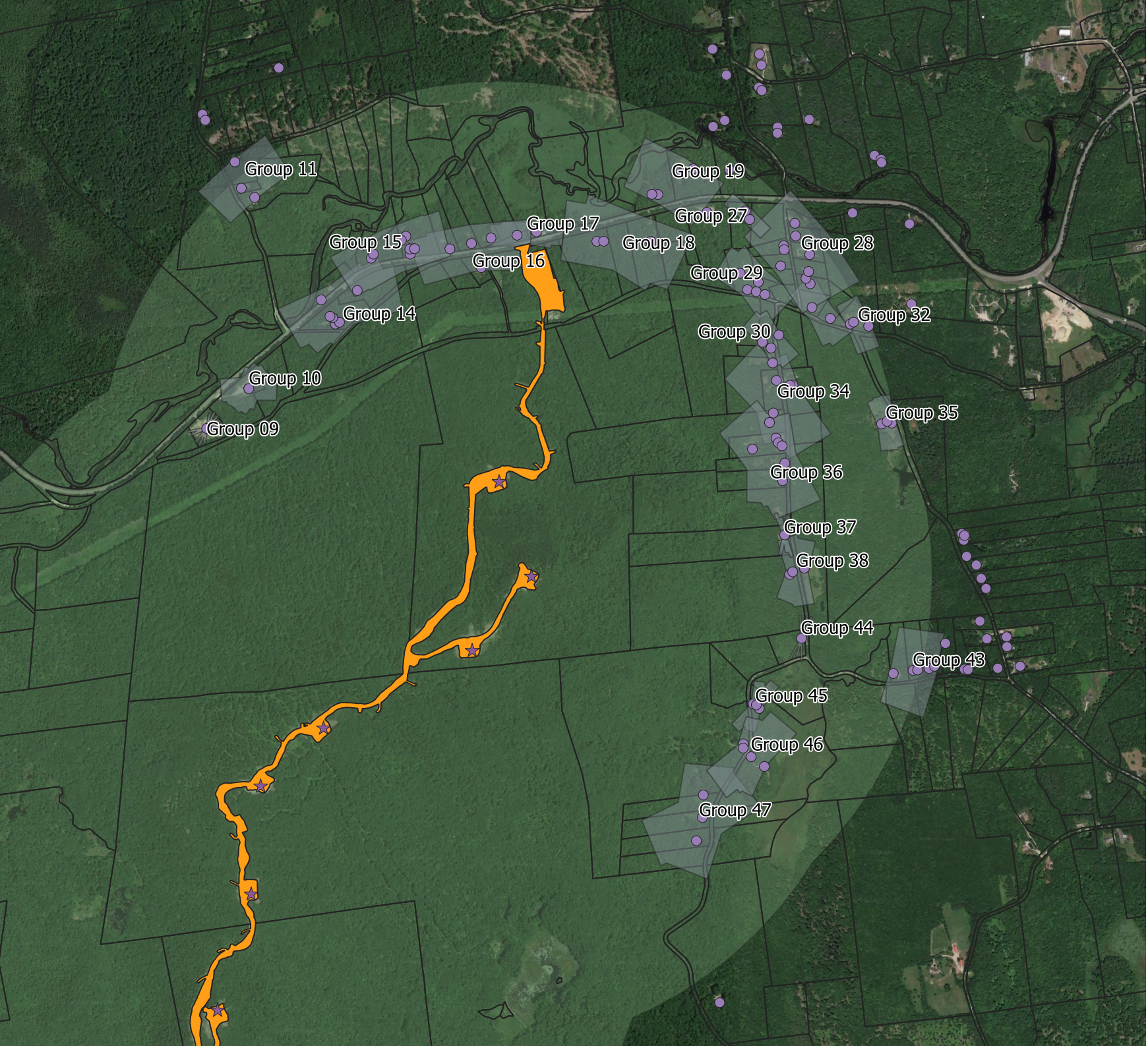




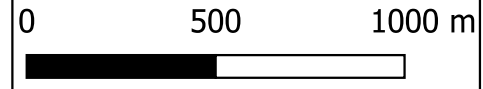
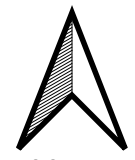
# Map A04

## Legend

- ★ Turbines
- Project zone
- Parcels boundary
- Buffer (1 mile)
- Receptors
- Groups



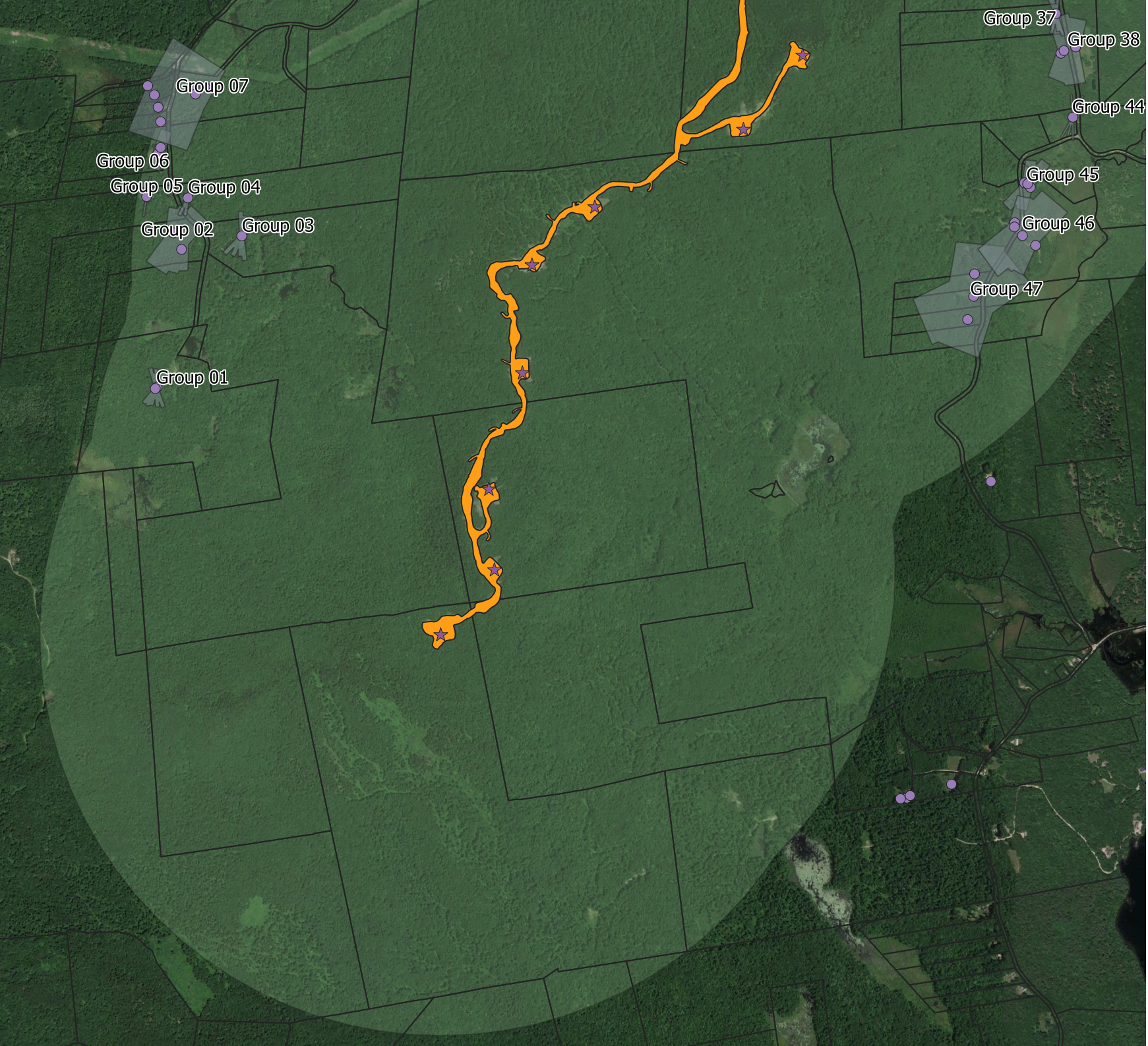
Antrim Wind Energy  
Shadow flicker groups



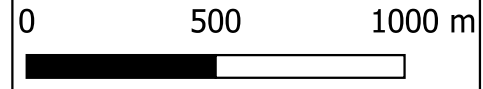
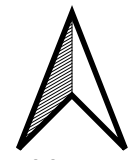
# Map A05

## Legend

- ★ Turbines
- Project zone
- Parcels boundary
- Buffer (1 mile)
- Receptors
- Groups



Antrim Wind Energy  
Shadow flicker groups



## **Appendix B - SCADA shadow flicker compilation**

Receptor	Lot no.	Parcel ID	Location	Within 1 mile of a turbine	Latitude	Longitude	Receptor group	YTD Group Shadow flicker occurred (hour)	YTD Group Shadow flicker protection (hour)	YTD Receptor Shadow flicker occurred (hour)	Below 8h allowance
1	222-003-000	1791	KEENE ROAD	YES	43.06946532	-72.0222675	Group 09	8.0	9.9	2.8	YES
2	222-002-000	1197	408 KEENE ROAD	YES	43.07091006	-72.0201972	Group 10	8.0	24.9	2.2	YES
3	211-003-000	694	398 KEENE ROAD	YES	43.07325594	-72.0159444	Group 14	8.0	26.7	2.5	YES
4	211-003-000	694	398 KEENE ROAD	YES	43.07332255	-72.0157432	Group 14	8.0	26.7	2.6	YES
5	211-003-000	694	398 KEENE ROAD	YES	43.07348236	-72.0160812	Group 14	8.0	26.7	2.4	YES
6	211-003-000	694	398 KEENE ROAD	YES	43.07353453	-72.0162113	Group 14	8.0	26.7	2.4	YES
7	211-002-000	1529	372 KEENE ROAD	YES	43.07447444	-72.0148725	Group 14	8.0	26.7	0.8	YES
8	211-033-000	1333	363 KEENE ROAD	YES	43.07579576	-72.0122698	Group 15	0.1	0.0	0.0	YES
9	211-033-000	1333	363 KEENE ROAD	YES	43.0760154	-72.0122113	Group 15	0.1	0.0	0.0	YES
10	211-033-000	1333	363 KEENE ROAD	YES	43.07598132	-72.0122898	Group 15	0.1	0.0	0.0	YES
11	211-033-000	1333	363 KEENE ROAD	YES	43.07599371	-72.0120582	Group 15	0.1	0.0	0.0	YES
12	211-033-000	1333	363 KEENE ROAD	YES	43.07644215	-72.0124859	Group 15	0.1	0.0	0.0	YES
