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SUMMERHAVEN WIND ENERGY CENTRE

Shadow Flicker Assessment

NextEra Energy Canada, ULC

Report No.: 1, Rev. C
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Task and objective: To conduct a post-construction shadow flicker assessment of the Summerhaven Wind Energy Centre.

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1 EXECUTIVE SUMMARY

An analysis has been conducted to predict the duration of shadow flicker to be experienced at receptors in the vicinity of the Summerhaven Wind Energy Centre (the "Project") in Ontario. This analysis was undertaken for 56 Siemens S2.2 – 2.221 MW wind turbines with a hub height of 80 m and rotor diameters of 93 m and 101 m, and 1,308 receptors in the vicinity of the Project.

Of the 1,308 receptors analyzed, 573 receptors are expected to experience some incidence of shadow flicker.

The receptor that is predicted to experience the most hours of shadow flicker in one year is receptor SMH2364. The predicted duration of shadow flicker at this receptor is 29 hours per year, taking into account annual cloud cover. Receptor SMH2364 is also expected to experience the most anticipated days of flicker exposure at 219 days; however, the highest predicted minutes of shadow flicker in one day at this receptor is 41 minutes. Receptor SMH2360 has the highest predicted value of minutes of shadow flicker in one day, with a total of 70 minutes, predicted to occur on September 4. There are 735 receptors which are not expected to experience any incidence of shadow flicker.

2 INTRODUCTION

NextEra Energy Canada, ULC (the "Client") has requested that Garrad Hassan America, Inc. ("GL GH"), a DNV GL company, provide environmental and permitting services, including assessment of the impact of the shadow flicker effects in the vicinity of the the Summerhaven Wind Energy Centre (the "Project"). The Project is located in Haldimand County, in southern Ontario. The Project consists of 56 turbines at a hub height of 80 m, with rotor diameters of 93 m and 101 m.

These turbines can have an influence on the shadow flicker experienced at sensitive locations in the vicinity of the site. The purpose of this shadow flicker analysis is to calculate the predicted shadow flicker duration from the Project at receptor locations. This report includes a brief description of the Project site, an explanation of the shadow flicker assessment methodology, results of the analysis including a map illustrating areas prone to shadow flicker, and concluding comments.

2.1 Shadow Flicker Definition

Shadow flicker is defined as the modulation of light levels resulting from the periodic passage of a rotating wind turbine blade between the sun and a viewer. The duration of shadow flicker experienced at a specific location can be determined using a purely geometric analysis which takes into account the relative positions of the sun throughout the year, the wind turbines at the site, and the viewer. This method has been used to determine the shadow flicker duration at sensitive locations in proximity to the Project.

It should be noted, as described in Section 4.3, that there are several simplifications and conservative assumptions inherent within the model, which may result in an overestimate of shadow flicker duration.

3 DESCRIPTION OF THE WIND FARM SITE

3.1 Site Description

The Project site is located in southern Ontario, in the County of Haldimand, near the city of Nanticoke. The Project began operations in August 2013 and is situated in simple terrain, generally consisting of open farmland. Land cover on and near the site consists primarily of arable farmland, interspersed with farmhouses and outbuildings surrounded by small wind breaks of deciduous trees. The site elevation ranges from 174 m to 216 m.

3.2 Wind Farm Layout

The turbine layout, which consists of 56 Siemens S2.2 – 2.221 MW wind turbine generators with a hub height of 80 m and rotor diameters of 93 m and 101 m, has been supplied by the Client [1]. The precise coordinates of each turbine are presented in Appendix A.

3.3 Receptor Locations

A list of receptors to be considered as shadow flicker receptors has been provided by the Client [2]. For the purposes of this analysis, only residential dwellings are considered to be receptors. Of the 2,419 receptors provided by the Client, the shadow flicker duration is calculated for 1,308 receptors located within 1,305 m (10 times the tip height, as explained in Section 4.2) of a turbine. The ID numbers and coordinates of these receptors are listed in Appendix B.

3.4 Applicable Provincial Guidance

There are no applicable provincial or county requirements with regards to shadow flicker in Ontario or Haldimand County, and this analysis is therefore being completed in accordance with industry best practice.

4 SHADOW FLICKER ASSESSMENT

4.1 Overview

Shadow flicker may occur under certain combinations of circumstances with regards to the position of the sun and wind direction; when the sun passes behind the rotating blades of a wind turbine, a moving shadow is cast in front of or behind the turbine. When viewed from a stationary position, the moving shadows cause periodic flickering of the sunlight, otherwise known as the "shadow flicker" phenomenon.

The effect is most noticeable inside buildings, where the flicker appears through a window opening. The likelihood and duration of the effect depends on a number of variables, namely:

- Orientation of the building relative to the turbine;
- Wind direction: the shape and intensity of the shadow are determined by the position of the sun relative to the blades (the turbine rotor continuously yaws to face the wind so the rotor plane will always be perpendicular to the wind direction;
- Distance from turbine: the farther the observer from the turbine, the less pronounced the effect;
- Turbine height and rotor diameter: a larger turbine rotor diameter will cast a larger shadow, meaning a larger area will be prone to incidences of shadow flicker;
- Time of year and day: position of sun relative to the horizon;
- Weather conditions: cloud cover reduces the occurrence of shadow flicker;
- Vegetation and other obstacles that help to mask shadows; and
- Operational status of turbines.

4.2 Assessment Methodology

The number of hours of shadow flicker experienced annually at a given location can be calculated using a geometrical model which takes into account the sun's position, topography of the wind farm site, and wind turbine specifications such as rotor diameter and hub height.

The wind turbine has been modeled assuming all wind turbines are disc objects oriented perpendicular to the sun-turbine vector, representing the maximum duration for which there is potential for shadow flicker to occur.

Shadow flicker has been calculated at the subject receptors (i.e. residences) at a height of 2 m to represent ground floor windows. Rather than facing a particular direction, shadow flicker receptors (windows) are simulated as horizontal planes, meaning they experience shadow flicker over 360°; this assumption therefore represents a worst case scenario. Simulations have been carried out with a resolution of 1 minute; if shadow flicker occurs in any 1 minute period, the model registers this as 1 minute of shadow flicker.

It is generally accepted that shadow flicker from wind turbines does not occur beyond a distance, D, from a given wind turbine. The UK wind industry considers this distance to be equivalent to 10 rotor diameters [3], while the Danish wind industry suggests a value of between 500 and 1000 m [4]. DNV GL has adopted a conservative approach and has assumed the distance, D, that a shadow can be cast to be defined as follows:

$$D = 10 \times (\text{hub height} + \text{rotor radius})$$

Beyond this distance, D, a viewer does not perceive the turbine blade to be chopping the light, but rather as an object passing in front of the sun.

Shadow flicker calculations can be adjusted using an annual cloud coverage figure which is based on historical meteorological data and statistics. According to data gathered from meteorological stations, annual cloud cover can be estimated and applied as a percentage. Furthermore, using the site-specific wind rose to consider the probability of the turbines being oriented in a given direction could lead to significant further reduction in the annual shadow flicker occurrence.

No attempt has been made to account for vegetation or other shielding effects around each shadow receptor in the calculations of shadow flicker duration. Similarly, neither turbine operational shut-down nor the site-specific wind rose have been considered in this analysis. Consideration of these factors could lead to a significant reduction of the levels of shadow flicker predicted.

4.3 Simplification and Conservative Assumptions

Shadow flicker duration calculated in the manner described above has several limitations and may over-estimate the annual number of hours of shadow flicker experienced at a specified location for several reasons, namely:

- The modeling of the wind turbine blades as discs rather than individual blades may result in an overestimate of shadow flicker duration.
- Turbine blades are of non-uniform thickness with the thickest part of the blade (maximum chord) close to the hub and the thinnest part (minimum chord) at the tip. Diffusion of sunlight, as discussed above, results in a limit to the maximum distance that a shadow can be perceived. This maximum distance will also be dependent on the thickness of the turbine blade and the human threshold for perception of light intensity variation. As such, a shadow cast by the blade tip will be shorter than the shadow cast by the thickest part of the blade [5].
- The wind turbine will not always be yawed such that its rotor is perpendicular to the sun-turbine vector. Any other rotor orientation will reduce the area of the projected shadow, and thus the incidence of shadow flicker. Additionally, the orientation of windows on a given house has not been taken into account, i.e. the model assumes that a window is always facing the turbine(s). The wind speed and direction frequency distribution, or wind rose, at the site can be used to determine probable turbine orientation in order to calculate the resulting reduction in shadow flicker duration; however this has not been done in this study.
- Aerosols (moisture, dust, smoke, etc.) in the atmosphere have the ability to influence shadows cast by a wind turbine. The length of the shadow cast by a wind turbine is dependent on the degree that direct sunlight is diffused, which in turn is dependent on the amount of dispersants (humidity, smoke and other aerosols) in the path between the light source (sun) and the receiver [5].
- The occurrence of cloud cover has the potential to significantly reduce the number of hours of shadow flicker. Cloud cover measurements recorded at nearby meteorological stations may be used to estimate probable levels of cloud cover, and to provide an indication of the resulting reduction in shadow flicker duration (see Section 4.4).
- The presence of vegetation or other physical barriers around a shadow receptor location may shield the view of the wind turbine, and therefore reduce the incidence of shadow flicker.
- Periods where the wind turbine is not in operation due to low winds, high winds, or for operational and maintenance reasons will also reduce shadow flicker occurrence.

In light of the reasons listed above the shadow flicker durations presented in Section 5 can be regarded as conservative.

