Appendix C

Shadow Flicker Analysis

DNV·GL

BITTER ROOT WIND PROJECT

Shadow Flicker Report

Flying Cow Wind, LLC

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Table of contents

Appendices

List of tables

List of figures

EXECUTIVE SUMMARY

DNV GL has conducted an analysis to predict the duration of shadow flicker expected to be experienced at receptors near the Bitter Root Wind Project (the “Project”) in Minnesota. This analysis was undertaken for a total of 40 Vestas V136 wind turbines, at a hub height of 344 feet (105 m) and rotor diameter of 446 feet (136 m).

Of the 357 receptors identified in proximity to the Project, 91 potentially affected receptors within 5676 feet (1730 m)[1] of a turbine have been included in this report. The Project is located on the border of South Dakota and Minnesota and receptors referenced in this report are located within both states. While 40 turbines have been modeled, only 37 will be constructed. Therefore, these results can be considered conservative.

The receptor in Minnesota that is predicted to experience the most hours of shadow flicker in one year is MN355. This receptor is a town hall, not a residence. The predicted duration of shadow flicker at this receptor is 52 hours per year when taking into account long-term average monthly cloud cover and annual wind rose. The predicted duration of shadow flicker on the worst day of the year at this receptor without considering cloud cover and wind rose statistics is 66 minutes on 18 June. MN321, which is the only other receptor exceeding 30 hours per year of shadow flicker, is a participating residence.

Receptor MN283 is expected to have the longest duration of flicker in a single day, with 74 minutes expected to occur on 27 April. This is a participating residence.

The receptor in South Dakota that is predicted to experience the most hours of shadow flicker in one year as well as the highest number of minutes in a single day is SD313. The predicted duration of shadow flicker at this receptor is 29 hours per year when taking into account long-term average monthly cloud cover and annual wind rose. The predicted duration of shadow flicker on the worst day of the year at this receptor without consideration of cloud cover and wind rose statistics is 59 minutes on 21 May.

There are certain simplifications and conservative assumptions inherent within the model that may result in an overestimation of shadow flicker duration.

[1] This corresponds to 10 turbine tip heights. 10 x (105 + 136/2) = 1730 m.

1 INTRODUCTION

This report is issued to Flying Cow Wind, LLC (“Customer”) pursuant to a written agreement arising from the *2017-08-02 Bitter Root DNV KEMA Contract for Services* dated 2 August 2017. The Customer has requested that DNV KEMA Renewables, Inc. (DNV GL) perform project development services, including a shadow flicker assessment for the Bitter Root Wind Project (the “Project”) located in Yellow Medicine County, Minnesota.

The current layout consists of 5 Vestas V136 and 35 Vestas V136-4.2 wind turbines. Both turbine models have identical physical dimensions, and therefore have identical expected impact on shadow flicker durations. The V136 is referenced without an associated rated capacity throughout the remainder of this report for the sake of simplicity. The V136 has a maximum blade tip height of 568 feet (173 m), a hub height of 344 feet (105 m), and a rotor diameter of 446 feet (136 m).

The purpose of this shadow flicker analysis is to calculate the predicted shadow flicker duration from the proposed Project at nearby receptor locations. This report includes a brief presentation of the Project site, a description of the shadow flicker assessment methodology, results of the analysis including a map illustrating areas prone to shadow flicker, and concluding comments.

1.1 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 the vicinity of the Project.

It should be noted, as described in Section 3, that there are certain simplifications and conservative assumptions inherent within the model that may result in an overestimation of shadow flicker duration.

2 DESCRIPTION OF THE WIND FARM SITE

2.1 Site description

The site is located in Yellow Medicine County, Minnesota and is approximately 10 miles west of Canby, Minnesota.

The proposed wind project is situated in relatively simple terrain, consisting of flat farm land, with wind turbine base elevations ranging from 1,476 feet to 1,706 feet. The ground cover on and near the site is primarily composed of farm land and open fields. Dwellings are interspersed throughout the Project site.

2.2 Wind farm layout

The proposed turbine layout consists of 40 Vestas V136 wind turbine generators at a hub height of 344 feet (105 m) and a rotor diameter of 446 feet (136 m).The coordinates of each turbine are presented in Appendix A.

