

BEFORE THE SOUTH DAKOTA PUBLIC UTILITIES COMMISSION

DOCKET NO. EL19-027

**IN THE MATTER OF THE APPLICATION BY CROWNED RIDGE WIND II, LLC FOR
A PERMIT OF A WIND ENERGY FACILITY IN DEUEL, GRANT AND CODINGTON
COUNTIES**

**DIRECT TESTIMONY OF DARREN KEARNEY
ON BEHALF OF THE PUBLIC UTILITIES COMMISSION STAFF
December 6, 2019**

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EXHIBITS

Exhibit_DK-1: Resume

Exhibit_DK-2: Responses to Staff Data Requests

Exhibit_DK-3: South Dakota Department of Health Letter

Exhibit_DK-4: Commission Staff Letter to SD DENR

Exhibit_DK-5: SD DENR Response Letter to Commission Staff

I. **INTRODUCTION AND QUALIFICATIONS**

Q. State your name.

A. Darren Kearney.

Q. State your employer and business address.

A. South Dakota Public Utilities Commission, 500 E Capitol Ave, Pierre, SD, 57501.

Q. State your position with the South Dakota Public Utilities Commission.

A. I am a Staff Analyst, which is also referred to as a Utility Analyst.

Q. What is your educational background?

A. I hold a Bachelor of Science degree, majoring in Biology, from the University of Minnesota. I also hold a Master of Business Administration degree from the University of South Dakota.

Q. Please provide a brief explanation of your work experience.

A. I began my career in the utility industry working as contract biologist for Xcel Energy, where I conducted biological studies around various power plants, performed statistical analysis on the data collected, and authored reports in order to meet National Pollutant Discharge Elimination System (NPDES) permit requirements.

After two years of performing biological studies, I then transitioned into an environmental compliance function at Xcel Energy as a full-time employee of the company and became responsible for ensuring Xcel's facilities maintained compliance with the Oil Pollution Act of 1990. This involved writing Spill Prevention Control and Countermeasure (SPCC) plans and also ensuring Xcel's facilities maintained compliance with those plans. I was also responsible for the company's Environmental Incident Response Program, which involved training Xcel employees on spill reporting and response, managing spill cleanups, and mobilizing in-house and contract spill response resources.

I was in that role for approximately three years and then I transitioned to a coal-fired power plant at Xcel and became responsible for environmental permitting and

1 compliance for the plant. Briefly, my responsibilities involved ensuring that the facility
2 complied with all environmental permits at the plant, which included a Clean Air Act Title
3 V Air Permit, a Clean Water Act NPDES permit, and a hazardous waste permit. I also
4 drafted reports on the plant's operations for submission to various agencies as required
5 by permit or law. After three years at the power plant, I left Xcel Energy to work for the
6 South Dakota Public Utilities Commission (PUC or Commission).

7
8 I have been at the PUC for over six years now. During my employment with the PUC, I
9 worked on a variety of matters in the telecom, natural gas, and electric industries. The
10 major dockets that I work on are energy conversion facility siting, transmission siting,
11 pipeline siting, wind energy facility siting, energy efficiency programs, and PURPA
12 avoided costs. I also work on matters involving the Midcontinent Independent System
13 Operator (MISO), specifically wholesale electricity market issues, transmission cost
14 allocation and regional transmission planning. I also attended a number of trainings on
15 public utility policy issues, electric grid operations, regional transmission planning,
16 electric wholesale markets, and utility ratemaking.

17
18 My resume is provided as Exhibit_DK-1.
19
20

21 II. PURPOSE OF TESTIMONY

22
23 **Q. On whose behalf was this testimony prepared?**

24 A. This testimony was prepared on behalf of the Staff of the South Dakota Public Utilities
25 Commission.
26

27 **Q. What is the purpose of your direct testimony?**

28 A. The purpose of my direct testimony is to discuss the Application review performed by
29 Commission Staff, identify any issues or concerns with the representations made in the
30 Application or by the Applicant, identify any outstanding concerns Staff has with
31 Application, and provide recommended permit conditions.
32
33
34

1 **Q. Does your testimony include all the permit conditions Staff recommends?**

2 A. No. My testimony only highlights certain recommended conditions that may be at
3 issue during the evidentiary hearing or conditions that may be unique to the
4 Crowned Ridge II project.