4.4 Current Analysis

The shadow flicker assessment for the Project has been conducted for 56 Siemens S2.221 MW turbines using the method described in Section 4.2. The turbines have been modelled assuming all wind turbines are disc objects oriented perpendicular to the sun-receptor vector, representing the maximum duration for which there is potential for shadow flicker to occur.

All receptors provided by the Client located within distance, D, from any turbine, defined in Section 4.2, have been included in the study. For the Siemens S2.2 – 2.221 MW wind turbine generator, distance, D, was calculated using the higher of the two blade tip heights included in the Project, which is 130.5 m. Distance, D, therefore equates to 1,305 m.

In order to render more realistic shadow flicker results, cloud cover statistics have been considered. According to data gathered from the London International Airport meteorological station, it has been estimated that the cloud cover is sufficient to nullify shadow flicker occurrence 66.1% of the time on an annual basis.

The model does not take into account any obstacles; for example vegetation, mountains, or other shielding effects, around each shadow receptor in calculating the shadow flicker duration. Similarly, neither turbine operational shut-down nor the site-specific wind rose have been considered in this analysis. Consideration of these factors could lead to a significant reduction of the levels of shadow flicker predicted.

5 RESULTS

An analysis has been conducted to determine the duration of shadow flicker predicted for receptors in the vicinity of the Summerhaven Wind Energy Centre in Ontario. This analysis was undertaken specifically for the Siemens S2.2 wind turbine with a hub height of 80 m and rotor diameters of 93 m and 101 m.

A map illustrating predicted shadow flicker duration at receptors in the vicinity of the Project is presented in Figure 1. This map takes into account average annual cloud cover. For illustrative purposes shadow flicker is shown at isopleths of 30 hours of flicker per year, taking into account annual cloud cover.

The results of the shadow flicker assessment are presented for the 573 of 1,308 receptors that are located within 1,305 m of a turbine (in terms of maximum minutes per day and total hours per year) and are expected to experience some incidence of shadow flicker. These results are presented in tabular format in Appendix B.

The receptor that is predicted to experience the most hours of shadow flicker in one year is receptor SMH2364. The predicted duration of shadow flicker at this receptor is 29 hours per year, taking into account annual cloud cover. Receptor SMH2364 also experiences the most anticipated days of flicker exposure at 219 days; however, the highest predicted minutes of shadow flicker in one day at this receptor is 41 minutes. Receptor SMH2360 has the highest predicted value of minutes of shadow flicker in one day, with a total of 70 minutes, predicted to occur on September 4. There are 735 receptors which are not expected to experience any incidence of shadow flicker.

Results in hours per year take into account the cloud cover from the London International Airport meteorological station, but as described in Section 4.3, these results are still considered to be conservative.

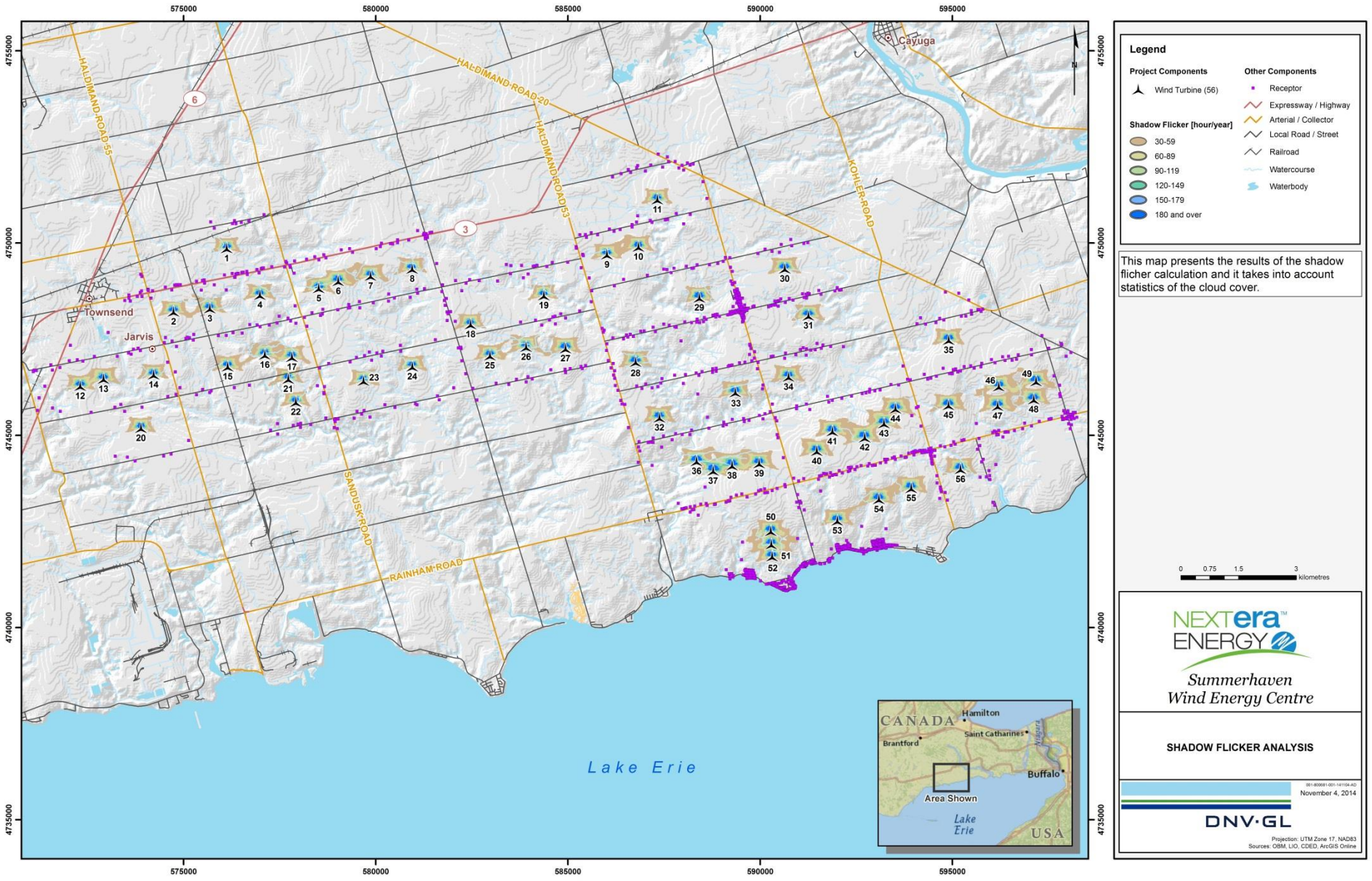

Figure 1: Summerhaven Shadow Flicker Map

6 CONCLUSION

An analysis has been conducted to predict the duration of shadow flicker to be experienced at receptors in the vicinity of the Summerhaven Wind Energy Centre. This analysis was undertaken specifically for the Siemens S2.2 – 2.2 MW wind turbine with a hub height of 80 m and rotor diameters of 93 m and 101 m.

The receptor that is predicted to experience the most hours of shadow flicker in one year is receptor SMH2364. The predicted duration of shadow flicker at this receptor is 29 hours per year, taking into account annual cloud cover. Receptor SMH2364 also experiences the most anticipated days of flicker exposure at 219 days; however, the highest predicted minutes of shadow flicker in one day at this receptor is 41 minutes. Receptor SMH2360 has the highest predicted value of minutes of shadow flicker in one day, with a total of 70 minutes, predicted to occur on September 4. There are 735 receptors which are not expected to experience any incidence of shadow flicker.

Detailed results for each of the 573 receptors that are located within 1,305 m of a turbine and are expected to experience some shadow flicker can be found in Appendix B. The duration experienced in hours per year takes into account average yearly cloud cover from the London International Airport meteorological station. Nevertheless, as described in Section 4.3, several other conservative assumptions have been made in this analysis.

7 REFERENCES

[1] Turbine Locations sent by email, C. Mitchell, NextEra Energy Resources, to E. Crivella, DNV GL, 2 April 2014, "Summerhaven_Turbines_Operational_WindLogics.xlsx"

[2] Receptor Locations sent by email, C. Mitchell, NextEra Energy Resources, to K. Kallevig-Childers, DNV GL, 14 April 2014, "Summerhaven_Receptors.gdb.zip"

[3] Department for Business Enterprise & Regulatory Reform, UK, "Onshore Wind: Shadow Flicker", http://www.berr.gov.uk/whatwedo/energy/sources/renewables/planning/onshore-wind/shadow-flicker/page18736.html, viewed 23 July 2010.

[4] Danish Wind Industry Association, "Shadow variations from Wind turbines", http://guidedtour.windpower.org/en/tour/env/shadow/shadow2.htm, viewed 22 July 2010.

[5] Freud H-D, Kiel F.H., "Influences of the opaqueness of the atmosphere, the extension of the sun and rotor blade profile on the shadow impact of wind turbine", DEWI Magazine No. 20 pp 43-51, Feb 2002.

