

**BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA**

**IN THE MATTER OF THE APPLICATION BY PREVAILING WIND PARK, LLC
FOR A PERMIT FOR A WIND ENERGY FACILITY IN BON HOMME, CHARLES MIX,
AND HUTCHINSON COUNTIES, SOUTH DAKOTA, FOR PREVAILING WIND
PARK ENERGY FACILITY**

SD PUC DOCKET EL-18-026

**PREFILED REBUTTAL TESTIMONY OF AARON ANDERSON
ON BEHALF OF PREVAILING WIND PARK, LLC**

September 26, 2018

1 **I. INTRODUCTION**

2

3 **Q. Please state your name.**

4 A. My name is Aaron Anderson.

5

6 **Q. Did you provide Direct Testimony in this Docket?**

7 A. Yes. I submitted direct testimony in this docket on May 30, 2018.

8

9 **Q. What is the purpose of your Rebuttal Testimony?**

10 A. The purpose of my Rebuttal Testimony is to provide an updated shadow flicker
11 analysis to reflect a taller hub height for the proposed turbine and to model shadow
12 flicker at nine (9) additional occupied residences that were identified in Prevailing
13 Wind Park, LLC's re-review of residences within and near the Prevailing Wind Park
14 Project area, as described in Bridget Canty's Rebuttal Testimony.

15

16 **Q. What exhibits are you attaching to your Rebuttal Testimony?**

17 A. Exhibit 1: Results of Updated Shadow Flicker Analysis.

18

19 **II. SHADOW FLICKER ANALYSIS UPDATE**

20

21 **Q. Please describe the updates reflected in the updated shadow flicker analysis.**

22 A. There are two updates reflected in my updated shadow flicker analysis. First, the
23 analysis uses the GE 3.8-137 wind turbine with the 111.5 meter hub height in place
24 of the 110 meter hub height. Second, the analysis evaluates shadow flicker on 146
25 occupied residences. This includes the original 137 residences and the nine (9)
26 additional residences identified during the September 2018 field review.

27

28 **Q. What are the results of your analysis?**

29 A. Attached as Exhibit 1 is a table showing the full results of my analysis. For summary
30 purposes, a table identifying receptors that were modeled to exceed the shadow
31 flicker commitments made by Prevailing Wind Park is included below. For a

32 discussion of mitigation that Prevailing Wind Park will undertake with respect to
33 shadow flicker, see the Rebuttal Testimony of Peter Pawlowski.

34

Summary of Shadow Flicker Results				
Receptor Name	Flicker Duration [hour/year]	Flicker Duration [max minutes/day]	Participating Status	County Name
076	33.90	51	Non-Participating	Charles Mix
017	19.87	40	Non-Participating	Charles Mix
024	6.20	31	Non-Participating	Charles Mix
031	6.43	31	Non-Participating	Charles Mix
070	8.80	36	Non-Participating	Charles Mix
112	5.37	31	Non-Participating	Charles Mix
149	7.35	31	Non-Participating	Charles Mix

35

36 **III. CONCLUSION**

37

38 **Q. Does this conclude your Rebuttal Testimony?**

39 A. Yes.

40 Dated this 26th day of September, 2018.

41 *Aaron Anderson*

42 _____

43 Aaron Anderson

44

45 64846436

Client Name: Prevailing Wind Park, LLC
Project Name: Prevailing Winds Wind Project
Project Location: Charles Mix and Bonne Homme Counties, South Dakota
Project Number: 105644

Study Type: Shadow Flicker Assessment

Client POC: Bridget Canty
Title: Permitting Project Manager
Address:
Phone: (831) 430-6326
Email: bcanty@spower.com

BMcD POC: Aaron Anderson P.E.
Title: Senior Project Manager, Renewable Energy Group
Address: 9400 Ward Parkway, Kansas City, MO 64114
Phone: (816) 823-6226
Email: aanderson@burnsmcd.com

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Version History: Version 6 | Issued 26-September-2018 | Author: Rose | Reviewer: Anderson
 Updated turbine layout and receptors. Previous versions issued with full report.