5
6
7 **III. REVIEW OF THE APPLICATION**
8

9 **Q. When did Crowned Ridge Wind II, LLC file its Application for a permit to construct**
10 **the wind energy facility?**

11 A. The Application was filed on July 9, 2019.
12

13 **Q. Did you review Crowned Ridge Wind II, LLC's Application for a permit to construct**
14 **the wind energy facility?**

15 A. Yes. I also reviewed the figures, appendixes, discovery responses produced by all
16 parties, Crowned Ridge II's direct and supplemental testimony and comments the PUC
17 received from the public.
18

19 **Q. Were other Staff involved in the review of the Application?**

20 A. Yes. Staff Analysts Jon Thurber and Eric Paulson and Staff Attorneys Kristen Edwards
21 and Amanda Reiss also assisted in reviewing the Application.
22

23 **Q. Explain, in your words, the main role of the PUC Staff in the Application**
24 **proceedings.**

25 A. After receiving the Application filing, Staff completed a review of the contents of the
26 Application as it relates to the Energy Facility Siting statutes, SDCL 49-41B, and Energy
27 Facility Siting Rules, ARSD 20:10:22. Staff then identified information required by
28 statute or rule that was either missing from the Application or unclear within the
29 Application and requested Crowned Ridge II to provide or clarify that information (see
30 Exhibit_DK-2). Once interested individuals were granted party status, Staff also issued
31 discovery to the intervenors to understand what concerns they had with the project (see
32 Exhibit_DK-2).
33

1 Staff hired two consultants to assist with reviewing the Application. David Hessler has
2 expertise on noise emitted from wind turbines and noise modeling. Mr. Hessler
3 completed his review and authored his testimony as filed in this docket. David Lawrence
4 has expertise on property valuation. Mr. Lawrence completed his review and authored
5 his testimony as filed in this docket.

6
7 Finally, Staff assisted intervenors and affected landowners by providing responses to
8 questions on the wind farm, the siting process at the PUC and the opportunities
9 available for these individuals to be heard by the Commission. If the landowners had
10 specific concerns with the wind farm, Staff often recommended that those individuals file
11 comments in the docket for the Commission's review. Where appropriate, Staff also
12 included some of the landowners' questions or concerns in Staff's data requests sent to
13 Crowned Ridge II to have them address the issue.

14
15 **Q. What is the purpose of Staff's expert witnesses in this proceeding?**

16 A. Given that information submitted in the Application regarding noise modeling is technical
17 in nature, Staff sought an expert in that field to assess the merits and deficiencies of the
18 Application. Staff asked Mr. Hessler to review the relevant portions of the Application,
19 testimony, appendixes, data requests, and public comments that fall within his area of
20 expertise and identify any concerns he had with the material submitted. Ultimately, Staff
21 requested that Mr. Hessler address whether or not the information submitted by
22 Crowned Ridge II aligns with industry best practices and if he agreed with the
23 conclusions Crowned Ridge II made regarding potential impacts from the project.

24
25 Regarding the property value expert, during the public input hearing one gentleman
26 commented that a potential buyer of his rural residential property backed out of the
27 purchase agreement after the buyer learned about the proposed wind farm in the area.
28 Staff hired Mr. Lawrence as a property valuation witness in order to examine this
29 concern and provide testimony on the potential impact wind turbines may have on
30 property values, if any. In addition, Staff requested that Mr. Lawrence update the
31 analysis he completed for Staff in previous wind energy facility dockets and provide
32 testimony on his findings.

IV. STATE AGENCY CONSULTATION

Q. Did Staff reach out to any State Agencies for input?

A. Yes. For this docket, Staff reached out to South Dakota Game, Fish, and Parks (SD GF&P), State Historic Preservation Office (SHPO), and South Dakota Department of Transportation – Aeronautics Division (SD DOT – Aeronautics).

Q. Did SD GF&P or SHPO communicate concerns to Staff specific to the Crowned Ridge II Wind Farm?

A. Since SD GF&P (Ms. Hilary Meyer) and SHPO (Ms. Paige Olson) are witnesses in this proceeding, I will defer to their testimony as to what concerns, if any, they may have with the proposed project.

Q. Did SD DOT - Aeronautics communicate concerns to Staff specific to the Crowned Ridge II Wind Farm?

A. SD DOT – Aeronautics reviewed the turbine layout and didn't have any concerns with proposed project. However, they mentioned that instrument flight rule (IFR) procedures would need to be adjusted by the FAA. This comment regarding the IFR procedure change was also identified by Crowned Ridge II in response to Staff's data request 1-6, where the FAA's Determination of No Hazard for certain turbines also noted the IFR procedure changes.

Q. Has Commission Staff consulted with any other State Agencies for other wind energy facility permit applications in the past?