APPENDIX A: TURBINE LAYOUT

Turbine ID	UTM Coordinates Easting [m][1]	Northing [m] [1]	Model
1	576124	4749873	S2.2 93mRD 80mHH
2	574742	4748226	S2.2 93mRD 80mHH
3	575685	4748309	S2.2 93mRD 80mHH
4	576990	4748661	S2.2 93mRD 80mHH
5	578518	4748834	S2.2 93mRD 80mHH
6	579024	4749020	S2.2 93mRD 80mHH
7	579869	4749157	S2.2 93mRD 80mHH
8	580947	4749341	S2.2 93mRD 80mHH
9	586015	4749711	S2.2 93mRD 80mHH
10	586837	4749912	S2.2 93mRD 80mHH
11	587326	4751141	S2.2 93mRD 80mHH
12	572316	4746292	S2.2 93mRD 80mHH
13	572920	4746475	S2.2 93mRD 80mHH
14	574224	4746586	S2.2 93mRD 80mHH
15	576150	4746799	S2.2 93mRD 80mHH
16	577118	4747104	S2.2 93mRD 80mHH
17	577821	4747047	S2.2 93mRD 80mHH
18	582468	4747896	S2.2 93mRD 80mHH
19	584373	4748649	S2.2 93mRD 80mHH
20	573893	4745199	S2.2 93mRD 80mHH
21	577726	4746477	S2.2 93mRD 80mHH
22	577924	4745876	S2.2 93mRD 80mHH
23	579685	4746426	S2.2 93mRD 80mHH
24	580952	4746798	S2.2 93mRD 80mHH
25	582973	4747085	S2.2 93mRD 80mHH
26	583914	4747307	S2.2 93mRD 80mHH
27	584940	4747269	S2.2 101mRD 80mHH
28	586761	4746915	S2.2 101mRD 80mHH
29	588422	4748589	S2.2 101mRD 80mHH
30	590644	4749342	S2.2 101mRD 80mHH
31	591259	4748123	S2.2 101mRD 80mHH
32	587382	4745469	S2.2 101mRD 80mHH
33	589357	4746128	S2.2 101mRD 80mHH
34	590739	4746531	S2.2 101mRD 80mHH
35	594906	4747489	S2.2 101mRD 80mHH
36	588348	4744337	S2.2 101mRD 80mHH
37	588779	4744087	S2.2 101mRD 80mHH
38	589271	4744225	S2.2 101mRD 80mHH
39	589975	4744279	S2.2 101mRD 80mHH

Turbine ID	UTM Coordinates Easting [m][1]	Northing [m] [1]	Model
40	591474	4744600	S2.2 101mRD 80mHH
41	591880	4745113	S2.2 101mRD 80mHH
42	592721	4744952	S2.2 101mRD 80mHH
43	593224	4745318	S2.2 101mRD 80mHH
44	593522	4745702	S2.2 101mRD 80mHH
45	594900	4745794	S2.2 101mRD 80mHH
46	596210	4746279	S2.2 101mRD 80mHH
47	596180	4745774	S2.2 101mRD 80mHH
48	597119	4745943	S2.2 101mRD 80mHH
49	597178	4746411	S2.2 101mRD 80mHH
50	590280	4742516	S2.2 101mRD 80mHH
51	590292	4742174	S2.2 101mRD 80mHH
52	590314	4741857	S2.2 101mRD 80mHH
53	592008	4742791	S2.2 101mRD 80mHH
54	593089	4743349	S2.2 101mRD 80mHH
55	593930	4743637	S2.2 101mRD 80mHH
56	595213	4744131	S2.2 101mRD 80mHH

[1] UTM Zone 17N, NAD83 datum

APPENDIX B: RECEPTOR LOCATIONS AND ASSOCIATED SHADOW FLICKER

Denotes Client-designated sensitive receptor

Receptor ID	UTM Coordinates		Number of days per year	Worst day	Minutes on worst day [min/day]	Total Hours in Year [hrs/yr]		Turbine IDs contributing to the events	Closest turbine	
	Easting [m][2]	Northing [m] [2]				Without cloud cover	Taking into account cloud cover		Distance [m]	ID
SMH2364	590974	4742315	219	27-Jul	41	84	29	50 51 52 53	696	51
SMH2395	593946	4745512	154	14-Jun	53	80	27	43 44 45	465	44
SMH2347	574585	4746899	93	12-Jan	48	65	22	14	478	14
SMH2381	578482	4746289	151	11-Jan	33	56	19	21 22 23	694	22
SMH2360	594066	4745717	94	4-Sep	70	54	18	43 44 45	544	44
SMH1704	590063	4746209	121	2-Jun	34	54	18	33 34	711	33
SMH251	586218	4746676	91	28-May	42	54	18	28	593	28
SMH883	589540	4742221	152	26-Jul	32	53	18	50 51 52	753	51
SMH1948	595724	4743910	80	5-Jun	45	52	18	56	557	56
SMH2400	594110	4745746	97	8-Sep	61	49	17	43 44 45	590	44
SMH186	594599	4743949	113	5-Aug	38	49	17	55 56	640	56
SMH2297	597791	4746300	107	25-Apr	38	48	16	48 49	623	49
SMH278	578538	4746750	120	24-Feb	39	47	16	17 21 23	776	17
SMH2354	582068	4747963	67	23-Sep	52	45	15	18	406	18
SMH2330	590073	4746307	105	8-May	36	44	15	33 34	703	34
SMH776	589516	4741766	105	10-Apr	30	38	13	51 52	803	52
SMH2411	597646	4746544	60	4-Oct	49	38	13	49	487	49
SMH290	590857	4748513	62	15-Dec	44	37	12	31	560	31
SMH2272	594304	4747893	91	19-Jan	35	36	12	35	725	35
SMH15	597792	4746082	88	9-Mar	34	36	12	48 49	687	48
SMH1279	585346	4749357	119	14-Jun	31	36	12	9 19	757	9

Receptor ID	UTM Coordinates		Number of days per year	Worst day	Minutes on worst day [min/day]	Total Hours in Year [hrs/yr]		Turbine IDs contributing to the events	Closest turbine	
	Easting [m][2]	Northing [m] [2]				Without cloud cover	Taking into account cloud cover		Distance [m]	ID
SMH166	577875	4749217	82	14-Nov	52	36	12	4 5 6	748	5
SMH1648	578654	4746078	126	2-Mar	29	35	12	21 22 23	757	22
SMH1216	589622	4741515	75	4-Jul	34	34	12	52	772	52
SMH1968	592983	4746155	65	11-Dec	36	34	11	44	704	44
SMH191	586124	4746751	95	29-Apr	38	33	11	27 28	658	28
SMH126	595567	4746747	76	30-Nov	33	33	11	46	795	46
SMH1759	578648	4746110	116	25-Feb	29	33	11	21 22 23	761	22
SMH1688	590604	4744416	84	9-Mar	37	33	11	39 40	644	39
SMH2378	590756	4748559	63	25-Dec	39	33	11	31	666	31
SMH2031	591017	4741530	70	4-Jun	33	33	11	52	775	52
SMH1562	586179	4746866	82	9-Apr	41	32	11	27 28	584	28
SMH509	577780	4749370	88	15-Dec	33	32	11	4 5 6	912	5
SMH950	581947	4748217	68	31-Jan	37	32	11	18	612	18
SMH1350	585479	4750149	65	2-Jan	34	31	11	9	692	9
SMH1754	592850	4746195	73	1-Dec	31	31	10	44	833	44
SMH14	597896	4745638	92	18-May	30	31	10	48	835	48
SMH1547	592643	4742631	64	4-May	38	30	10	53	655	53
SMH741	583841	4749095	63	1-Jan	34	30	10	19	694	19
SMH1476	595886	4743918	70	10-May	36	30	10	56	706	56
SMH1743	594672	4743360	80	23-Jul	31	29	10	55	792	55
SMH2289	594545	4744607	74	26-Nov	31	29	10	56	820	56
SMH552	591316	4741702	105	17-Apr	23	29	10	51 52	1014	52
SMH2307	597927	4745571	74	31-May	29	29	10	48	890	48
SMH265	594603	4743762	83	14-Mar	34	29	10	55 56	685	55
SMH2128	591047	4741599	72	23-Jul	32	28	10	52	777	52
SMH1636	581807	4748378	72	7-Jan	29	28	10	18	818	18
SMH269	578668	4746264	95	19-Apr	27	28	10	21 22 23	839	22

Receptor ID	UTM Coordinates		Number of days per year	Worst day	Minutes on worst day [min/day]	Total Hours in Year [hrs/yr]		Turbine IDs contributing to the events	Closest turbine	
	Easting [m][2]	Northing [m][2]				Without cloud cover	Taking into account cloud cover		Distance [m]	ID
SMH1684	576338	4749110	81	19-Jan	30	28	10	4	792	4
SMH1630	591277	4741682	96	20-Apr	25	28	9	51 52	979	52
SMH715	589601	4741486	67	22-Jun	32	28	9	52	804	52
SMH1481	595760	4744308	53	3-Mar	42	28	9	56	575	56
SMH1685	576330	4749114	81	14-Jan	28	27	9	4	786	1
SMH2376	572381	4746929	59	18-Dec	34	27	9	13	640	12
SMH1554	591330	4741706	108	26-Aug	23	27	9	51 52	1027	52
SMH984	589251	4748209	77	31-May	27	27	9	29	912	29
SMH590	589220	4748210	72	3-Jul	29	27	9	29	883	29
SMH640	588215	4745136	89	20-Jul	29	26	9	32	810	36
SMH605	595978	4743848	72	15-May	30	26	9	56	816	56
SMH2006	591365	4741660	100	20-Apr	22	26	9	51 52	1069	52
SMH1211	594510	4744611	78	14-Jan	28	26	9	56	851	56
SMH1378	591346	4741657	97	20-Aug	24	26	9	51 52	1051	52
SMH181	591006	4743117	81	18-Dec	28	26	9	50 53	942	50
SMH1799	571783	4746763	73	17-Dec	32	26	9	12 13	711	12
SMH2299	595478	4746807	69	2-Dec	29	26	9	46	890	35
SMH1595	589272	4748215	82	26-May	26	26	9	29	929	29
SMH1773	586358	4750353	55	15-Dec	35	26	9	10	651	10
SMH1266	572239	4746962	71	30-Nov	29	26	9	13	674	12
SMH1871	591331	4741655	93	22-Apr	24	25	9	51 52	1037	52
SMH1767	590656	4748454	59	1-Feb	36	25	9	31	688	31
SMH1293	591388	4741665	102	19-Apr	22	25	8	51 52	1091	52
SMH1728	591175	4741697	86	19-Apr	26	25	8	51 52	876	52
SMH731	586013	4747377	86	23-Jan	28	24	8	27 28	879	28
SMH305	590874	4743886	82	26-May	26	24	8	39	933	40
SMH412	574156	4748568	58	9-Nov	33	24	8	2	678	2
SMH1741	585309	4750215	69	13-Jan	27	24	8	9	867	9