2.3 Receptors locations

A list of 349 receptors to be considered as sound receptors was provided by the Customer [4]. It was desktop validated by DNV GL using available aerial imagery, for a new total of 357 receptors. DNV GL has excluded any receptors that have been confirmed to be uninhabited barns by the Customer. Of the total number of identified receptors, results for 60 receptors in Minnesota and 31 receptors in South Dakota that are located within or near the project area are reported here. Coordinates of each receptor center are presented in Appendix B.

2.4 Applicable regulations

There are no applicable local or state requirements with regard to exceedance limits of shadow flicker in the jurisdictions associated with this Project in South Dakota.

The state of Minnesota has prepared the Application Guidance for Site Permitting of Large Wind Energy Conversion Systems in Minnesota [5] (the "Minnesota State Guidance"), which was used in the development of this report and states the following:

> *8.4.3 Shadow Flicker*
> *Provide an analysis and discussion of shadow flicker based on the preliminary turbine layout. Include isopleths for 100, 50, and 25 hours / year of potential shadow flicker. List the assumptions and methodology used in the analysis. Provide a figure illustrating likely hours of shadow flicker/year at 1,000 feet and a table showing potential shadow durations/ day at 1,000 feet based.*

As discussed further in Section 3.2, this assessment provides a more detailed and thorough estimate of the shadow flicker impacts from the Project than required in the guidelines by assessing impacts out to 5676 feet (1730 m), rather than 1,000 feet (305 m). Figure 4-1 presents the shadow flicker duration isopleths for each turbine.

3 SHADOW FLICKER ASSESSMENT

3.1 Overview

Shadow flicker may occur under certain combinations of circumstances with regard to the sun's position 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;
- Operational status of turbines.

3.2 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.

Shadow flicker has been calculated at the subject receptors (i.e. residences) at a height of 6.5 feet (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°, often referenced as the "greenhouse" scenario; this assumption therefore represents a worst case scenario. Simulations with WindFarmer Analyst software 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 [1], while the Danish wind industry suggests a value of between 1640 feet and 3281 feet (500 and 1000 m) [3].

DNV GL has adopted a conservative approach and has assumed the length, D, that a shadow can be cast to be defined as follows:

D = 10 x (hub height + rotor radius)

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

The annual hours of shadow flicker at receptors has been calculated in two steps:

1) A "worst case" or astronomical worst-case, which represents the number of hours of annual shadow flicker that does not take into account attenuating factors, such as cloud cover or the site specific wind rose.

2) An "expected case" that considers cloud cover and the site specific wind rose in order to get a more realistic estimate, as described below. It is noted that additional attenuation factors are still not considered, and therefore the "expected case" is still conservative.

3.2.1 Attenuations

Shadow flicker calculations can be adjusted using average monthly cloud coverage, which is based on historical meteorological data and statistics. According to data gathered from the Huron and Sioux Falls National Oceanic and Atmospheric Administration (NOAA) stations[1], monthly cloud cover can be estimated and applied as a percentage decrease in flicker duration. Cloud cover percentages are shown in Table 3-1.

Table 3-1 Monthly cloud cover percentage (%) reduction (Huron and Sioux Falls)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Percentage	61.3	64.0	67.7	63.1	60.3	52.5	42.9	43.6	46.7	51.6	65.0	63.9

Further, the annual site-specific wind rose was used in order to consider the probability of the turbines being oriented in a given direction. This produces a more accurate estimate of shadow flicker duration at residences. The directional wind frequency that was measured on site was provided by the Customer [6] and is shown in Table 3-2.

Table 3-2 Site specific directional frequencies (%)

Sector (°)	0	30	60	90	120	150	180	210	240	270	300	330
Percentage	12.5	5.2	3.5	3.9	6.4	6.6	11.4	12.0	7.1	8.4	10.0	13.0

Note: The sectors are defined as 30° sectors centered at the given value.

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, turbine operational shut-down has not been

[1] The Huron and Sioux Falls NOAA stations are located approximately 149km and 129km from the Project site respectively.

considered in this analysis. Consideration of these factors could lead to a reduction of the levels of shadow flicker predicted.

3.3 Simplifications 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 results 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 [7].

- 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).

- 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 [7].

- 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, it is likely that the shadow flicker durations presented in Section 4 and Appendix B can be regarded as conservative.

4 RESULTS AND CONCLUSION

An analysis has been conducted to determine the duration of shadow flicker predicted for receptors in the vicinity of the Bitter Root Wind Project in Minnesota. This analysis was undertaken specifically for the Vestas V136 wind turbine with a blade tip height of 568 feet (173 m). While 40 turbines have been modeled, only 37 will be constructed. Therefore, these results can be considered conservative.