13	211-032-000	406	375 KEENE ROAD	YES	43.07564392	-72.014196	Group 15	0.1	0.0	0.0	YES
14	211-032-000	406	375 KEENE ROAD	YES	43.07579136	-72.0140821	Group 15	0.1	0.0	0.0	YES
15	211-028-000	1184	43 LOVERENS MILL ROAD	YES	43.0778236	-72.0199507	Group 11	0.0	0.0	0.0	YES
16	211-027-000	970	45 LOVERENS MILL ROAD	YES	43.07815293	-72.020606	Group 11	0.0	0.0	0.0	YES
17	211-026-000	1415	47 LOVERENS MILL ROAD	NO	43.07910619	-72.0209329	Group 11	0.0	0.0	0.0	YES
18	222-010-000	1702	KEENE ROAD	NO	43.06770487	-72.0336691	Group 08	0.0	0.0	0.0	YES
19	222-010-000	1702	KEENE ROAD	NO	43.06770663	-72.0340774	Group 08	0.0	0.0	0.0	YES
20	212-032-000	395	362 KEENE ROAD	YES	43.07531829	-72.0087713	Group 16	0.0	0.0	0.0	YES
21	212-026-000	733	344 KEENE ROAD	YES	43.07628792	-72.0030738	Group 18	0.2	0.0	0.0	YES
22	212-026-000	733	344 KEENE ROAD	YES	43.07629251	-72.0027367	Group 18	0.2	0.0	0.0	YES
23	212-024-000	1417	340 KEENE ROAD	YES	43.07629527	-72.0004097	Group 18	0.2	0.0	0.0	YES
24	212-016-000	565	7 BRACKETT ROAD	YES	43.07456185	-71.9956408	Group 29	8.0	13.5	1.5	YES
25	212-016-000	565	7 BRACKETT ROAD	YES	43.07448893	-71.9952077	Group 29	8.0	13.5	1.3	YES
26	212-016-000	565	7 BRACKETT ROAD	YES	43.07483929	-71.9951057	Group 29	8.0	13.5	1.4	YES
27	212-016-000	565	7 BRACKETT ROAD	YES	43.07438656	-71.9947756	Group 29	8.0	13.5	1.2	YES
28	212-016-000	565	7 BRACKETT ROAD	YES	43.07515348	-71.9960032	Group 29	8.0	13.5	2.0	YES
29	212-019-000	566	130 REED CARR ROAD	YES	43.07542152	-71.9940073	Group 28	8.0	16.0	1.2	YES
30	212-020-000	564	134 REED CARR ROAD	YES	43.07615539	-71.9938633	Group 28	8.0	16.0	1.7	YES
31	212-020-000	564	134 REED CARR ROAD	YES	43.07601206	-71.9938371	Group 28	8.0	16.0	1.6	YES
32	212-022-000	1152	334 KEENE ROAD	YES	43.07739811	-71.9957628	Group 27	1.5	0.0	0.0	YES
33	212-010-000	1354	95 REED CARR ROAD	YES	43.07292407	-71.9940854	Group 30	8.0	17.7	2.3	YES
34	212-012-000	575	90 REED CARR ROAD	YES	43.07245374	-71.9944674	Group 30	8.0	17.7	2.5	YES