WIND TURBINE COORDINATES - GE3.8-137

Turbine Number	Easting [m]	Northing [m]	Turbine Model	Hub Height [m]
1A.01	579,956	4,775,946	GE3.8-137	111.5
1A.02	580,807	4,775,443	GE3.8-137	111.5
1A.03	580,970	4,776,074	GE3.8-137	111.5
1A.04	580,259	4,777,725	GE3.8-137	111.5
1A.05	580,759	4,777,855	GE3.8-137	111.5
1A.06	581,221	4,778,640	GE3.8-137	111.5
1A.07	581,719	4,779,255	GE3.8-137	111.5
1B.08	579,428	4,778,668	GE3.8-137	111.5
1B.09	579,671	4,779,153	GE3.8-137	111.5
1B.10	580,170	4,780,211	GE3.8-137	111.5
1B.11	580,939	4,780,407	GE3.8-137	111.5
1B.12	580,170	4,781,359	GE3.8-137	111.5
1B.13	580,604	4,781,811	GE3.8-137	111.5
1B.14	580,727	4,782,275	GE3.8-137	111.5
2A.15	575,324	4,774,400	GE3.8-137	111.5
2A.16	575,201	4,775,693	GE3.8-137	111.5
2A.17	576,064	4,775,521	GE3.8-137	111.5
2A.18	576,650	4,776,014	GE3.8-137	111.5
2A.19	577,060	4,776,210	GE3.8-137	111.5
2A.20	577,580	4,776,426	GE3.8-137	111.5
2A.21	579,275	4,777,079	GE3.8-137	111.5
2B.22	574,404	4,774,437	GE3.8-137	111.5
2B.23	573,519	4,774,711	GE3.8-137	111.5
2B.24	572,179	4,774,804	GE3.8-137	111.5
2B.25	571,662	4,775,700	GE3.8-137	111.5
2B.26	571,219	4,774,346	GE3.8-137	111.5
2B.27	570,700	4,773,949	GE3.8-137	111.5
2B.28	570,639	4,774,959	GE3.8-137	111.5
3A.29	574,452	4,773,338	GE3.8-137	111.5
3A.30	573,634	4,773,249	GE3.8-137	111.5
3A.31	570,336	4,773,327	GE3.8-137	111.5
3A.32	568,781	4,773,724	GE3.8-137	111.5
3A.33	569,071	4,774,045	GE3.8-137	111.5
3A.34	568,691	4,775,793	GE3.8-137	111.5
3A.35	569,074	4,775,995	GE3.8-137	111.5
3A.36	569,026	4,777,349	GE3.8-137	111.5
3B.37	573,856	4,770,651	GE3.8-137	111.5
3B.38	571,896	4,770,015	GE3.8-137	111.5
3B.39	572,076	4,769,232	GE3.8-137	111.5
3B.40	572,380	4,771,753	GE3.8-137	111.5
3B.41	571,220	4,771,721	GE3.8-137	111.5
3B.42	570,763	4,771,308	GE3.8-137	111.5
3B.43	570,487	4,770,821	GE3.8-137	111.5
4A.44	575,275	4,769,819	GE3.8-137	111.5
4A.45	576,925	4,769,963	GE3.8-137	111.5
4A.46	576,997	4,769,043	GE3.8-137	111.5
4A.47	577,718	4,768,001	GE3.8-137	111.5
4A.48	576,805	4,767,428	GE3.8-137	111.5
4A.49	578,173	4,768,318	GE3.8-137	111.5
4B.50	579,886	4,767,974	GE3.8-137	111.5

WIND TURBINE COORDINATES - GE3.8-137

Turbine Number	Easting [m]	Northing [m]	Turbine Model	Hub Height [m]
4B.51	581,200	4,768,190	GE3.8-137	111.5
4B.52	581,716	4,768,536	GE3.8-137	111.5
4B.53	580,860	4,769,311	GE3.8-137	111.5
4B.54	579,755	4,766,668	GE3.8-137	111.5
4B.55	579,255	4,766,296	GE3.8-137	111.5
4B.56	578,787	4,765,862	GE3.8-137	111.5
4B.57	578,011	4,765,079	GE3.8-137	111.5
5A.58	571,464	4,768,160	GE3.8-137	111.5
5A.59	572,004	4,766,553	GE3.8-137	111.5
5A.60	570,006	4,766,129	GE3.8-137	111.5
5A.61	570,143	4,766,716	GE3.8-137	111.5
5A.62	571,597	4,766,151	GE3.8-137	111.5

Notes:

[1] All coordinates presented in UTM NAD83 Zone 14N (meters)

[2] All coordinates provided by Developer in "PWIND - 62x GE38137 111p5m v180925-02" on 20180925