Of the 357 dwelling locations identified, 91 are within a distance of 5676 feet (1730 m). The results of the shadow flicker assessment are presented for all receptor locations in the Project area (in terms of minutes on worst day and total hours per year) in tabular format in Appendix B.

A detailed map illustrating predicted “expected case” shadow flicker duration at receptors lying within 5676 feet (1730 m) of the Bitter Root Wind Project is presented in Figure 4-1. This map takes into account average monthly cloud cover and annual site wind rose. In accordance with the Minnesota State Guidance, shadow flicker is shown in isopleths of 25, 50 and 100 hours per year.

The receptor in Minnesota that is predicted to experience the most hours of shadow flicker in one year is MN355. This receptor is a town hall, not a residence. The predicted duration of shadow flicker at this receptor is 52 hours per year when taking into account long-term average monthly cloud cover and annual wind rose. The predicted duration of shadow flicker on the worst day of the year at this receptor without considering cloud cover and wind rose statistics is 66 minutes on 18 June. MN321, which is the only other receptor exceeding 30 hours per year of shadow flicker, is a participating residence.

Receptor MN283 is expected to have the longest duration of flicker in a single day, with 74 minutes expected to occur on 27 April. This is a participating residence.

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Results for the “expected case” in hours per year take into account the average monthly cloud cover from the NOAA meteorological stations at Huron and Sioux Falls and the annual site specific wind rose. It should be noted that the predicted level of exposure for minutes on worst day assumes no cloud cover or wind rose statistics.

As described in Section 3, certain conservative assumptions have been made in this analysis, which likely results in an overestimation of the shadow flicker impacts that may be experienced at each receptor.