35	212-013-000	576	92 REED CARR ROAD	YES	43.07266255	-71.9948922	Group 30	8.0	17.7	2.5	YES
36	212-008-000	2025	5 BRACKETT ROAD	YES	43.07353403	-71.9915504	Group 31	8.0	0.0	1.7	YES
37	212-007-000	562	121 REED CARR ROAD	YES	43.07392689	-71.9924549	Group 31	8.0	0.0	2.3	YES
38	212-006-000	690	123 REED CARR ROAD	YES	43.07478161	-71.992548	Group 28	8.0	16.0	0.8	YES
39	212-006-000	690	123 REED CARR ROAD	YES	43.07497914	-71.9927599	Group 28	8.0	16.0	0.9	YES
40	212-005-000	1293	127 REED CARR ROAD	YES	43.07522462	-71.9926325	Group 28	8.0	16.0	0.9	YES
41	212-004-000	809	131 REED CARR ROAD	YES	43.07583679	-71.9925818	Group 28	8.0	16.0	1.0	YES
42	212-003-000	964	135 REED CARR ROAD	YES	43.07651065	-71.9932759	Group 28	8.0	16.0	1.6	YES
43	212-002-000	1274	139 REED CARR ROAD	YES	43.07696781	-71.9933171	Group 28	8.0	16.0	1.5	YES
44	212-052-000	1467	331 KEENE ROAD	YES	43.07889985	-71.9965474	Group 20	0.0	0.0	0.0	YES
45	212-051-000	1668	335 KEENE ROAD	YES	43.07892268	-71.9983343	Group 19	0.0	0.0	0.0	YES
46	212-051-000	1668	335 KEENE ROAD	YES	43.07876632	-71.9988897	Group 19	0.0	0.0	0.0	YES
47	212-050-000	502	339 KEENE ROAD	YES	43.07798623	-72.0000711	Group 19	0.0	0.0	0.0	YES
48	212-050-000	502	339 KEENE ROAD	YES	43.07799472	-72.0003687	Group 19	0.0	0.0	0.0	YES

Receptor	Lot no.	Parcel ID	Location	Within 1 mile of a turbine	Latitude	Longitude	Receptor group	YTD Group Shadow flicker occurred (hour)	YTD Group Shadow flicker protection (hour)	YTD Receptor Shadow flicker occurred (hour)	Below 8h allowance
49	212-044-000	549	345 KEENE ROAD	YES	43.076621	-72.0060523	Group 17	0.0	0.0	0.0	YES
50	212-040-000	567	351 KEENE ROAD	YES	43.07639192	-72.0082904	Group 16	0.0	0.0	0.0	YES
51	212-039-000	1185	355 KEENE ROAD	YES	43.07619091	-72.0092522	Group 16	0.0	0.0	0.0	YES
52	212-038-000	1328	359 KEENE ROAD	YES	43.07599257	-72.0103148	Group 16	0.0	0.0	0.0	YES