RECEPTOR COORDINATES

Receptor Name	Easting [ft]	Northing [ft]	Participating Status	County Name
REC-001	583,179	4,781,949	Non-participating	Hutchinson
REC-002	578,731	4,782,429	Participating	Hutchinson
REC-003	580,507	4,783,274	Non-participating	Hutchinson
REC-004	582,679	4,780,105	Non-participating	Hutchinson
REC-005	583,327	4,778,397	Non-participating	Bon Homme
REC-006	583,615	4,778,695	Non-participating	Bon Homme
REC-007	579,386	4,783,172	Non-participating	Hutchinson
REC-008	579,365	4,780,123	Non-participating	Hutchinson
REC-009	582,486	4,779,597	Non-participating	Bon Homme
REC-010	570,706	4,779,233	Non-participating	Charles Mix
REC-011	568,955	4,779,050	Non-participating	Charles Mix
REC-012	575,451	4,778,870	Non-participating	Bon Homme
REC-013	570,834	4,777,924	Non-participating	Charles Mix
REC-014	578,568	4,777,265	Non-participating	Bon Homme
REC-015	578,579	4,777,228	Non-participating	Bon Homme
REC-016	569,438	4,774,776	Participating	Charles Mix
REC-017	568,000	4,773,684	Non-participating	Charles Mix
REC-018	575,894	4,773,069	Participating	Bon Homme
REC-019	568,870	4,772,838	Participating	Charles Mix
REC-020	568,171	4,772,373	Non-participating	Charles Mix
REC-021	574,123	4,771,642	Participating	Bon Homme
REC-022	574,118	4,771,913	Non-participating	Bon Homme
REC-023	567,115	4,771,132	Non-participating	Charles Mix
REC-024	569,456	4,770,886	Non-participating	Charles Mix
REC-025	582,410	4,770,691	Participating	Bon Homme
REC-026	582,206	4,770,538	Non-participating	Bon Homme
REC-027	569,451	4,770,123	Non-participating	Charles Mix
REC-028	578,916	4,770,107	Participating	Bon Homme
REC-029	567,890	4,769,897	Non-participating	Charles Mix
REC-030	574,058	4,769,738	Non-participating	Bon Homme
REC-031	571,038	4,769,100	Non-participating	Charles Mix
REC-032	579,595	4,768,434	Participating	Bon Homme
REC-033	574,388	4,768,112	Non-participating	Bon Homme
REC-034	575,857	4,767,969	Non-participating	Bon Homme
REC-035	568,988	4,768,088	Non-participating	Charles Mix
REC-036	574,140	4,767,903	Non-participating	Bon Homme
REC-037	580,535	4,767,956	Participating	Bon Homme
REC-038	569,571	4,767,694	Non-participating	Charles Mix
REC-039	575,754	4,767,512	Non-participating	Bon Homme
REC-040	575,854	4,767,409	Non-participating	Bon Homme
REC-041	577,366	4,767,429	Participating	Bon Homme
REC-042	580,535	4,768,650	Non-participating	Bon Homme
REC-043	582,314	4,767,105	Non-participating	Bon Homme
REC-044	577,582	4,766,535	Participating	Bon Homme
REC-045	580,460	4,766,528	Participating	Bon Homme
REC-046	570,892	4,766,384	Participating	Charles Mix
REC-047	576,072	4,766,099	Non-participating	Bon Homme
REC-048	575,888	4,765,484	Non-participating	Bon Homme
REC-049	579,136	4,765,004	Non-participating	Bon Homme
REC-050	575,594	4,764,878	Participating	Bon Homme

RECEPTOR COORDINATES

Receptor Name	Easting [ft]	Northing [ft]	Participating Status	County Name
REC-051	577,015	4,764,806	Participating	Bon Homme
REC-052	571,035	4,764,976	Non-participating	Charles Mix
REC-053	575,752	4,763,554	Non-participating	Bon Homme
REC-054	579,261	4,763,509	Non-participating	Bon Homme
REC-055	575,738	4,763,383	Non-participating	Bon Homme
REC-056	578,784	4,763,423	Non-participating	Bon Homme
REC-057	575,729	4,763,021	Non-participating	Bon Homme
REC-058	574,690	4,762,906	Non-participating	Bon Homme
REC-059	574,609	4,762,765	Non-participating	Bon Homme
REC-060	575,719	4,763,759	Non-participating	Bon Homme
REC-061	566,590	4,774,005	Non-participating	Charles Mix
REC-062	566,795	4,771,446	Non-participating	Charles Mix
REC-063	567,576	4,773,523	Non-participating	Charles Mix
REC-064	568,170	4,775,222	Non-participating	Charles Mix
REC-065	568,402	4,770,548	Non-participating	Charles Mix
REC-066	569,475	4,776,605	Participating	Charles Mix
REC-067	569,782	4,765,374	Non-participating	Charles Mix
REC-068	570,301	4,776,152	Non-participating	Charles Mix
REC-069	570,321	4,776,086	Non-participating	Charles Mix
REC-070	570,931	4,767,169	Non-participating	Charles Mix
REC-071	571,247	4,765,598	Non-participating	Charles Mix
REC-072	571,848	4,767,001	Participating	Charles Mix
REC-073	572,712	4,764,371	Non-participating	Charles Mix
REC-074	572,760	4,768,610	Non-participating	Bon Homme
REC-075	572,875	4,775,184	Participating	Charles Mix
REC-076	573,024	4,775,138	Non-participating	Charles Mix
REC-077	573,104	4,767,559	Non-participating	Bon Homme
REC-078	572,690	4,764,270	Non-participating	Charles Mix
REC-079	572,840	4,766,532	Participating	Charles Mix
REC-080	574,527	4,771,635	Participating	Bon Homme
REC-081	574,606	4,772,084	Participating	Bon Homme
REC-082	575,265	4,775,117	Participating	Bon Homme
REC-083	575,384	4,771,696	Participating	Bon Homme
REC-084	575,460	4,773,772	Participating	Bon Homme
REC-085	576,210	4,770,611	Participating	Bon Homme
REC-086	576,538	4,765,598	Participating	Bon Homme
REC-087	576,971	4,770,447	Participating	Bon Homme
REC-088	577,660	4,765,661	Participating	Bon Homme
REC-089	577,747	4,768,860	Participating	Bon Homme
REC-090	577,878	4,764,079	Non-participating	Bon Homme
REC-091	577,916	4,763,844	Non-participating	Bon Homme
REC-092	578,532	4,767,119	Participating	Bon Homme
REC-093	578,576	4,778,619	Participating	Bon Homme
REC-094	578,515	4,776,677	Participating	Bon Homme
REC-095	578,804	4,764,275	Non-participating	Bon Homme
REC-096	578,828	4,768,793	Non-participating	Bon Homme
REC-097	578,943	4,770,455	Non-participating	Bon Homme
REC-098	579,475	4,767,289	Non-participating	Bon Homme
REC-099	579,721	4,762,442	Participating	Bon Homme
REC-100	580,720	4,765,706	Non-participating	Bon Homme