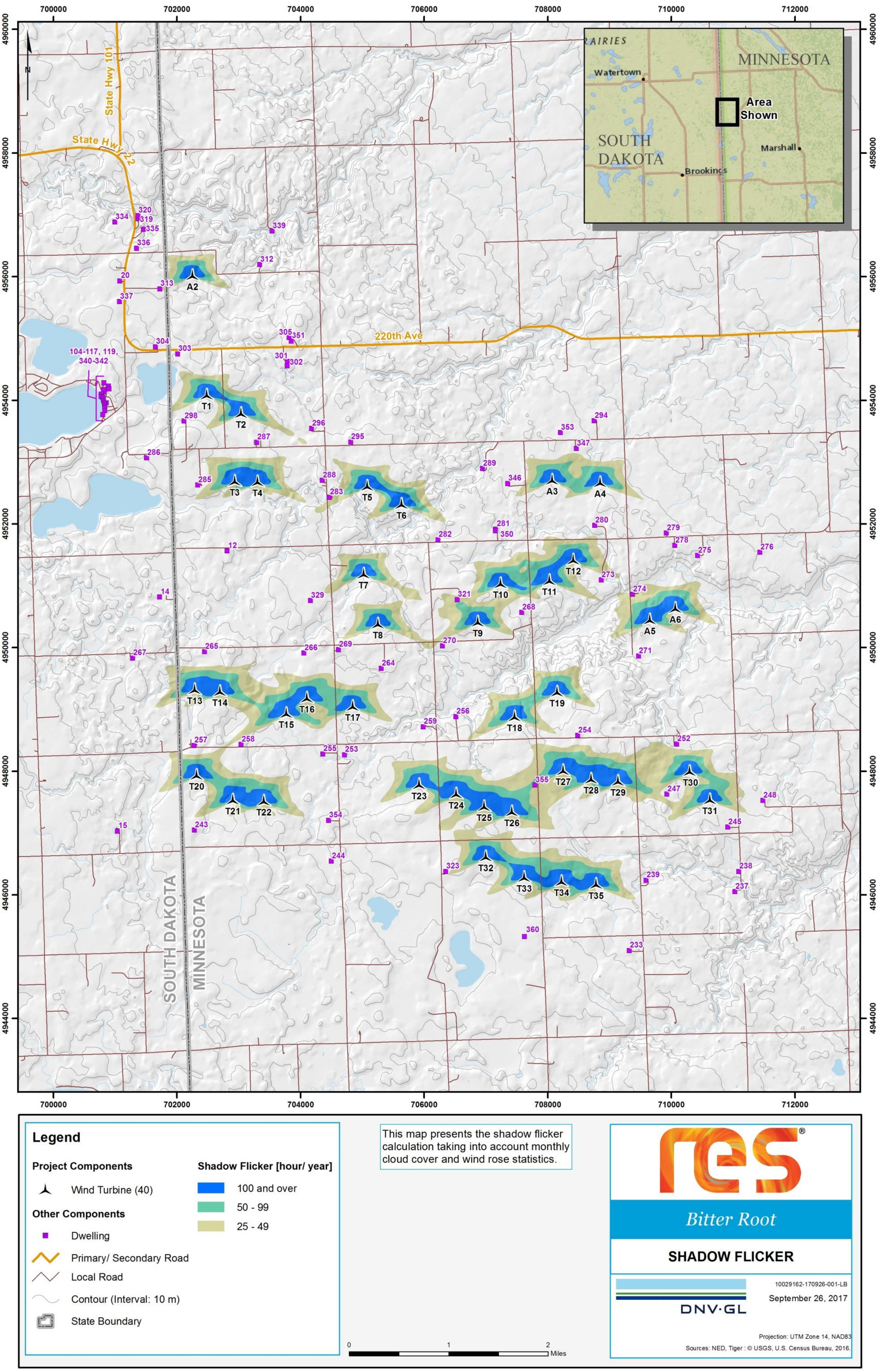

Figure 4-1 Modeled hours of shadow flicker at Bitter Root Wind Project (Expected Case)

5 REFERENCES

[1] Turbine layout locations sent by email, by RES, to A, DNV GL, 15 August 2017, "PUSAbrt047_46_PPM_UTMz14_NAD83_feet".

[2] Department for Business Enterprise & Regulatory Reform, UK, "Onshore Wind: Shadow Flicker", http://webarchive.nationalarchives.gov.uk/20090609003228/http:/www.berr.gov.uk/whatwedo/energy/sources/renewables/planning/onshore-wind/shadow-flicker/page18736.html

[3] Danish Wind Industry Association, "Shadow variations from Wind turbines", http://xn--drmstrre-64ad.dk/wp-content/wind/miller/windpower%20web/en/tour/env/shadow/shadow2.htm

[4] Receptor locations sent by email, by RES, to S. Dokouzian, DNV GL, 20 September 2016, "all_houses.shp", and confirmed by RES 15 August, 2017.

[5] Minnesota Department of Commerce, Office of Energy Security-Energy Facilities Permitting, "Application Guidance for Site Permitting of Large Wind Energy Conversion Systems in Minnesota," http://mn.gov/commerce/energyfacilities/documents/LWECS_APP_Guide_AUG2010.pdf, August 2010.

[6] Wind Rose table updated by DNV GL as resulting from ongoing energy assessment, 22 August 2017.

[7] 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 – WIND TURBINE COORDINATES

Customer ID	Easting [m]	Northing [m]
T1	702481	4954063
T2	703038	4953767
T3	702934	4952670
T4	703302	4952660
T5	705081	4952591
T6	705636	4952296
T7	705023	4951170
T8	705254	4950361
T9	706869	4950393
T10	707238	4951012
T11	708028	4951063
T12	708415	4951396
T13	702284	4949299
T14	702696	4949266
T15	703771	4948913
T16	704101	4949160
T17	704846	4949028
T18	707462	4948861
T19	708151	4949258
T20	702319	4947915
T21	702904	4947515
T22	703403	4947497
T23	705918	4947760
T24	706516	4947609
T25	706969	4947409
T26	707421	4947322
T27	708248	4947988
T28	708701	4947853
T29	709136	4947817
T30	710299	4947977
T31	710624	4947520
T32	706999	4946593
T33	707619	4946260
T34	708221	4946195
T35	708781	4946148
A2	702251	4955997
A3	708072	4952689
A4	708851	4952646
A5	709652	4950426
A6	710065	4950615