53	221-010-000	559	80 REED CARR ROAD	YES	43.07128345	-71.9941942	Group 34	8.0	48.2	0.9	YES
54	221-011-000	1108	21 REED CARR ROAD	YES	43.07111574	-71.9933802	Group 34	8.0	48.2	0.8	YES
55	221-011-000	1108	21 REED CARR ROAD	YES	43.07111011	-71.9935242	Group 34	8.0	48.2	0.8	YES
56	221-009-000	1466	72 REED CARR ROAD	YES	43.07010506	-71.994344	Group 34	8.0	48.2	1.3	YES
57	221-009-000	1466	72 REED CARR ROAD	YES	43.0697597	-71.9945284	Group 34	8.0	48.2	1.3	YES
58	221-008-000	969	66 REED CARR ROAD	YES	43.06879635	-71.9953638	Group 36	8.0	57.4	1.2	YES
59	221-008-000	969	66 REED CARR ROAD	YES	43.06919819	-71.9942054	Group 36	8.0	57.4	1.0	YES
60	221-008-000	969	66 REED CARR ROAD	YES	43.06903201	-71.9940843	Group 36	8.0	57.4	1.0	YES
61	221-008-000	969	66 REED CARR ROAD	YES	43.06892066	-71.9939093	Group 36	8.0	57.4	1.0	YES
62	221-006-000	668	58 REED CARR ROAD	YES	43.06765898	-71.99387	Group 36	8.0	57.4	1.1	YES
63	221-004-000	1054	38 REED CARR ROAD	YES	43.065701	-71.9937612	Group 37	8.0	23.7	2.6	YES
64	221-003-000	1624	20 REED CARR ROAD	YES	43.06427338	-71.9935033	Group 38	8.0	54.2	1.8	YES
65	221-003-000	1624	20 REED CARR ROAD	YES	43.06436829	-71.993358	Group 38	8.0	54.2	1.7	YES
66	221-002-000	419	6 REED CARR ROAD	YES	43.06196373	-71.9929072	Group 44	8.0	32.4	2.0	YES
67	226-010-000	596	224 CRAIG ROAD	YES	43.05814121	-71.9957527	Group 46	8.0	14.5	2.4	YES
68	226-010-000	596	224 CRAIG ROAD	YES	43.05798748	-71.9957644	Group 46	8.0	14.5	2.0	YES
69	226-002-000	597	235 CRAIG ROAD	YES	43.05942211	-71.9949844	Group 45	8.0	13.6	1.6	YES
70	226-002-000	597	235 CRAIG ROAD	YES	43.0573246	-71.994717	Group 46	8.0	14.5	1.1	YES
71	226-002-000	597	235 CRAIG ROAD	YES	43.05767568	-71.9953665	Group 46	8.0	14.5	1.4	YES
72	226-002-000	597	235 CRAIG ROAD	YES	43.05958474	-71.9952778	Group 45	8.0	13.6	1.6	YES
73	226-002-000	597	235 CRAIG ROAD	YES	43.05954703	-71.995123	Group 45	8.0	13.6	1.6	YES
74	226-008-000	1404	118 CRAIG ROAD	YES	43.05547174	-71.9977611	Group 47	8.0	20.5	0.8	YES