RECEPTOR COORDINATES

Receptor Name	Easting [ft]	Northing [ft]	Participating Status	County Name
REC-101	580,992	4,762,541	Non-participating	Bon Homme
REC-102	581,560	4,763,175	Non-participating	Bon Homme
REC-103	581,721	4,767,420	Participating	Bon Homme
REC-104	581,794	4,770,381	Non-participating	Bon Homme
REC-105	581,891	4,769,063	Non-participating	Bon Homme
REC-106	581,883	4,766,985	Participating	Bon Homme
REC-107	582,090	4,770,568	Non-participating	Bon Homme
REC-108	582,148	4,764,102	Participating	Bon Homme
REC-109	582,610	4,767,583	Non-participating	Bon Homme
REC-110	583,963	4,770,430	Non-participating	Bon Homme
REC-111	582,578	4,767,332	Non-participating	Bon Homme
REC-112	570,034	4,777,429	Non-participating	Charles Mix
REC-113	580,226	4,778,670	Participating	Bon Homme
REC-114	580,644	4,779,066	Participating	Bon Homme
REC-115	580,813	4,776,798	Participating	Bon Homme
REC-116	581,676	4,775,654	Participating	Bon Homme
REC-117	579,368	4,775,404	Participating	Bon Homme
REC-118	580,095	4,784,337	Non-participating	Hutchinson
REC-119	581,868	4,783,246	Non-participating	Hutchinson
REC-120	582,411	4,781,467	Non-participating	Hutchinson
REC-121	582,256	4,783,055	Non-participating	Hutchinson
REC-122	582,261	4,777,793	Participating	Bon Homme
REC-123	581,461	4,785,646	Non-participating	Hutchinson
REC-124	577,505	4,781,336	Non-participating	Hutchinson
REC-125	580,996	4,773,976	Non-participating	Bon Homme
REC-126	580,916	4,774,830	Participating	Bon Homme
REC-127	581,474	4,775,076	Participating	Bon Homme
REC-128	581,468	4,774,997	Participating	Bon Homme
REC-129	576,816	4,779,814	Non-participating	Bon Homme
REC-130	567,502	4,781,060	Non-participating	Charles Mix
REC-131	568,850	4,781,446	Non-participating	Charles Mix
REC-132	570,408	4,783,811	Non-participating	Charles Mix
REC-133	570,806	4,783,497	Non-participating	Charles Mix
REC-134	570,845	4,782,153	Non-participating	Charles Mix
REC-135	573,665	4,780,153	Non-participating	Charles Mix
REC-136	579,049	4,772,150	Non-participating	Bon Homme
REC-137	579,104	4,772,978	Non-participating	Bon Homme
REC-138	573,105	4,772,224	Participating	Bon Homme
REC-139	569,781	4,772,134	Non-participating	Charles Mix
REC-140	580,689	4,768,952	Non-participating	Bon Homme
REC-141	577,130	4,782,270	Non-participating	Hutchinson
REC-142	584,340	4,769,093	Non-participating	Bon Homme
REC-143	582,522	4,766,643	Non-participating	Bon Homme
REC-144	582,964	4,764,514	Non-participating	Bon Homme
REC-145	568,186	4,765,929	Non-participating	Charles Mix
REC-146	576,221	4,771,527	Participating	Bon Homme
REC-147	575,778	4,770,361	Participating	Bon Homme

RECEPTOR COORDINATES

Receptor Name	Easting [ft]	Northing [ft]	Participating Status	County Name
REC-148	568,806	4,770,128	Non-participating	Charles Mix
REC-149	567,763	4,773,526	Non-participating	Charles Mix

Notes:

- [1] All coordinates presented in UTM NAD83 Zone 14N (meters)
- [2] Coordinates provided by Developer in "RECEPTORS-OCCUPIED.KMZ" and through field investigation data provided 20180920
- [3] Receptor description provided by client
- [4] ReceptorCoord updated with REC-138 in v2
- [5] ReceptorCoord in v4 did not change from v2
- [6] Participating status provided by Developer in "Prevailing Winds - Homes on Leased Land" dated 20180516