Receptor ID	UTM Coordinates		Number of days per year	Worst day	Minutes on worst day [min/day]	Total Hours in Year [hrs/yr]		Turbine IDs contributing to the events	Closest turbine	
	Easting [m][2]	Northing [m][2]				Without cloud cover	Taking into account cloud cover		Distance [m]	ID
SMH2202	595802	4744377	51	17-Feb	37	24	8	56	638	56
SMH1579	591098	4741578	66	24-Jul	30	24	8	52	832	52
SMH1865	574908	4746240	60	12-Jun	30	24	8	14	767	14
SMH2386	575463	4748777	67	8-Jan	26	24	8	2	518	3
SMH2316	598047	4745532	78	14-Jul	25	24	8	48	1015	48
SMH2375	573638	4747109	41	25-Dec	47	24	8	13 14	785	14
SMH1893	594173	4748052	59	7-Dec	28	23	8	35	924	35
SMH578	589326	4748181	78	30-May	25	23	8	29	992	29
SMH1864	574790	4746646	47	21-Mar	38	23	8	14	569	14
SMH1772	588180	4750745	73	31-May	24	23	8	11	941	11
SMH1063	586049	4746944	73	25-Mar	32	23	8	27 28	713	28
SMH319	573217	4745731	58	1-Jan	28	23	8	20	801	13
SMH873	592840	4746123	63	24-Jan	32	23	8	44	801	44
SMH2205	573468	4745622	49	20-Dec	36	23	8	20	600	20
SMH936	592379	4744169	70	5-Jun	25	23	8	40	854	42
SMH951	588762	4746633	52	16-Dec	32	22	8	33	780	33
SMH352	594447	4744667	69	15-Jan	26	22	8	56	935	56
SMH507	576267	4749206	61	2-Jan	27	22	8	4	682	1
SMH1239	586199	4750303	59	14-Nov	31	22	8	10	620	9
SMH924	591352	4741712	91	26-Aug	23	22	7	51 52	1048	52
SMH2065	591325	4741740	86	12-Apr	24	22	7	51 52	1018	52
SMH2249	591146	4743061	84	24-Feb	26	22	7	50 53	903	53
SMH1206	591110	4741584	59	10-May	29	22	7	52	842	52
SMH855	591407	4741669	98	22-Aug	21	21	7	51 52	1109	52
SMH1825	591226	4741664	82	23-Apr	26	21	7	51 52	932	52
SMH513	591345	4742164	94	3-Aug	21	21	7	50 51 52	913	53
SMH2275	581878	4748159	49	13-Feb	34	21	7	18	646	18
SMH1331	589283	4748163	66	12-Jun	26	21	7	29	961	29

Receptor ID	UTM Coordinates		Number of days per year	Worst day	Minutes on worst day [min/day]	Total Hours in Year [hrs/yr]		Turbine IDs contributing to the events	Closest turbine	
	Easting [m][2]	Northing [m][2]				Without cloud cover	Taking into account cloud cover		Distance [m]	ID
SMH2348	580649	4747186	45	20-Dec	43	21	7	23 24	492	24
SMH1606	578779	4746867	90	20-Aug	22	21	7	17 21 23	975	17
SMH2169	571550	4746832	69	30-Nov	25	21	7	12	937	12
SMH555	581855	4748208	50	7-Feb	33	21	7	18	688	18
SMH1152	591182	4741677	78	22-Apr	26	21	7	51 52	886	52
SMH953	577766	4749412	57	9-Dec	26	21	7	5	948	5
SMH2373	585398	4749675	46	5-Sep	36	21	7	9	618	9
SMH1849	586003	4747206	67	22-Oct	29	20	7	27 28	812	28
SMH2278	591095	4741619	54	3-Aug	30	20	7	52	816	52
SMH1984	591374	4741705	86	25-May	22	20	7	51 52	1071	52
SMH1958	591157	4741682	75	22-Apr	28	20	7	51 52	861	52
SMH312	591124	4741590	56	28-Jul	29	20	7	52	853	52
SMH1978	581858	4747983	44	15-Mar	35	20	7	18	616	18
SMH118	598005	4745587	66	21-Jul	27	20	7	48	955	48
SMH2317	598115	4745466	68	5-Jun	22	19	7	48	1104	48
SMH1158	589299	4741349	71	8-Jul	22	19	7	52	1135	52
SMH722	589297	4748225	69	17-Jul	26	19	7	29	948	29
SMH2374	585385	4749705	43	31-Mar	35	19	6	9	630	9
SMH113	598081	4745469	64	10-Jun	24	19	6	48	1072	48
SMH868	589675	4741495	51	21-Jun	29	19	6	52	734	52
SMH2298	597962	4747054	53	11-Dec	26	19	6	49	1014	49
SMH1004	590997	4741498	50	19-Jun	30	19	6	52	772	52
SMH408	584676	4747896	59	7-Jan	25	19	6	26	680	27
SMH2175	574081	4748769	51	14-Dec	28	19	6	2	855	2
SMH2410	596372	4746945	76	18-Jan	26	19	6	49	685	46
SMH1013	591110	4741625	52	4-May	30	19	6	52	829	52
SMH1707	591188	4741664	72	14-Aug	27	19	6	51 52	895	52
SMH205	591423	4741673	85	23-Aug	20	19	6	51 52	1124	52

Receptor ID	UTM Coordinates		Number of days per year	Worst day	Minutes on worst day [min/day]	Total Hours in Year [hrs/yr]		Turbine IDs contributing to the events	Closest turbine	
	Easting [m][2]	Northing [m][2]				Without cloud cover	Taking into account cloud cover		Distance [m]	ID
SMH493	595971	4743954	48	12-Aug	32	19	6	56	778	56
SMH403	591380	4741719	78	13-Apr	22	19	6	51 52	1075	52
SMH1924	591103	4741648	50	2-May	30	18	6	52	816	52
SMH923	593061	4742287	66	5-Jun	22	18	6	53	1062	54
SMH1238	589943	4749728	52	31-Jan	31	18	6	30	800	30
SMH317	594540	4744456	50	1-Nov	32	18	6	56	747	56
SMH2296	596018	4746968	97	30-May	18	18	6	35 49	715	46
SMH515	591138	4741596	52	7-May	29	18	6	52	864	52
SMH876	592347	4744156	60	19-Jun	25	18	6	40	879	42
SMH2267	582238	4746938	61	20-Apr	30	18	6	24 25	750	25
SMH988	585307	4748233	78	26-May	22	18	6	19	1022	19
SMH122	597807	4746007	42	24-Mar	34	18	6	48	691	48
SMH2067	581584	4749466	42	12-Mar	34	18	6	8	649	8
SMH182	578201	4749579	73	14-Jan	24	18	6	6	810	5
SMH483	594463	4744597	62	23-Jan	28	18	6	56	883	56
SMH641	591003	4743813	76	30-May	22	18	6	39	917	40
SMH115	598170	4745436	66	3-Jul	22	18	6	48	1167	48
SMH461	590952	4745765	65	29-Nov	23	18	6	41	795	34
SMH1899	592466	4744108	64	27-Jun	23	18	6	40	882	42
SMH830	591144	4741674	64	13-Aug	29	18	6	51 52	850	52
SMH1321	591124	4741631	48	3-May	29	18	6	52	841	52
SMH2393	573275	4747054	74	5-Feb	20	18	6	12 14	679	13
SMH2247	592106	4748779	57	7-Jan	24	17	6	31	1071	31
SMH1992	591368	4741760	73	9-Apr	22	17	6	51 52	1058	52
SMH1966	590534	4748545	55	27-Jan	28	17	6	31	805	30
SMH2301	596309	4747042	58	3-Dec	24	17	6	49	769	46
SMH1421	593102	4742276	69	31-May	20	17	6	53	1073	54
SMH1929	580120	4749907	69	15-Jan	24	17	6	8	791	7