75	226-007-000	393	112 CRAIG ROAD	YES	43.05463186	-71.998048	Group 47	8.0	20.5	0.0	YES
76	235-016-000	593	77 CRAIG ROAD	NO	43.04878197	-71.9968712	Group 48	0.0	0.0	0.0	YES
77	224-002-000	1076	156 SALMON BROOK ROAD	YES	43.05754833	-72.033833	Group 03	8.0	28.4	2.6	YES
78	223-001-000	780	68 SALMON BROOK ROAD	YES	43.06282431	-72.0362545	Group 07	8.0	7.6	1.2	YES
79	223-001-000	780	68 SALMON BROOK ROAD	YES	43.06266911	-72.0361467	Group 07	8.0	7.6	1.3	YES
80	223-001-000	780	68 SALMON BROOK ROAD	YES	43.06292776	-72.0356879	Group 07	8.0	7.6	1.3	YES
81	240-014-000	1169	53 BRIMSTONE CORNER ROAD	NO	43.03730204	-72.0012669	Group 50	0.0	0.0	0.0	YES
82	240-014-000	1169	53 BRIMSTONE CORNER ROAD	NO	43.0373287	-72.0009566	Group 50	0.0	0.0	0.0	YES
83	240-014-000	1169	53 BRIMSTONE CORNER ROAD	NO	43.03741533	-72.0007899	Group 50	0.0	0.0	0.0	YES
84	240-013-000	1424	55 BRIMSTONE CORNER ROAD	NO	43.03783397	-71.9987567	Group 49	0.0	0.0	0.0	YES
85	211-030-000	1761	385 KEENE ROAD	YES	43.07412976	-72.0166452	Group 14	8.0	26.7	2.0	YES
86	224-005-000	1455	200 SALMON BROOK ROAD	YES	43.05206126	-72.0379773	Group 01	8.0	30.4	2.9	YES
87	224-005-000	1455	200 SALMON BROOK ROAD	YES	43.05201481	-72.0380624	Group 01	8.0	30.4	2.9	YES
88	224-008-000	1637	157 SALMON BROOK ROAD	YES	43.05764381	-72.0372096	Group 02	8.0	25.1	1.0	YES
89	224-008-000	1637	157 SALMON BROOK ROAD	YES	43.05705174	-72.0367973	Group 02	8.0	25.1	1.7	YES
90	224-009-000	1638	127 SALMON BROOK ROAD	YES	43.05895407	-72.0385322	Group 05	4.9	0.0	1.7	YES
91	211-010-000	448	63 LOVERENS MILL ROAD	NO	43.08060581	-72.0223991	Group 12	0.0	0.0	0.0	YES
92	211-010-000	448	63 LOVERENS MILL ROAD	NO	43.0808172	-72.0225342	Group 12	0.0	0.0	0.0	YES
93	211-009-000	706	71 LOVERENS MILL ROAD	NO	43.08250887	-72.0187843	Group 13	0.0	0.0	0.0	YES
94	208-001-000	392	50 LIBERTY FARM ROAD	NO	43.08325146	-71.9974082	Group 21	0.0	0.0	0.0	YES