WIND SPEED FREQUENCY DISTRIBUTION - 111.5 MAGL

Bin [m/s]	Wind Direction [degrees]											
	0	30	60	90	120	150	180	210	240	270	300	330
0	11.63	9.15	7.94	7.92	7.53	7.80	8.96	5.46	5.14	5.35	10.68	12.43
1	11.51	9.25	11.54	9.35	8.16	4.89	3.58	8.52	9.42	9.91	10.83	10.20
2	20.70	20.13	20.43	17.93	15.71	12.23	10.56	15.50	18.48	21.81	17.68	17.72
3	33.22	34.35	34.95	33.11	29.54	23.68	20.09	29.61	31.54	34.00	27.44	29.54
4	52.15	56.03	57.94	55.29	52.65	35.96	28.99	46.16	45.04	55.74	46.51	48.70
5	72.48	70.20	75.20	70.95	67.65	50.49	38.48	52.72	57.06	64.37	57.02	66.18
6	81.89	83.87	81.78	85.27	89.90	69.52	50.15	62.29	68.49	78.41	65.81	71.98
7	96.59	95.00	98.95	97.99	102.77	81.21	57.90	72.27	81.10	84.11	76.67	81.19
8	102.03	89.37	95.39	101.36	101.50	88.94	76.50	77.23	90.82	89.96	84.70	86.32
9	104.00	95.04	105.73	95.63	101.91	103.82	97.70	99.43	98.02	93.31	87.28	87.37
10	91.57	103.26	106.21	98.09	107.43	111.11	107.15	107.33	109.89	102.07	92.31	92.86
11	90.03	91.21	95.97	96.93	95.27	114.82	130.43	109.07	110.93	99.29	95.28	86.57
12	72.68	71.41	72.31	78.47	80.22	97.90	124.26	102.86	90.53	86.11	87.42	81.99
13	55.36	56.78	53.37	59.24	59.95	78.28	104.76	87.84	71.31	62.37	69.16	65.63
14	40.54	40.48	33.32	40.20	39.37	55.87	69.60	59.70	50.90	49.04	54.02	47.97
15	26.30	27.72	22.60	26.65	21.13	36.25	35.80	31.98	30.57	26.73	37.69	36.57
16	19.06	18.47	13.08	15.28	9.32	19.23	22.26	18.43	15.66	18.46	25.87	26.87
17	11.91	12.71	6.83	7.28	6.69	7.58	10.69	7.61	7.57	10.26	20.54	20.48
18	7.90	10.59	5.39	4.48	4.71	4.06	6.00	3.14	4.30	6.27	14.83	13.39
19	4.72	6.88	3.08	2.84	3.40	1.52	3.19	2.30	3.12	2.14	8.86	10.20
20	2.26	4.50	2.50	1.45	1.01	0.64	0.68	1.54	1.78	2.07	6.90	6.91
21	1.57	1.50	1.73	1.40	0.96	0.54	0.30	0.56	1.11	1.50	4.82	4.08
22	0.62	0.63	0.58	0.53	0.25	0.20	0.13	0.70	0.82	1.07	3.11	3.07
23	0.46	0.25	0.48	0.05	0.30	0.15	0.21	0.63	0.97	0.71	2.22	1.69
24	0.26	0.04	0.29	0.19	0.15	0.20	0.04	0.63	0.15	0.14	1.47	0.98
25	0.16	0.04	0.14	0.05	0.05	0.15	0.26	0.77	0.15	0.00	1.04	0.74
26	0.00	0.13	0.14	0.00	0.00	0.10	0.21	0.28	0.07	0.07	0.39	0.40
27	0.03	0.13	0.10	0.00	0.00	0.29	0.04	0.21	0.00	0.07	0.14	0.25
28	0.00	0.04	0.00	0.00	0.00	0.29	0.04	0.28	0.00	0.00	0.04	0.09
29	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.14	0.00	0.00	0.00	0.06
30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.21	0.15	0.00	0.00	0.00
31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00
32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00
33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sum	1012	1009	1008	1008	1008	1008	1009	1005	1005	1005	1011	1012

Notes:

- [1] All data provided by sPower via "Prevailing Winds Site Average.windog"
- [2] All data presented in milles for period from September 20, 2013 to September 13, 2018
- [3] All data presented at 111.5 magl

SUNSHINE PROBABILITY DATA

Figure 1: Monthly Sunshine Probability for Wagner, South Dakota

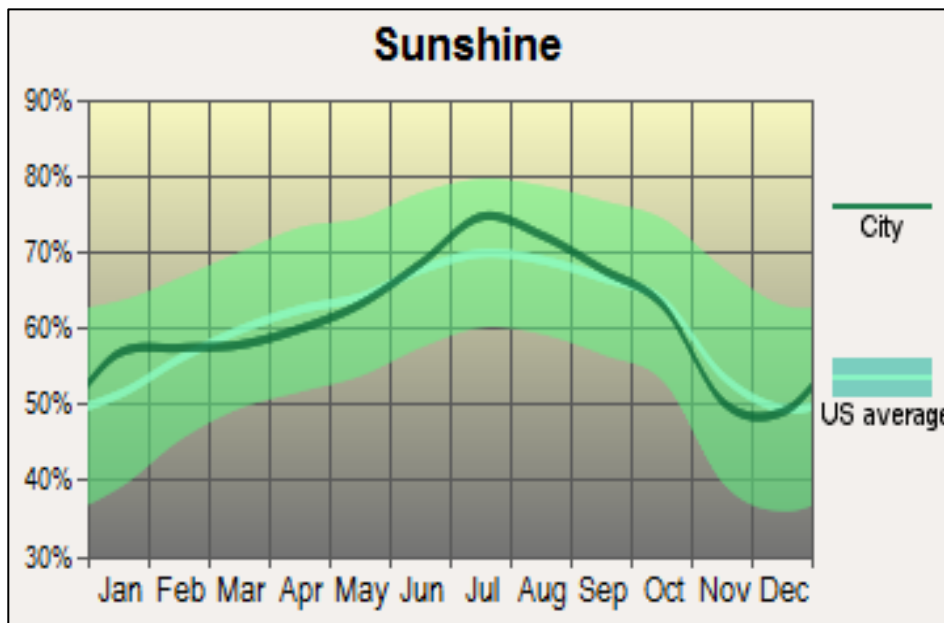


Table 1: Monthly Sunshine Probability for Wagner, South Dakota

Month	Avg Possible Sunshine
January	58%
February	58%
March	59%
April	60%
May	63%
June	69%
July	74%
August	72%
September	68%
October	65%
November	50%
December	50%