Receptor ID	UTM Coordinates		Number of days per year	Worst day	Minutes on worst day [min/day]	Total Hours in Year [hrs/yr]		Turbine IDs contributing to the events	Closest turbine	
	Easting [m][2]	Northing [m][2]				Without cloud cover	Taking into account cloud cover		Distance [m]	ID
SMH528	592063	4748777	51	10-Dec	25	17	6	31	1036	31
SMH2246	576112	4748780	61	14-Mar	25	17	6	3 4	636	3
SMH1047	589356	4748188	66	26-May	25	17	6	29	1016	29
SMH112	598026	4745480	58	19-Jun	25	17	6	48	1018	48
SMH791	591440	4741675	79	17-Apr	19	17	6	51 52	1141	52
SMH455	595953	4744079	43	1-Sep	33	17	6	56	742	56
SMH744	574884	4748914	53	1-Jan	23	17	6	3	703	2
SMH1873	593804	4744432	68	5-Jul	21	17	6	42	805	55
SMH1253	591170	4741581	50	7-May	27	17	6	52	899	52
SMH1800	591155	4741603	49	4-Aug	29	17	6	52	879	52
SMH1414	576362	4749196	46	20-Dec	28	17	6	4	718	1
SMH790	591429	4741689	76	16-Apr	21	17	6	51 52	1128	52
SMH496	574846	4748910	60	9-Jan	22	17	6	3	692	2
SMH1878	578927	4745416	74	30-May	21	17	6	22	1103	22
SMH133	596556	4746949	45	16-Dec	28	17	6	49	754	46
SMH119	598074	4745546	62	22-May	23	16	6	48	1034	48
SMH184	591193	4741651	67	15-Aug	27	16	6	51 52	903	52
SMH1315	591141	4741638	46	30-Apr	29	16	6	52	856	52
SMH173	576289	4747671	68	14-Jan	22	16	6	16	879	3
SMH1534	589292	4741313	61	25-Jun	21	16	6	52	1158	52
SMH639	577904	4748365	80	3-Aug	23	16	6	4 6	773	5
SMH2239	593111	4742247	62	10-Jun	21	16	5	53	1102	54
SMH1148	589858	4747173	56	2-Dec	22	16	5	34	1090	34
SMH2212	591131	4741665	45	26-Apr	29	16	5	52	839	52
SMH1947	574077	4748783	46	20-Dec	26	16	5	2	867	2
SMH900	591402	4741745	70	31-Aug	21	16	5	51 52	1094	52
SMH1931	586577	4745197	50	5-Aug	29	16	5	32	850	32
SMH2342	587483	4744981	52	5-Jan	23	16	5	36	498	32

Receptor ID	UTM Coordinates		Number of days per year	Worst day	Minutes on worst day [min/day]	Total Hours in Year [hrs/yr]		Turbine IDs contributing to the events	Closest turbine	
	Easting [m][2]	Northing [m][2]				Without cloud cover	Taking into account cloud cover		Distance [m]	ID
SMH1088	587713	4744885	44	18-Dec	28	16	5	36	671	32
SMH1427	593154	4742237	65	5-Jun	19	16	5	53	1114	54
SMH401	589275	4749262	52	3-Jan	22	16	5	29	1087	29
SMH698	593038	4742268	58	25-Jun	23	16	5	53	1082	54
SMH1340	594700	4743572	41	9-Apr	30	16	5	55	759	56
SMH789	594465	4744559	52	29-Jan	29	16	5	56	862	56
SMH268	594690	4743622	40	3-Apr	31	16	5	55	730	56
SMH526	594714	4743534	42	15-Apr	30	16	5	55	778	56
SMH2035	591169	4741608	47	3-May	27	16	5	52	891	52
SMH120	598006	4745637	50	11-May	26	15	5	48	938	48
SMH1072	588377	4746072	68	7-Sep	23	15	5	32 33	982	33
SMH2011	594686	4743655	40	12-Sep	32	15	5	55	710	56
SMH1995	589249	4748153	56	25-Jun	23	15	5	29	935	29
SMH1236	591155	4741644	45	10-Aug	27	15	5	52	868	52
SMH2350	592754	4746101	46	3-Feb	28	15	5	44	865	44
SMH2361	593768	4744422	60	19-Jun	21	15	5	42	802	55
SMH1676	591183	4741614	44	8-Aug	28	15	5	52	902	52
SMH837	574809	4748916	63	13-Jan	20	15	5	3	693	2
SMH1619	591169	4741649	50	27-Apr	27	15	5	51 52	880	52
SMH439	594485	4744253	41	11-Mar	32	15	5	56	738	56
SMH2291	571589	4746696	47	30-Jan	28	15	5	12	832	12
SMH475	573572	4747140	43	20-Dec	26	15	5	14	856	14
SMH824	577685	4749486	47	24-Dec	23	15	5	5	1058	5
SMH1430	586079	4750359	49	14-Nov	26	14	5	10	651	9
SMH786	593183	4742246	70	31-May	19	14	5	53	1107	54
SMH1979	581550	4747487	57	23-May	23	14	5	18	912	24
SMH2012	590497	4748500	45	3-Nov	28	14	5	31	850	31
SMH1985	574916	4748918	45	18-Dec	24	14	5	3	714	2

Receptor ID	UTM Coordinates		Number of days per year	Worst day	Minutes on worst day [min/day]	Total Hours in Year [hrs/yr]		Turbine IDs contributing to the events	Closest turbine	
	Easting [m][2]	Northing [m][2]				Without cloud cover	Taking into account cloud cover		Distance [m]	ID
SMH2244	591751	4746011	56	19-Jun	21	14	5	34	907	41
SMH491	594386	4744644	57	18-Nov	25	14	5	56	973	56
SMH2398	579587	4748315	65	5-Jun	18	14	5	5	888	7
SMH331	591197	4741620	43	30-Apr	27	14	5	52	914	52
SMH1131	589542	4748052	68	5-Jun	18	14	5	29	1242	29
SMH114	598138	4745512	58	24-May	22	14	5	48	1106	48
SMH1558	593666	4744459	54	19-Jun	22	14	5	42	863	55
SMH1180	590129	4749838	38	16-Dec	28	14	5	30	715	30
SMH1536	589212	4741319	71	30-May	19	14	5	52	1226	52
SMH834	592295	4744161	51	19-Jun	22	14	5	40	898	42
SMH2210	594468	4744346	40	28-Feb	30	14	5	56	775	56
SMH1660	594465	4744276	38	9-Mar	30	14	5	56	762	56
SMH2255	594429	4744565	48	31-Jan	27	14	5	56	896	56
SMH1277	589214	4741264	59	26-Jun	19	14	5	52	1250	52
SMH1368	578944	4745354	56	12-Jun	19	14	5	22	1146	22
SMH432	589379	4748192	56	22-May	22	14	5	29	1036	29
SMH2394	573371	4745801	72	31-May	19	14	5	12	797	20
SMH1374	589346	4748233	52	18-May	23	14	5	29	990	29
SMH1159	594453	4744451	42	14-Feb	30	14	5	56	825	56
SMH421	591211	4741626	53	30-Apr	26	14	5	51 52	926	52
SMH1940	586382	4751803	59	30-Nov	20	14	5	11	1153	11
SMH2008	592137	4744019	57	30-Nov	20	13	5	54	882	40
SMH2240	593141	4742280	65	13-Jul	20	13	5	53	1070	54
SMH222	589556	4748025	62	28-Jun	18	13	5	29	1267	29
SMH1146	592378	4746020	59	16-Dec	19	13	5	43 44	1035	41
SMH1758	575251	4747475	48	2-Jan	21	13	4	15	907	2
SMH614	589535	4748068	71	31-May	18	13	4	29	1229	29
SMH2013	594871	4743312	46	11-May	25	13	4	55	888	56

Receptor ID	UTM Coordinates		Number of days per year	Worst day	Minutes on worst day [min/day]	Total Hours in Year [hrs/yr]		Turbine IDs contributing to the events	Closest turbine	
	Easting [m][2]	Northing [m] [2]				Without cloud cover	Taking into account cloud cover		Distance [m]	ID
SMH413	585454	4750219	39	16-Dec	26	13	4	9	757	9
SMH129	598084	4747153	45	19-Dec	22	13	4	49	1171	49
SMH2332	575340	4746053	68	30-May	17	13	4	14	1101	15
SMH2362	582147	4747273	55	4-Mar	26	13	4	24 25	701	18
SMH810	573908	4748755	55	20-Nov	24	13	4	2	988	2
SMH2189	594436	4744475	41	12-Feb	29	13	4	56	850	56
SMH1208	593121	4742218	54	12-Jun	19	13	4	53	1131	54
SMH1831	594451	4744397	40	22-Feb	29	13	4	56	807	56
SMH1808	574074	4748798	40	20-Dec	24	13	4	2	879	2
SMH1525	590472	4748496	42	8-Feb	26	13	4	31	863	30
SMH996	580182	4747188	41	6-Nov	27	13	4	24	863	24
SMH161	590471	4748356	38	25-Feb	28	13	4	31	822	31
SMH544	594080	4747902	41	5-Feb	27	13	4	35	923	35
SMH1179	589945	4746895	42	10-Feb	27	13	4	34	873	34
SMH2405	582223	4747254	36	6-Mar	28	12	4	25	687	18
SMH1634	594426	4744510	42	8-Feb	27	12	4	56	874	56
SMH2142	589296	4748348	42	7-Aug	26	12	4	29	907	29
SMH866	589693	4741489	41	18-Jun	22	12	4	52	722	52
SMH2251	593129	4744281	40	20-Dec	23	12	4	55	785	42
SMH1228	573878	4747202	51	4-Jan	18	12	4	13	707	14
SMH859	590984	4741487	38	19-Jun	25	12	4	52	765	52
SMH1691	588490	4746655	50	25-Jan	23	12	4	33	1015	33
SMH1658	590948	4745690	50	19-Nov	24	12	4	41	867	34
SMH1019	582211	4747289	36	11-Oct	28	12	4	25	659	18
SMH887	589930	4746729	36	3-Mar	28	12	4	34	830	33
SMH1083	589763	4747254	46	3-Jan	19	12	4	34	1197	33
SMH540	589402	4748199	48	21-Jul	22	12	4	29	1055	29
SMH1115	585057	4746731	60	27-Jun	16	12	4	26	551	27