95	208-002-000	924	48 LIBERTY FARM ROAD	NO	43.08231503	-71.9967172	Group 21	0.0	0.0	0.0	YES
96	212-053-000	927	14 LIBERTY FARM ROAD	NO	43.08045207	-71.9973657	Group 20	0.0	0.0	0.0	YES

Receptor	Lot no.	Parcel ID	Location	Within 1 mile of a turbine	Latitude	Longitude	Receptor group	YTD Group Shadow flicker occurred (hour)	YTD Group Shadow flicker protection (hour)	YTD Receptor Shadow flicker occurred (hour)	Below 8h allowance
97	212-053-000	927	14 LIBERTY FARM ROAD	NO	43.08067501	-71.9967949	Group 20	0.0	0.0	0.0	YES
98	212-059-000	1103	11 STACY HILL ROAD	NO	43.08187432	-71.9951162	Group 22	0.0	0.0	0.0	YES
99	212-059-000	1103	11 STACY HILL ROAD	NO	43.08176123	-71.9949738	Group 22	0.0	0.0	0.0	YES
100	212-060-000	1165	15 LIBERTY FARM ROAD	NO	43.08044015	-71.994185	Group 23	0.0	0.0	0.0	YES
101	212-060-000	1165	15 LIBERTY FARM ROAD	NO	43.08022446	-71.9941923	Group 23	0.0	0.0	0.0	YES
102	212-058-000	1109	17 STACY HILL ROAD	NO	43.08072356	-71.992628	Group 23	0.0	0.0	0.0	YES
103	212-054-000	704	8 STACY HILL ROAD	NO	43.08308142	-71.9950956	Group 22	0.0	0.0	0.0	YES
104	212-054-000	704	8 STACY HILL ROAD	NO	43.08268312	-71.9949932	Group 22	0.0	0.0	0.0	YES
105	213-011-000	450	33 STACY HILL ROAD	NO	43.07917217	-71.9890527	Group 24	0.0	0.0	0.0	YES
106	213-011-000	450	33 STACY HILL ROAD	NO	43.07943296	-71.989402	Group 24	0.0	0.0	0.0	YES
107	213-011-000	450	33 STACY HILL ROAD	NO	43.07929127	-71.9890794	Group 24	0.0	0.0	0.0	YES
108	212-001-000	1062	151 REED CARR ROAD	NO	43.07734631	-71.9904743	Group 26	0.0	0.0	0.0	YES
109	213-009-000	384	286 KEENE ROAD	NO	43.07696067	-71.9876661	Group 25	0.0	0.0	0.0	YES
110	213-008-000	1983	3 BRACKETT ROAD	NO	43.07406686	-71.9875548	Group 33	0.0	0.0	0.0	YES
111	212-009-000	1982	119 REED CARR ROAD	YES	43.07333195	-71.9905632	Group 32	4.6	0.0	0.8	YES
112	212-009-000	1982	119 REED CARR ROAD	YES	43.07340217	-71.9904036	Group 32	4.6	0.0	0.8	YES
113	212-009-000	1982	119 REED CARR ROAD	NO	43.07325645	-71.9896601	Group 32	4.6	0.0	0.0	YES