Notes:

- [1] Data source: <http://www.city-data.com/city/Wagner-South-Dakota.html>
- [2] Data location: Wagner, South Dakota
- [3] Data in Table 1 estimated by Burns & McDonnell from source data in Figure 1

GE 3.8-137 POWER CURVE

Wind Speed [m/s]	Power [kW]
0.0	0
0.5	0
1.0	0
1.5	0
2.0	0
2.5	0
3.0	14
3.5	88
4.0	179
4.5	295
5.0	434
5.5	596
6.0	786
6.5	1009
7.0	1269
7.5	1567
8.0	1906
8.5	2280
9.0	2648
9.5	2980
10.0	3284
10.5	3567
11.0	3776
11.5	3830
12.0	3830
12.5	3830
13.0	3830
13.5	3830
14.0	3830
14.5	3830
15.0	3830
15.5	3830
16.0	3830
16.5	3830
17.0	3830
17.5	3830
18.0	3830
18.5	3830
19.0	3830
19.5	3830
20.0	3830
20.5	3830
21.0	3830
21.5	3830
22.0	3830
22.5	3830
23.0	3830
23.5	3830
24.0	3830
24.5	3830
25.0	3830

Notes:

[1] Power curve for air density of 1.16 kg/m³ and site specific TI band

[2] All data provided by sPower via "Site Specific Power Curve - PCD_1206271_PrevailingWind_3.8-137_EN_r01"

EXHIBIT A3-1

SHADOW FLICKER RESULTS - SORTED BY RECEPTOR ID - GE3.8-137

Receptor Name	Easting [m]	Northing [m]	Flicker Duration [hour/year]	Flicker Duration [max minutes/day]	Participating Status	County Name
REC-001	583,179	4,781,949	0.00	0	Non-participating	Hutchinson
REC-002	578,731	4,782,429	0.00	0	Participating	Hutchinson
REC-003	580,507	4,783,274	0.00	0	Non-participating	Hutchinson
REC-004	582,679	4,780,105	5.67	27	Non-participating	Hutchinson
REC-005	583,327	4,778,397	0.00	0	Non-participating	Bon Homme
REC-006	583,615	4,778,695	0.00	0	Non-participating	Bon Homme
REC-007	579,386	4,783,172	0.00	0	Non-participating	Hutchinson
REC-008	579,365	4,780,123	11.02	39	Non-participating	Hutchinson
REC-009	582,486	4,779,597	9.22	38	Non-participating	Bon Homme
REC-010	570,706	4,779,233	0.00	0	Non-participating	Charles Mix
REC-011	568,955	4,779,050	0.00	0	Non-participating	Charles Mix
REC-012	575,451	4,778,870	0.00	0	Non-participating	Bon Homme
REC-013	570,834	4,777,924	0.00	0	Non-participating	Charles Mix
REC-014	578,568	4,777,265	12.22	43	Non-participating	Bon Homme
REC-015	578,579	4,777,228	12.83	44	Non-participating	Bon Homme
REC-016	569,438	4,774,776	4.80	27	Participating	Charles Mix
REC-017	568,000	4,773,684	19.87	40	Non-participating	Charles Mix
REC-018	575,894	4,773,069	0.00	0	Participating	Bon Homme
REC-019	568,870	4,772,838	0.00	0	Participating	Charles Mix
REC-020	568,171	4,772,373	0.00	0	Non-participating	Charles Mix
REC-021	574,123	4,771,642	0.00	0	Participating	Bon Homme
REC-022	574,118	4,771,913	0.00	0	Non-participating	Bon Homme
REC-023	567,115	4,771,132	0.00	0	Non-participating	Charles Mix
REC-024	569,456	4,770,886	6.20	31	Non-participating	Charles Mix
REC-025	582,410	4,770,691	0.00	0	Participating	Bon Homme
REC-026	582,206	4,770,538	0.00	0	Non-participating	Bon Homme
REC-027	569,451	4,770,123	0.00	0	Non-participating	Charles Mix
REC-028	578,916	4,770,107	0.00	0	Participating	Bon Homme
REC-029	567,890	4,769,897	0.00	0	Non-participating	Charles Mix
REC-030	574,058	4,769,738	3.57	25	Non-participating	Bon Homme
REC-031	571,038	4,769,100	6.43	31	Non-participating	Charles Mix
REC-032	579,595	4,768,434	9.67	45	Participating	Bon Homme
REC-033	574,388	4,768,112	0.00	0	Non-participating	Bon Homme
REC-034	575,857	4,767,969	0.00	0	Non-participating	Bon Homme
REC-035	568,988	4,768,088	0.00	0	Non-participating	Charles Mix
REC-036	574,140	4,767,903	0.00	0	Non-participating	Bon Homme
REC-037	580,535	4,767,956	0.00	0	Participating	Bon Homme
REC-038	569,571	4,767,694	0.00	0	Non-participating	Charles Mix
REC-039	575,754	4,767,512	0.00	0	Non-participating	Bon Homme
REC-040	575,854	4,767,409	7.42	34	Non-participating	Bon Homme
REC-041	577,366	4,767,429	22.70	55	Participating	Bon Homme
REC-042	580,535	4,768,650	28.00	53	Non-participating	Bon Homme
REC-043	582,314	4,767,105	0.00	0	Non-participating	Bon Homme
REC-044	577,582	4,766,535	0.00	0	Participating	Bon Homme
REC-045	580,460	4,766,528	18.48	45	Participating	Bon Homme
REC-046	570,892	4,766,384	46.25	76	Participating	Charles Mix
REC-047	576,072	4,766,099	0.00	0	Non-participating	Bon Homme
REC-048	575,888	4,765,484	0.00	0	Non-participating	Bon Homme
REC-049	579,136	4,765,004	4.85	27	Non-participating	Bon Homme
REC-050	575,594	4,764,878	0.00	0	Participating	Bon Homme