Coordinates are given in UTM Zone 14, NAD 83 Datum

APPENDIX B – RECEPTOR LOCATIONS & SHADOW FLICKER RESULTS

Receptor ID	UTM Easting [m]	UTM Northing [m]	Layout PUSAbrt047_46 results					Turbine IDs contributing to the events	Closest turbine	
			Days per year	Worst day	Minutes on Worst day	Total Hours in Year [hrs/yr]			Distance [feet]	Turbine ID
						Astronomical Worst case	Expected Case with monthly cloud cover and wind rose			
MN355	707793	4947775	296	18-Jun	66	201	52	T24 T25 T26 T27 T28 T29	1649	T27
MN321	706536	4950774	229	1-Jan	66	148	38	T7 T8 T9 T10 T11	1660	T9
SD313	701724	4955801	116	21-May	59	98	29	A2	1846	A2
MN274	709375	4950861	196	14-Dec	62	113	27	T11 T12 A5 A6	1692	A5
MN283	704468	4952431	131	27-Apr	74	84	22	T3 T4 T5 T6	2077	T5
MN247	709927	4947628	139	13-Mar	44	71	19	T27 T28 T29 T31	1673	T30
MN323	706349	4946378	128	4-Aug	48	64	17	T32 T33	2246	T32
MN273	708865	4951091	150	7-Sep	38	64	16	T10 T11 A5 A6	1784	T12
MN329	704160	4950759	131	25-May	34	51	14	T7 T8	3136	T7
MN285	702337	4952627	83	9-Apr	52	52	13	T3 T4	1964	T3
MN288	704353	4952705	106	22-Mar	49	49	12	T3 T4 T5 T6	2418	T5
MN248	711483	4947527	112	5-Apr	37	43	11	T30 T31	2818	T31
MN252	710088	4948438	120	17-Dec	44	51	11	T28 T29 T30	1663	T30
MN354	704454	4947204	71	7-May	48	31	9	T21 T22 T23	3579	T22
MN258	703037	4948433	109	28-Jan	37	44	9	T15 T16 T20	2877	T15
MN296	704178	4953544	125	18-Aug	28	37	9	T2 T3 T4	3811	T2
MN255	704360	4948279	126	10-Jan	27	38	9	T21 T22 T23	2839	T15
MN346	707352	4952653	69	6-Apr	44	34	9	A3 A4	2365	A3
MN347	708463	4953219	60	16-Dec	47	39	9	A3	2162	A3
MN282	706224	4951742	103	11-Jan	27	32	8	T7 T10	2651	T6
MN239	709593	4946236	50	29-Mar	51	29	7	T34 T35	2680	T35
MN270	706297	4950025	83	28-Jul	30	29	7	T8 T9	2231	T9
MN268	707580	4950569	55	13-Mar	42	30	7	T9	1836	T10
MN256	706512	4948882	76	26-Mar	33	28	7	T17 T18 T19	3118	T18
MN269	704614	4949967	54	19-Jun	35	24	6	T8	2465	T8
MN264	705305	4949662	107	19-Feb	24	26	6	T9 T15 T16 T17	2299	T8
MN259	705986	4948717	72	3-May	27	20	6	T17 T18	3149	T23
MN302	703784	4954558	75	17-Dec	28	25	5	T1 T2	3567	T2
MN266	704055	4949911	73	7-May	24	20	5	T8 T14	2469	T16