114	221-014-000	967	15 REED CARR ROAD	YES	43.0645025	-71.9927825	Group 38	8.0	54.2	1.5	YES
115	220-012-000	1129	50 OLD CARR ROAD	YES	43.06972281	-71.9890081	Group 35	8.0	9.2	2.1	YES
116	220-012-000	1129	50 OLD CARR ROAD	YES	43.06975708	-71.9885033	Group 35	8.0	9.2	2.0	YES
117	220-012-000	1129	50 OLD CARR ROAD	YES	43.06982125	-71.9887332	Group 35	8.0	9.2	2.1	YES
118	220-015-000	865	43 OLD CARR ROAD	NO	43.06553312	-71.9849363	Group 39	0.0	0.0	0.0	YES
119	220-015-000	865	43 OLD CARR ROAD	NO	43.06570569	-71.9848978	Group 39	0.0	0.0	0.0	YES
120	220-015-000	865	43 OLD CARR ROAD	NO	43.06577166	-71.9850328	Group 39	0.0	0.0	0.0	YES
121	220-016-000	1381	39 OLD CARR ROAD	NO	43.0649486	-71.9847877	Group 39	0.0	0.0	0.0	YES
122	220-017-000	1356	35 OLD CARR ROAD	NO	43.06463812	-71.9843091	Group 39	0.0	0.0	0.0	YES
123	220-018-000	1504	31 OLD CARR ROAD	NO	43.06415323	-71.984066	Group 39	0.0	0.0	0.0	YES
124	220-019-000	427	27 OLD CARR ROAD	NO	43.0637915	-71.9838232	Group 39	0.0	0.0	0.0	YES
125	220-021-000	829	15 OLD CARR ROAD	NO	43.06204476	-71.982804	Group 40	0.0	0.0	0.0	YES
126	220-022-000	759	9 OLD CARR ROAD	NO	43.0616888	-71.9827824	Group 40	0.0	0.0	0.0	YES
127	220-023-000	1423	5 OLD CARR ROAD	NO	43.06098405	-71.9821313	Group 41	0.0	0.0	0.0	YES
128	220-002-000	459	117 OLD POUND ROAD	YES	43.06070597	-71.9883807	Group 43	8.0	13.4	1.4	YES
129	220-003-000	1465	115 OLD POUND ROAD	YES	43.06082122	-71.9874087	Group 43	8.0	13.4	1.2	YES
130	220-003-000	1465	115 OLD POUND ROAD	YES	43.0608359	-71.9871808	Group 43	8.0	13.4	1.2	YES
131	220-004-000	860	113 OLD POUND ROAD	NO	43.06089067	-71.9866197	Group 43	8.0	13.4	0.0	YES
132	220-004-000	860	113 OLD POUND ROAD	NO	43.06097099	-71.9863515	Group 43	8.0	13.4	0.0	YES
133	220-005-000	702	111 OLD POUND ROAD	NO	43.06180263	-71.9858146	Group 42	0.0	0.0	0.0	YES
134	220-006-000	1512	109 OLD POUND ROAD	NO	43.06085245	-71.9846994	Group 42	0.0	0.0	0.0	YES