EXHIBIT A3-1

SHADOW FLICKER RESULTS - SORTED BY RECEPTOR ID - GE3.8-137

Receptor Name	Easting [m]	Northing [m]	Flicker Duration [hour/year]	Flicker Duration [max minutes/day]	Participating Status	County Name
REC-051	577,015	4,764,806	8.20	32	Participating	Bon Homme
REC-052	571,035	4,764,976	0.00	0	Non-participating	Charles Mix
REC-053	575,752	4,763,554	0.00	0	Non-participating	Bon Homme
REC-054	579,261	4,763,509	0.00	0	Non-participating	Bon Homme
REC-055	575,738	4,763,383	0.00	0	Non-participating	Bon Homme
REC-056	578,784	4,763,423	0.00	0	Non-participating	Bon Homme
REC-057	575,729	4,763,021	0.00	0	Non-participating	Bon Homme
REC-058	574,690	4,762,906	0.00	0	Non-participating	Bon Homme
REC-059	574,609	4,762,765	0.00	0	Non-participating	Bon Homme
REC-060	575,719	4,763,759	0.00	0	Non-participating	Bon Homme
REC-061	566,590	4,774,005	0.00	0	Non-participating	Charles Mix
REC-062	566,795	4,771,446	0.00	0	Non-participating	Charles Mix
REC-063	567,576	4,773,523	5.02	27	Non-participating	Charles Mix
REC-064	568,170	4,775,222	0.00	0	Non-participating	Charles Mix
REC-065	568,402	4,770,548	0.00	0	Non-participating	Charles Mix
REC-066	569,475	4,776,605	0.00	0	Participating	Charles Mix
REC-067	569,782	4,765,374	0.00	0	Non-participating	Charles Mix
REC-068	570,301	4,776,152	3.13	24	Non-participating	Charles Mix
REC-069	570,321	4,776,086	3.20	24	Non-participating	Charles Mix
REC-070	570,931	4,767,169	8.80	36	Non-participating	Charles Mix
REC-071	571,247	4,765,598	11.72	25	Non-participating	Charles Mix
REC-072	571,848	4,767,001	0.00	0	Participating	Charles Mix
REC-073	572,712	4,764,371	0.00	0	Non-participating	Charles Mix
REC-074	572,760	4,768,610	0.00	0	Non-participating	Bon Homme
REC-075	572,875	4,775,184	20.17	42	Participating	Charles Mix
REC-076	573,024	4,775,138	33.90	51	Non-participating	Charles Mix
REC-077	573,104	4,767,559	0.00	0	Non-participating	Bon Homme
REC-078	572,690	4,764,270	0.00	0	Non-participating	Charles Mix
REC-079	572,840	4,766,532	0.00	0	Participating	Charles Mix
REC-080	574,527	4,771,635	0.00	0	Participating	Bon Homme
REC-081	574,606	4,772,084	0.00	0	Participating	Bon Homme
REC-082	575,265	4,775,117	8.75	31	Participating	Bon Homme
REC-083	575,384	4,771,696	0.00	0	Participating	Bon Homme
REC-084	575,460	4,773,772	4.85	29	Participating	Bon Homme
REC-085	576,210	4,770,611	0.00	0	Participating	Bon Homme
REC-086	576,538	4,765,598	0.00	0	Participating	Bon Homme
REC-087	576,971	4,770,447	0.00	0	Participating	Bon Homme
REC-088	577,660	4,765,661	5.57	28	Participating	Bon Homme
REC-089	577,747	4,768,860	24.83	42	Participating	Bon Homme
REC-090	577,878	4,764,079	0.00	0	Non-participating	Bon Homme
REC-091	577,916	4,763,844	0.00	0	Non-participating	Bon Homme
REC-092	578,532	4,767,119	3.78	24	Participating	Bon Homme
REC-093	578,576	4,778,619	20.83	37	Participating	Bon Homme
REC-094	578,515	4,776,677	12.23	38	Participating	Bon Homme
REC-095	578,804	4,764,275	0.00	0	Non-participating	Bon Homme
REC-096	578,828	4,768,793	22.47	54	Non-participating	Bon Homme
REC-097	578,943	4,770,455	0.00	0	Non-participating	Bon Homme
REC-098	579,475	4,767,289	0.00	0	Non-participating	Bon Homme
REC-099	579,721	4,762,442	0.00	0	Participating	Bon Homme
REC-100	580,720	4,765,706	0.00	0	Non-participating	Bon Homme