Receptor ID	UTM Easting [m]	UTM Northing [m]	Layout PUSAbrt047_46 results					Turbine IDs contributing to the events	Closest turbine	
			Days per year	Worst day	Minutes on Worst day	Total Hours in Year [hrs/yr]				
						Astronomical Worst case	Expected Case with monthly cloud cover and wind rose		Distance [feet]	Turbine ID
MN254	708487	4948578	51	4-May	30	18	5	T18	2087	T27
SD267	701283	4949829	62	31-Oct	33	21	5	T13 T14	3717	T13
MN350	707151	4951886	88	16-Feb	22	20	5	T6 T11 T12	2881	T10
MN298	702112	4953664	63	9-Apr	33	20	5	T2 T4	1783	T1
MN289	706945	4952894	67	8-Mar	28	20	5	T6 A3	3760	A3
MN257	702272	4948417	70	15-Dec	22	18	4	T15 T22	1654	T20
MN253	704711	4948265	54	3-Nov	35	19	4	T22 T23	2542	T17
MN243	702282	4947047	50	12-May	27	15	4	T22	2554	T21
SD336	701344	4956459	51	5-Feb	32	18	4	A2	3339	A2
MN281	707153	4951915	65	27-Oct	22	15	4	T6 T12	2976	T10
SD334	700994	4956881	62	13-Jan	21	14	3	A2	5042	A2
MN312	703338	4956195	36	14-Mar	28	13	3	A2	3625	A2
SD337	701072	4955596	40	3-May	23	11	3	A2	4088	A2
SD286	701509	4953069	58	26-Feb	18	10	3	T2 T3	4561	T1
MN265	702445	4949933	39	1-Jan	17	9	2	T15	2146	T13
SD20	701072	4955930	32	2-Apr	24	9	2	A2	3875	A2
MN271	709469	4949862	32	15-Feb	22	9	2	T19	1945	A5
MN339	703541	4956735	34	5-Feb	22	9	2	A2	4874	A2
MN301	703787	4954629	39	22-Oct	23	9	2	T1 T2	3747	T2
MN305	703812	4955013	44	21-Jan	19	9	2	T1	4814	T2
SD335	701456	4956763	31	21-Dec	22	9	2	A2	3623	A2
MN276	711434	4951539	36	26-Jan	19	7	2	A6	5419	A6
MN351	703850	4954957	36	27-Jan	19	7	2	T1	4727	T2
MN279	709919	4951851	26	2-Mar	19	5	1	T12	4083	A6
MN295	704811	4953323	24	17-Feb	17	5	1	T4	2560	T5
MN280	708762	4951975	27	18-Dec	25	9	1	T12	2215	T12
MN278	710057	4951651	23	16-Mar	17	4	1	T12	3398	A6
SD342	700902	4954185	22	18-Mar	16	4	1	T1	5197	T1
SD341	700891	4954229	22	27-Sep	16	4	1	T1	5245	T1
SD117	700828	4953833	22	9-Apr	14	3	1	T1	5475	T1
SD111	700858	4953956	22	2-Apr	15	4	1	T1	5336	T1
SD115	700830	4953892	22	5-Sep	15	3	1	T1	5447	T1
SD119	700800	4953765	22	14-Apr	14	3	1	T1	5601	T1

Receptor ID	UTM Easting [m]	UTM Northing [m]	Layout PUSAbrt047_46 results					Turbine IDs contributing to the events	Closest turbine	
			Days per year	Worst day	Minutes on Worst day	Total Hours in Year [hrs/yr]			Distance [feet]	Turbine ID
						Astronomical Worst case	Expected Case with monthly cloud cover and wind rose			
SD114	700829	4953910	22	6-Sep	15	3	1	T1	5443	T1
SD116	700831	4953871	21	7-Apr	15	3	1	T1	5450	T1
SD113	700826	4953934	22	3-Apr	15	3	1	T1	5446	T1
SD112	700823	4953956	22	2-Apr	15	3	1	T1	5451	T1
SD104	700824	4954134	20	21-Mar	14	3	1	T1	5441	T1
SD110	700810	4953987	22	31-Mar	14	3	1	T1	5488	T1
SD109	700808	4954014	22	28-Mar	14	3	1	T1	5490	T1
SD105	700811	4954168	20	19-Mar	14	3	1	T1	5490	T1
SD340	700816	4954282	20	12-Mar	14	3	1	T1	5510	T1
SD108	700798	4954046	21	27-Mar	14	3	1	T1	5522	T1
SD106	700773	4954098	19	22-Mar	13	3	1	T1	5605	T1
SD107	700773	4954059	20	26-Mar	14	3	1	T1	5606	T1
SD304	701652	4954864	19	19-Dec	14	4	1	T1	3782	T1
SD15	701032	4947031	13	18-Jun	2	0	0	T20	5123	T20
MN245	710913	4947095	0	N/A	0	0	0		1686	T31
MN287	703291	4953319	0	N/A	0	0	0		1688	T2
MN353	708207	4953477	0	N/A	0	0	0		2625	A3
MN303	702011	4954748	0	N/A	0	0	0		2726	T1
MN360	707624	4945325	0	N/A	0	0	0		3068	T33
MN275	710428	4951486	0	N/A	0	0	0		3096	A6
MN294	708752	4953668	0	N/A	0	0	0		3369	A4
MN12	702811	4951562	0	N/A	0	0	0		3658	T3
MN233	709321	4945099	0	N/A	0	0	0		3870	T35
MN238	711091	4946378	0	N/A	0	0	0		4048	T31
SD319	701367	4956937	0	N/A	0	0	0		4234	A2
SD320	701368	4956986	0	N/A	0	0	0		4352	A2
MN244	704496	4946545	0	N/A	0	0	0		4756	T22
MN237	711029	4946052	0	N/A	0	0	0		4996	T31
SD14	701717	4950816	0	N/A	0	0	0		5313	T13

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