Receptor ID	UTM Coordinates		Number of days per year	Worst day	Minutes on worst day [min/day]	Total Hours in Year [hrs/yr]		Turbine IDs contributing to the events	Closest turbine	
	Easting [m][2]	Northing [m][2]				Without cloud cover	Taking into account cloud cover		Distance [m]	ID
SMH349	583503	4749202	52	19-Nov	22	12	4	19	1031	19
SMH2352	590317	4745812	42	9-May	23	12	4	33	834	34
SMH1781	581738	4748911	46	19-Jun	21	12	4	8	900	8
SMH743	594813	4743510	36	16-Apr	26	12	4	55	739	56
SMH2252	576389	4749201	37	17-Dec	24	11	4	4	722	1
SMH1466	590432	4745377	45	1-Jan	19	11	4	40	1189	39
SMH1343	589242	4749010	41	7-Feb	25	11	4	29	922	29
SMH667	589379	4748247	44	14-May	22	11	4	29	1016	29
SMH297	580012	4749852	57	31-Jan	21	11	4	6 8	710	7
SMH2235	594365	4744579	42	7-Nov	25	11	4	56	959	56
SMH1418	578953	4745428	51	25-May	21	11	4	22	1122	22
SMH1190	590420	4748481	38	13-Feb	26	11	4	31	890	30
SMH825	577664	4749518	40	18-Dec	21	11	4	5	1090	4
SMH1198	593908	4746443	61	18-Jan	19	11	4	45	836	44
SMH2344	592059	4744080	52	1-Dec	17	11	4	54	783	40
SMH1282	589567	4747999	56	19-Jun	17	11	4	29	1288	29
SMH2063	577627	4749376	45	19-Nov	22	11	4	5	958	4
SMH1469	592519	4744184	46	21-Jul	21	11	4	40	794	42
SMH800	585223	4749864	34	4-Oct	27	11	4	9	807	9
SMH1513	589554	4748003	56	19-Jun	17	11	4	29	1275	29
SMH341	575155	4747536	45	1-Jan	17	11	4	15	804	2
SMH1187	592656	4746086	38	11-Feb	25	11	4	44	947	44
SMH1311	574770	4748906	55	18-Jan	19	11	4	3	681	2
SMH561	586187	4746567	39	21-Jun	21	11	4	28	671	28
SMH2335	587774	4746562	42	11-May	22	10	4	28	1073	28
SMH315	592998	4744222	52	19-Nov	22	10	4	55	781	42
SMH1237	589425	4748200	44	18-May	21	10	4	29	1076	29
SMH1533	589261	4741400	46	20-May	20	10	4	52	1148	52

Receptor ID	UTM Coordinates		Number of days per year	Worst day	Minutes on worst day [min/day]	Total Hours in Year [hrs/yr]		Turbine IDs contributing to the events	Closest turbine	
	Easting [m][2]	Northing [m][2]				Without cloud cover	Taking into account cloud cover		Distance [m]	ID
SMH1412	580146	4747061	34	22-Feb	25	10	4	24	785	23
SMH2165	589529	4748090	53	26-May	18	10	4	29	1214	29
SMH185	595308	4746786	43	29-Jan	23	10	3	46	810	35
SMH682	589270	4748948	36	16-Feb	26	10	3	29	921	29
SMH1702	585212	4749901	34	4-Mar	26	10	3	9	825	9
SMH1328	589849	4747006	41	8-Nov	24	10	3	34	1006	33
SMH2363	576725	4747877	46	21-May	20	10	3	3	828	4
SMH2160	573919	4748609	37	8-Feb	23	10	3	2	908	2
SMH990	578146	4748065	56	12-Jun	15	10	3	4	854	5
SMH637	587068	4749159	53	19-Jun	17	10	3	9	788	10
SMH1710	590398	4748388	34	25-Feb	26	10	3	31	901	31
SMH960	576717	4746304	50	16-Apr	21	10	3	21 22	753	15
SMH2228	593169	4742290	48	24-May	19	10	3	53	1062	54
SMH116	598237	4745467	48	22-May	19	10	3	48	1215	48
SMH1512	575102	4747548	50	3-Dec	17	10	3	15	768	2
SMH1426	587493	4749320	38	17-Dec	20	10	3	29	884	10
SMH595	582031	4746232	51	19-Jun	17	10	3	24	1218	24
SMH117	598146	4745593	41	11-May	23	10	3	48	1085	48
SMH2408	578699	4745448	42	19-Jun	19	10	3	22	885	22
SMH2045	591292	4745670	33	19-Dec	23	10	3	41	810	41
SMH1726	593047	4742234	47	19-Jun	18	10	3	53	1116	54
SMH228	580151	4749991	37	19-Dec	21	10	3	8	880	7
SMH1877	573872	4748712	41	29-Jan	23	10	3	2	997	2
SMH196	575802	4748912	57	22-Jan	16	10	3	2 4	614	3
SMH2367	597260	4745362	42	17-May	20	10	3	47	598	48
SMH473	590381	4748490	37	27-Oct	25	10	3	31	892	30
SMH1590	594340	4744565	39	5-Feb	23	10	3	56	975	56
SMH1959	589587	4748049	55	30-May	17	10	3	29	1284	29

Receptor ID	UTM Coordinates		Number of days per year	Worst day	Minutes on worst day [min/day]	Total Hours in Year [hrs/yr]		Turbine IDs contributing to the events	Closest turbine	
	Easting [m][2]	Northing [m][2]				Without cloud cover	Taking into account cloud cover		Distance [m]	ID
SMH584	589285	4748916	34	19-Oct	25	10	3	29	923	29
SMH284	589422	4748240	40	29-Jul	21	9	3	29	1059	29
SMH2365	584937	4748050	56	28-Nov	16	9	3	26	781	27
SMH772	589336	4748569	33	2-Apr	25	9	3	29	914	29
SMH1881	596134	4744239	32	18-Mar	25	9	3	56	927	56
SMH1501	578990	4745422	44	22-May	19	9	3	22	1159	22
SMH1346	594182	4745239	32	9-Apr	25	9	3	43	806	44
SMH1883	591946	4748754	33	17-Dec	21	9	3	31	933	31
SMH1342	589478	4748177	42	18-May	19	9	3	29	1134	29
SMH22	598090	4745414	45	19-Jun	17	9	3	48	1106	48
SMH1661	589521	4748123	44	22-May	18	9	3	29	1194	29
SMH2269	594292	4744612	38	3-Feb	22	9	3	56	1039	56
SMH1838	577076	4749354	44	19-Jun	17	9	3	1	698	4
SMH2134	592968	4744223	45	23-Jan	19	9	3	55	770	42
SMH1753	586481	4745802	34	19-Feb	23	9	3	32	961	32
SMH631	589330	4748770	32	2-Oct	25	9	3	29	926	29
SMH2050	589462	4748210	40	28-Jul	21	9	3	29	1107	29
SMH794	589708	4741489	34	19-Jun	19	9	3	52	709	52
SMH895	594306	4744563	36	8-Feb	22	9	3	56	999	55
SMH1804	590978	4743458	51	22-Nov	18	9	3	53	1172	50
SMH366	589440	4748254	36	3-Aug	21	9	3	29	1072	29
SMH1786	587438	4744690	33	16-Feb	23	9	3	36	781	32
SMH1425	589518	4748136	43	22-May	19	8	3	29	1186	29
SMH1836	579297	4748398	42	19-Jun	18	8	3	5	679	6
SMH1012	593198	4742299	41	21-May	18	8	3	53	1056	54
SMH194	589340	4748742	32	14-Mar	25	8	3	29	931	29
SMH111	597980	4745465	41	19-Jun	18	8	3	48	985	48
SMH991	589218	4748141	42	19-Jun	17	8	3	29	913	29

Receptor ID	UTM Coordinates		Number of days per year	Worst day	Minutes on worst day [min/day]	Total Hours in Year [hrs/yr]		Turbine IDs contributing to the events	Closest turbine	
	Easting [m][2]	Northing [m][2]				Without cloud cover	Taking into account cloud cover		Distance [m]	ID
SMH2305	598197	4745594	36	2-Aug	21	8	3	48	1133	48
SMH531	572030	4746936	37	8-Nov	22	8	3	13	705	12
SMH463	589511	4748153	40	21-Jul	19	8	3	29	1173	29
SMH1203	589353	4748721	30	26-Sep	25	8	3	29	940	29
SMH1911	589390	4748438	33	17-Apr	22	8	3	29	980	29
SMH532	571390	4746278	29	31-Mar	24	8	3	12	926	12
SMH2406	576066	4749167	36	31-Jan	21	8	3	4	708	1
SMH993	589339	4748971	32	16-Feb	22	8	3	29	993	29
SMH2259	589451	4748263	36	7-May	21	8	3	29	1079	29
SMH1856	589359	4748697	30	18-Mar	23	8	3	29	943	29
SMH1810	590338	4748387	31	14-Oct	24	8	3	31	958	31
SMH1535	589195	4741396	40	25-Jul	19	8	3	52	1210	52
SMH1070	589366	4748673	30	21-Mar	23	8	3	29	948	29
SMH692	589577	4748081	45	26-May	18	8	3	29	1262	29
SMH1034	585892	4747781	35	3-Feb	20	8	3	27	1081	27
SMH1649	589378	4748632	31	26-Mar	24	8	3	29	957	29
SMH782	594270	4744608	36	5-Feb	21	8	3	56	1029	55
SMH1028	589383	4748612	31	13-Sep	23	8	3	29	961	29
SMH1075	588406	4746557	34	10-Feb	21	8	3	33	1043	33
SMH1774	594275	4744561	34	10-Feb	21	8	3	56	986	55
SMH1155	579022	4745424	40	21-May	18	8	3	22	1187	22
SMH402	589563	4747977	47	19-Jun	14	8	3	29	1295	29
SMH2222	589516	4748173	38	27-Jul	19	8	3	29	1170	29
SMH1640	589784	4746936	33	13-Feb	22	8	3	34	914	33
SMH1404	591061	4743239	35	8-Feb	21	8	3	53	1048	53
SMH2177	589388	4748593	30	31-Mar	23	8	3	29	966	29
SMH1139	589567	4748104	42	18-Jul	18	8	3	29	1243	29
SMH390	586300	4746171	50	18-Jan	17	8	3	32	875	28