EXHIBIT A3-1

SHADOW FLICKER RESULTS - SORTED BY RECEPTOR ID - GE3.8-137

Receptor Name	Easting [m]	Northing [m]	Flicker Duration [hour/year]	Flicker Duration [max minutes/day]	Participating Status	County Name
REC-101	580,992	4,762,541	0.00	0	Non-participating	Bon Homme
REC-102	581,560	4,763,175	0.00	0	Non-participating	Bon Homme
REC-103	581,721	4,767,420	0.00	0	Participating	Bon Homme
REC-104	581,794	4,770,382	0.00	0	Non-participating	Bon Homme
REC-105	581,891	4,769,063	0.00	0	Non-participating	Bon Homme
REC-106	581,883	4,766,985	0.00	0	Participating	Bon Homme
REC-107	582,090	4,770,568	0.00	0	Non-participating	Bon Homme
REC-108	582,148	4,764,102	0.00	0	Participating	Bon Homme
REC-109	582,610	4,767,583	0.00	0	Non-participating	Bon Homme
REC-110	583,963	4,770,430	0.00	0	Non-participating	Bon Homme
REC-111	582,578	4,767,332	0.00	0	Non-participating	Bon Homme
REC-112	570,034	4,777,429	5.37	31	Non-participating	Charles Mix
REC-113	580,226	4,778,670	5.92	31	Participating	Bon Homme
REC-114	580,644	4,779,066	32.80	46	Participating	Bon Homme
REC-115	580,813	4,776,798	1.73	17	Participating	Bon Homme
REC-116	581,676	4,775,654	0.00	0	Participating	Bon Homme
REC-117	579,368	4,775,404	0.00	0	Participating	Bon Homme
REC-118	580,095	4,784,337	0.00	0	Non-participating	Hutchinson
REC-119	581,868	4,783,246	0.00	0	Non-participating	Hutchinson
REC-120	582,411	4,781,467	0.00	0	Non-participating	Hutchinson
REC-121	582,256	4,783,055	0.00	0	Non-participating	Hutchinson
REC-122	582,261	4,777,793	0.00	0	Participating	Bon Homme
REC-123	581,461	4,785,646	0.00	0	Non-participating	Hutchinson
REC-124	577,505	4,781,336	0.00	0	Non-participating	Hutchinson
REC-125	580,996	4,773,976	0.00	0	Non-participating	Bon Homme
REC-126	580,916	4,774,830	0.00	0	Participating	Bon Homme
REC-127	581,474	4,775,076	0.00	0	Participating	Bon Homme
REC-128	581,468	4,774,997	0.00	0	Participating	Bon Homme
REC-129	576,816	4,779,814	0.00	0	Non-participating	Bon Homme
REC-130	567,502	4,781,060	0.00	0	Non-participating	Charles Mix
REC-131	568,850	4,781,446	0.00	0	Non-participating	Charles Mix
REC-132	570,408	4,783,811	0.00	0	Non-participating	Charles Mix
REC-133	570,806	4,783,497	0.00	0	Non-participating	Charles Mix
REC-134	570,845	4,782,153	0.00	0	Non-participating	Charles Mix
REC-135	573,665	4,780,153	0.00	0	Non-participating	Charles Mix
REC-136	579,049	4,772,150	0.00	0	Non-participating	Bon Homme
REC-137	579,104	4,772,978	0.00	0	Non-participating	Bon Homme
REC-138	573,105	4,772,224	0.00	0	Participating	Bon Homme
REC-139	569,781	4,772,134	6.15	26	Non-participating	Charles Mix
REC-140	580,689	4,768,952	5.27	29	Non-participating	Bon Homme
REC-141	577,130	4,782,270	0.00	0	Non-participating	Hutchinson
REC-142	584,340	4,769,093	0.00	0	Non-participating	Bon Homme
REC-143	582,522	4,766,643	0.00	0	Non-participating	Bon Homme
REC-144	582,964	4,764,514	0.00	0	Non-participating	Bon Homme
REC-145	568,186	4,765,929	0.00	0	Non-participating	Charles Mix
REC-146	576,221	4,771,527	0.00	0	Participating	Bon Homme
REC-147	575,778	4,770,361	15.03	43	Participating	Bon Homme

SHADOW FLICKER RESULTS - SORTED BY RECEPTOR ID - GE3.8-137

Receptor Name	Easting [m]	Northing [m]	Flicker Duration [hour/year]	Flicker Duration [max minutes/day]	Participating Status	County Name
REC-148	568,806	4,770,128	0.00	0	Non-participating	Charles Mix
REC-149	567,763	4,773,526	7.35	31	Non-participating	Charles Mix

Notes:

- [1] All coordinates presented in UTM NAD83 Zone 14N (meters)
- [2] All results based on GE3.8-137 layout
- [3] Obstacles modeled for certain receptor locations noted in version 5c of the full report dated 20180529