135	220-006-000	1512	109 OLD POUND ROAD	NO	43.06086962	-71.98487	Group 42	0.0	0.0	0.0	YES
136	220-008-000	1002	103 OLD POUND ROAD	NO	43.06090901	-71.9832301	Group 41	0.0	0.0	0.0	YES
137	220-009-000	1510	12 OLD CARR ROAD	NO	43.0619725	-71.9837734	Group 40	0.0	0.0	0.0	YES
138	220-010-000	1000	16 OLD CARR ROAD	NO	43.0626085	-71.9841196	Group 40	0.0	0.0	0.0	YES
139	223-003-000	2006	117 SALMON BROOK ROAD	YES	43.06051366	-72.0379789	Group 06	5.8	0.0	1.9	YES
140	223-003-000	2006	117 SALMON BROOK ROAD	YES	43.06073057	-72.0378502	Group 06	5.8	0.0	1.9	YES
141	223-004-000	494	107 SALMON BROOK ROAD	YES	43.06166439	-72.037857	Group 07	8.0	7.6	1.0	YES
142	223-005-000	1121	103 SALMON BROOK ROAD	NO	43.06218491	-72.0379823	Group 07	8.0	7.6	0.0	YES
143	223-006-000	422	99 SALMON BROOK ROAD	NO	43.06295826	-72.0385023	Group 07	8.0	7.6	0.0	YES
144	223-006-000	422	99 SALMON BROOK ROAD	NO	43.06262898	-72.0381705	Group 07	8.0	7.6	0.0	YES

Receptor	Lot no.	Parcel ID	Location	Within 1 mile of a turbine	Latitude	Longitude	Receptor group	YTD Group Shadow flicker occurred (hour)	YTD Group Shadow flicker protection (hour)	YTD Receptor Shadow flicker occurred (hour)	Below 8h allowance
145	226-009-000	568	CRAIG ROAD	YES	43.05628535	-71.9977182	Group 47	8.0	20.5	0.0	YES
146	221-007-000	1112	62 REED CARR ROAD	YES	43.06829684	-71.9937656	Group 36	8.0	57.4	1.0	YES
147	212-022-000	1152	334 KEENE ROAD	YES	43.07709654	-71.9955495	Group 27	1.5	0.0	0.2	YES
148	212-043-000	1664	349 KEENE ROAD	YES	43.07649611	-72.0070062	Group 17	0.0	0.0	0.0	YES
149	211-033-000	1333	363 KEENE ROAD	YES	43.07629277	-72.0127075	Group 15	0.1	0.0	0.0	YES
150	224-001-000	1416	128 SALMON BROOK ROAD	YES	43.05891293	-72.0364964	Group 04	7.2	0.0	2.1	YES
151	212-023-000	1057	88 REED CARR ROAD	YES	43.07735099	-71.9976525	Group 34	8.0	48.2	1.0	YES
152	212-011-000	782	336 KEENE ROAD	YES	43.07191704	-71.9943853	Group 19	0.0	0.0	0.0	YES