Receptor ID	UTM Coordinates		Number of days per year	Worst day	Minutes on worst day [min/day]	Total Hours in Year [hrs/yr]		Turbine IDs contributing to the events	Closest turbine	
	Easting [m][2]	Northing [m] [2]				Without cloud cover	Taking into account cloud cover		Distance [m]	ID
SMH1432	589505	4748195	38	28-Jul	19	8	3	29	1152	29
SMH658	589397	4748571	30	2-Apr	23	8	3	29	975	29
SMH694	589496	4748222	36	11-May	19	8	3	29	1135	29
SMH1854	591042	4743286	35	4-Feb	20	8	3	53	1083	50
SMH1631	591591	4747264	31	17-Dec	19	7	3	34	921	31
SMH1841	593832	4746455	43	19-Nov	18	7	3	45	814	44
SMH2162	589405	4748537	30	6-Apr	22	7	3	29	984	29
SMH345	577295	4749382	40	21-May	18	7	3	1	783	4
SMH1988	593864	4744531	38	28-Jul	19	7	3	42	896	55
SMH910	590464	4744935	30	22-Feb	22	7	2	40	818	39
SMH1113	585920	4747680	30	16-Feb	22	7	2	27	1063	27
SMH307	586407	4745814	31	20-Feb	21	7	2	32	1034	32
SMH1363	589428	4748480	30	12-Apr	22	7	2	29	1012	29
SMH2024	589446	4748414	32	19-Apr	22	7	2	29	1039	29
SMH1686	589437	4748453	30	26-Aug	22	7	2	29	1024	29
SMH1173	589419	4748516	30	2-Sep	22	7	2	29	1000	29
SMH438	580028	4747141	30	18-Feb	21	7	2	24	793	23
SMH1577	573798	4748614	30	14-Feb	22	7	2	2	1021	2
SMH768	590281	4748364	28	3-Mar	23	7	2	31	1007	31
SMH2054	589722	4747099	36	29-Jan	19	7	2	34	1037	33
SMH381	589961	4743557	43	26-May	15	7	2	37	722	39
SMH619	589495	4748257	33	6-May	20	7	2	29	1123	29
SMH190	589463	4748363	31	25-Apr	20	7	2	29	1065	29
SMH1897	589558	4748138	36	23-Jul	18	7	2	29	1222	29
SMH1902	592920	4744212	38	27-Jan	19	7	2	55	766	42
SMH1217	589433	4748464	29	13-Apr	20	7	2	29	1019	29
SMH234	589458	4748375	31	23-Apr	21	7	2	29	1058	29
SMH1358	589452	4748395	32	20-Aug	22	7	2	29	1048	29

Receptor ID	UTM Coordinates		Number of days per year	Worst day	Minutes on worst day [min/day]	Total Hours in Year [hrs/yr]		Turbine IDs contributing to the events	Closest turbine	
	Easting [m][2]	Northing [m][2]				Without cloud cover	Taking into account cloud cover		Distance [m]	ID
SMH174	579575	4748475	34	10-May	18	7	2	5	743	7
SMH1791	589467	4748349	32	15-Aug	20	7	2	29	1072	29
SMH822	589482	4748308	32	29-Apr	19	7	2	29	1097	29
SMH155	589475	4748326	32	28-Apr	20	7	2	29	1085	29
SMH523	589491	4748275	33	7-Aug	19	7	2	29	1114	29
SMH1580	589552	4748168	36	27-Jul	19	7	2	29	1206	29
SMH226	589403	4748806	28	8-Mar	22	7	2	29	1005	29
SMH576	589408	4748777	28	11-Mar	22	7	2	29	1004	29
SMH125	595211	4746675	30	26-Oct	21	7	2	46	869	35
SMH1379	594230	4744554	31	12-Feb	21	7	2	56	965	55
SMH1682	589413	4748749	28	14-Mar	22	7	2	29	1004	29
SMH899	592623	4744211	34	10-May	18	7	2	40	747	42
SMH956	586372	4745904	31	12-Feb	21	7	2	32	1083	28
SMH1114	585942	4747732	31	29-Oct	20	7	2	27	1104	27
SMH1369	575062	4747514	47	23-Nov	14	7	2	15	781	2
SMH1879	589426	4748715	28	18-Mar	22	7	2	29	1012	29
SMH168	591132	4743870	34	11-May	18	7	2	39	806	40
SMH1609	589539	4748204	35	10-May	18	7	2	29	1181	29
SMH1653	592123	4745961	36	25-Jan	17	7	2	43	882	41
SMH1874	588172	4745020	32	19-Jun	17	7	2	32	705	36
SMH710	590439	4745015	30	15-Feb	20	7	2	40	870	39
SMH152	588337	4746619	32	7-Feb	19	6	2	33	1132	33
SMH1896	589571	4748152	35	28-Jul	17	6	2	29	1229	29
SMH1048	589445	4748694	28	20-Mar	22	6	2	29	1028	29
SMH154	584993	4749503	28	22-Aug	20	6	2	9	1043	9
SMH253	589488	4748444	29	13-Apr	19	6	2	29	1076	29
SMH1365	594206	4744607	31	8-Feb	19	6	2	56	1009	55
SMH1014	587686	4749230	28	25-Dec	18	6	2	29	976	29

Receptor ID	UTM Coordinates		Number of days per year	Worst day	Minutes on worst day [min/day]	Total Hours in Year [hrs/yr]		Turbine IDs contributing to the events	Closest turbine	
	Easting [m][2]	Northing [m][2]				Without cloud cover	Taking into account cloud cover		Distance [m]	ID
SMH2300	595749	4748220	29	19-Dec	17	6	2	35	1116	35
SMH1792	589464	4748573	28	9-Sep	21	6	2	29	1042	29
SMH252	589479	4748473	29	12-Apr	21	6	2	29	1063	29
SMH1650	589491	4748423	29	17-Apr	19	6	2	29	1082	29
SMH2040	589462	4748632	27	26-Mar	21	6	2	29	1041	29
SMH1520	589453	4748663	27	23-Mar	20	6	2	29	1034	29
SMH2124	589465	4748600	28	30-Mar	21	6	2	29	1043	29
SMH1603	594206	4744544	30	27-Oct	20	6	2	56	948	55
SMH1097	589524	4748296	30	30-Apr	19	6	2	29	1140	29
SMH247	589515	4748334	30	27-Apr	19	6	2	29	1122	29
SMH1942	589504	4748404	29	18-Apr	19	6	2	29	1098	29
SMH2001	589548	4748227	32	7-May	18	6	2	29	1183	29
SMH175	571241	4745974	30	11-Aug	19	6	2	12	1121	12
SMH1037	589504	4748372	30	22-Apr	20	6	2	29	1104	29
SMH1703	589543	4748262	31	3-May	18	6	2	29	1168	29
SMH1288	589510	4748352	29	25-Apr	19	6	2	29	1114	29
SMH1509	591876	4745907	44	19-Jun	13	6	2	34	794	41
SMH512	580895	4748588	40	19-Jun	14	6	2	7	755	8
SMH551	589489	4748508	28	8-Apr	19	6	2	29	1070	29
SMH1360	589532	4748285	32	30-Apr	18	6	2	29	1151	29
SMH569	590220	4748341	26	6-Oct	21	6	2	31	1062	31
SMH1611	590263	4745615	37	19-Jun	14	6	2	33	1032	34
SMH1938	595143	4746648	28	20-Feb	19	6	2	46	874	35
SMH811	594174	4744606	31	9-Feb	18	6	2	56	999	55
SMH2391	574695	4748781	29	8-Feb	18	6	2	3	557	2
SMH1193	571199	4745647	43	21-Jun	12	6	2	12	1290	12
SMH2295	596113	4746889	29	31-Oct	18	6	2	49	618	46
SMH1573	576114	4747598	30	5-Feb	18	6	2	16	800	15

Receptor ID	UTM Coordinates		Number of days per year	Worst day	Minutes on worst day [min/day]	Total Hours in Year [hrs/yr]		Turbine IDs contributing to the events	Closest turbine	
	Easting [m][2]	Northing [m][2]				Without cloud cover	Taking into account cloud cover		Distance [m]	ID
SMH845	593057	4742205	36	19-Jun	14	6	2	53	1144	54
SMH2041	592973	4742248	36	19-Jun	14	6	2	53	1107	54
SMH2388	592838	4744258	33	27-Jan	17	6	2	55	704	42
SMH1957	589543	4748317	28	27-Apr	18	6	2	29	1154	29
SMH972	594439	4746484	27	22-Dec	17	6	2	44	830	45
SMH1729	590949	4743258	29	11-Feb	18	6	2	53	999	50
SMH417	593948	4744557	30	6-May	17	6	2	42	920	55
SMH1314	582076	4749025	29	30-Apr	16	5	2	8	1172	8
SMH2042	589568	4748275	29	29-Apr	17	5	2	29	1188	29
SMH664	594147	4744598	28	30-Oct	19	5	2	56	985	55
SMH2292	591985	4743973	32	13-Nov	16	5	2	54	809	40
SMH1408	589597	4748216	30	7-May	16	5	2	29	1233	29
SMH1351	589118	4741506	28	12-Aug	18	5	2	52	1246	52
SMH729	589582	4748277	28	30-Apr	18	5	2	29	1201	29
SMH1199	589541	4748564	25	9-Sep	19	5	2	29	1119	29
SMH2253	591546	4741671	26	16-Apr	18	5	2	52	1212	53
SMH1140	589883	4743472	41	19-Jun	11	5	2	37	812	39
SMH880	579894	4746950	26	12-Mar	18	5	2	24	564	23
SMH745	589599	4748282	28	29-Apr	17	5	2	29	1216	29
SMH714	576525	4747657	23	21-Dec	17	5	2	16	811	16
SMH1498	585772	4750216	26	14-Oct	18	5	2	10	560	9
SMH2032	589608	4748239	27	7-Aug	16	5	2	29	1237	29
SMH289	577888	4749533	26	1-Nov	17	5	2	6	941	5
SMH1571	587189	4744217	25	9-Apr	18	5	2	36	1165	36
SMH1637	581066	4748795	27	7-Aug	16	5	2	7	559	8
SMH1593	589597	4748386	26	19-Apr	18	5	2	29	1192	29
SMH1065	589611	4748283	27	29-Apr	17	5	2	29	1228	29
SMH1144	589635	4748247	26	9-Aug	16	5	2	29	1260	29

Receptor ID	UTM Coordinates		Number of days per year	Worst day	Minutes on worst day [min/day]	Total Hours in Year [hrs/yr]		Turbine IDs contributing to the events	Closest turbine	
	Easting [m][2]	Northing [m][2]				Without cloud cover	Taking into account cloud cover		Distance [m]	ID
SMH2372	592801	4744200	28	4-Feb	16	5	2	55	756	42
SMH2018	595084	4746723	26	16-Feb	17	5	2	46	786	35
SMH1543	589723	4741488	23	20-Jun	15	5	2	52	697	52
SMH1493	593118	4742167	36	16-Jun	11	5	2	53	1182	54
SMH1052	581784	4748507	23	16-Dec	15	5	2	18	917	18
SMH1952	593276	4742568	24	19-Apr	18	5	2	53	803	54
SMH1990	591577	4741653	25	24-Aug	17	5	2	52	1217	53
SMH1064	589625	4748290	26	28-Apr	16	5	2	29	1240	29
SMH1830	577046	4749347	32	16-Jun	11	5	2	1	688	4
SMH798	588631	4745470	23	30-Mar	18	5	2	32	980	33
SMH1613	587216	4744926	29	1-Feb	15	4	2	36	568	32
SMH933	589604	4746902	25	19-Oct	18	4	1	34	812	33
SMH353	589630	4748300	25	26-Apr	15	4	1	29	1242	29
SMH1392	595024	4746709	24	18-Feb	16	4	1	46	789	35
SMH1846	587940	4747457	26	10-Feb	15	4	1	28	1230	29
SMH2331	573618	4748490	24	4-Mar	17	4	1	2	1155	2
SMH1480	589654	4748252	27	30-Apr	15	4	1	29	1277	29
SMH1944	589646	4748294	26	27-Apr	15	4	1	29	1259	29
SMH457	594083	4744579	26	26-Oct	16	4	1	56	954	55
SMH1807	574194	4748760	21	19-Dec	15	4	1	2	765	2
SMH1413	571168	4746685	24	20-Feb	16	4	1	12	1213	12
SMH1467	583963	4746523	34	19-Jun	11	4	1	25	786	26
SMH1191	587216	4744817	26	29-Oct	16	4	1	36	673	32
SMH1530	578705	4749611	23	26-Oct	16	4	1	7	672	6
SMH2242	595000	4746601	24	28-Feb	16	4	1	46	813	45
SMH1949	586163	4751720	25	2-Feb	14	4	1	11	1299	11
SMH227	573579	4748646	22	18-Feb	15	4	1	2	1237	2
SMH1608	579834	4747163	24	19-Oct	17	4	1	24	752	23

Receptor ID	UTM Coordinates		Number of days per year	Worst day	Minutes on worst day [min/day]	Total Hours in Year [hrs/yr]		Turbine IDs contributing to the events	Closest turbine	
	Easting [m][2]	Northing [m][2]				Without cloud cover	Taking into account cloud cover		Distance [m]	ID
SMH160	589664	4748298	25	26-Apr	14	4	1	29	1276	29
SMH1215	575135	4744866	25	29-Apr	15	4	1	20	1286	20
SMH1797	586168	4747534	22	5-Oct	17	4	1	27	857	28
SMH1875	594026	4744564	23	23-Oct	15	4	1	56	932	55
SMH1491	589693	4748304	24	23-Apr	14	4	1	29	1303	29
SMH1259	579103	4749823	21	24-Dec	14	4	1	7	807	6
SMH929	573581	4748566	22	16-Oct	16	4	1	2	1210	2
SMH309	584072	4746464	34	19-Jun	10	4	1	25	858	26
SMH261	574527	4748851	24	7-Feb	13	4	1	3	661	2
SMH2368	585604	4748471	22	26-Aug	15	4	1	19	1244	19
SMH601	594033	4744595	23	14-Feb	14	4	1	56	964	55
SMH1085	571112	4746689	22	22-Feb	15	3	1	12	1268	12
SMH869	587576	4749308	21	19-Dec	13	3	1	29	954	10
SMH780	588517	4751594	22	19-Feb	15	3	1	11	1274	11
SMH1605	593991	4744575	22	23-Oct	14	3	1	56	940	55
SMH1086	571091	4746656	22	25-Feb	15	3	1	12	1278	12
SMH1628	585462	4746810	21	6-Apr	15	3	1	28	695	27
SMH1850	587147	4744818	23	14-Feb	14	3	1	36	692	32
SMH1221	589735	4747335	21	24-Dec	13	3	1	34	1265	33
SMH1750	593999	4744492	22	25-Feb	14	3	1	56	858	55
SMH243	585553	4749094	21	18-Feb	14	3	1	19	771	9
SMH1960	583170	4749012	21	24-Feb	14	3	1	19	1257	19
SMH318	585605	4750267	21	25-Feb	14	3	1	10	691	9
SMH1465	585617	4748757	20	21-Mar	15	3	1	19	1034	9
SMH884	583769	4747941	20	26-Mar	14	3	1	18	650	26
SMH1549	576420	4749210	18	20-Dec	13	3	1	4	726	1
SMH454	575908	4747592	21	14-Feb	13	3	1	16	751	3
SMH1080	588616	4751158	19	13-Sep	15	3	1	11	1290	11

Receptor ID	UTM Coordinates		Number of days per year	Worst day	Minutes on worst day [min/day]	Total Hours in Year [hrs/yr]		Turbine IDs contributing to the events	Closest turbine	
	Easting [m][2]	Northing [m] [2]				Without cloud cover	Taking into account cloud cover		Distance [m]	ID
SMH1747	593017	4742208	26	19-Jun	10	3	1	53	1143	54
SMH1824	573472	4748506	20	4-Mar	14	3	1	2	1301	2
SMH2161	579710	4747069	20	4-Mar	13	3	1	24	643	23
SMH961	590957	4741482	18	20-Jun	12	3	1	52	744	52
SMH608	589539	4747946	30	25-Jun	8	3	1	29	1289	29
SMH17	596461	4747052	16	20-Dec	12	2	1	49	813	46
SMH1463	592943	4742244	22	25-Jun	8	2	1	53	1083	53
SMH2074	584925	4746718	26	19-Jun	7	2	1	26	551	27
SMH704	589622	4741420	19	20-Jun	8	2	1	52	818	52
SMH20	597992	4745428	21	19-Jun	7	2	1	48	1014	48
SMH840	593128	4742138	21	19-Jun	7	2	1	53	1212	54
SMH2022	575548	4748955	13	19-Dec	8	1	0	2	660	3
SMH1842	583398	4749441	13	20-Dec	8	1	0	19	1256	19
SMH436	593079	4742161	18	19-Jun	6	1	0	53	1188	54
SMH783	594359	4746460	9	19-Dec	6	1	0	44	858	45
SMH1829	577021	4749337	11	19-Jun	3	0	0	1	677	4
SMH16	595744	4746782	6	20-Dec	6	0	0	46	686	46
SMH1241	595654	4744634	5	21-Dec	6	0	0	56	669	56
SMH1182	592333	4744082	10	19-Jun	3	0	0	40	953	42
SMH602	589737	4741488	6	20-Jun	4	0	0	52	685	52
SMH1245	573817	4747264	3	21-Dec	3	0	0	13	791	14

[2] UTM Zone 17N, NAD83 datum

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Driven by our purpose of safeguarding life, property and the environment, DNV GL enables organizations to advance the safety and sustainability of their business. We provide classification and technical assurance along with software and independent expert advisory services to the maritime, oil and gas, and energy industries. We also provide certification services to customers across a wide range of industries. Operating in more than 100 countries, our 16,000 professionals are dedicated to helping our customers make the world safer, smarter and greener.