A. Yes. Staff reached out to South Dakota Department of Health (SD DOH) during the review of the Crocker Wind Farm (EL17-055) and Prevailing Wind Park (EL18-026). In addition, Staff reached out to South Dakota Department of Environment and Natural Resources (SD DENR) during the review of the Deuel Harvest Wind Farm (docket EL18-053).

Q. Please explain the consultation between Staff and SD DOH for wind energy facilities.

A. SDCL 49-41B-22(3) requires the Applicant to establish that the Crowned Ridge II Wind Farm will not substantially impair the health, safety, or welfare of the inhabitants. At the

1 Public Input Hearing and through written comments to the Commission, commenters
2 have raised concerns regarding health impacts to inhabitants near wind facilities.
3 Commission Staff believes SD DOH is the appropriate State agency to assess the
4 potential health impacts from wind farms.
5

6 Staff reached out to SD DOH to determine if the agency had any concerns about the
7 potential impact to human health from wind turbines when reviewing the Crocker Wind
8 Farm (docket EL17-055). Crocker was the first wind project the Commission had
9 reviewed in recent years and Staff was interested in understanding SD DOH's position
10 on wind farms. SD DOH provided a letter (dated October 13, 2017) in response and
11 stated the agency has not taken a formal position on the matter. Further, the letter
12 stated that studies have generally concluded there is insufficient evidence to establish a
13 significant risk to human health.
14

15 Additional comments received by the Commission on health concerns for the Prevailing
16 Wind Park project (docket EL18-026), as well as supporting information submitted with
17 those comments, was also provided by Staff to SD DOH for review. SD DOH's position
18 did not change based on the additional information Staff provided and the agency
19 responded that the letter dated October 13, 2017 is generally applicable to any wind
20 turbine project.
21

22 **Q. Did Staff reach out to SD DOH for this docket?**

23 A. Yes.
24

25 **Q. What was SD DOH's response?**

26 A. SD DOH responded that, consistent with October 2017 letter, the agency has not taken a
27 formal position on the issue of wind turbines and human health. Further, SD DOH
28 referenced the Massachusetts Department of Public Health and Minnesota Department
29 of Health studies and identified those studies generally conclude that there is insufficient
30 evidence to establish significant risk to human health. The letter also states that
31 annoyance and quality of life are the most common complaints associated with wind
32 turbines and the studies indicate those issues may be minimized by incorporating best
33 practices into planning guidelines. I included the SD DOH's letter as Exhibit_DK-3.
34

1 **Q. Please explain Staff's consultation with SD DENR.**

2 A. During the Deuel Harvest proceeding, intervenors brought up concerns about the impact
3 wind turbine construction and operation may have on shallow aquifers and spring-fed
4 streams. The main concerns raised were that wind turbines may cause pollution of the
5 aquifers and springs due to spills and vibrations during operations. Staff reached out to
6 SD DENR to determine if the Agency had similar concerns and if they had any
7 knowledge about wind turbine construction and operations adversely impacting aquifers
8 or springs (Exhibit_DK-4).

9
10 **Q. What was SD DENR's response?**

11 A. SD DENR provided Commission Staff with a response letter (dated March 29, 2019)
12 identifying that historical spills reported by wind turbines in South Dakota have been
13 minor and were easily addressed. In addition, SD DENR does not consider a concrete
14 foundation to be a source of ground water contamination. I included SD DENR's letter
15 as Exhibit_DK-5.

16
17
18 **V. APPLICATION COMPLETENESS**

19
20 **Q. Was Crowned Ridge II's Application considered complete at the time of filing?**

21 A. At the time of the filing, the application was generally complete. However, as identified
22 earlier in my testimony, Staff requested further information, or clarification, from
23 Crowned Ridge II that Staff believed was necessary to satisfy the requirements of SDCL
24 49-41B and ARSD 20:10:22. It is Staff's position that ARSD 20:10:22:04(5) allows for
25 the applicant to provide additional information throughout the Commission's review
26 period by stating:

27
28 "The truth and accuracy of the application shall be verified by the
29 applicant. ***Each application shall be considered to be a continuing***
30 ***application***, and the applicant must immediately notify the commission
31 of any changes of facts or applicable law materially affecting the
32 application. This duty continues up to and includes the date on which
33 the permit is issued or denied." (ARSD 20:10:22:04(5)) **{emphasis**
34 **added}**

1 Finally, I would note that an applicant supplementing its original application with
2 additional information as requested by Staff is not unusual for siting dockets.

3
4 **Q. Based on your review of the Application, responses to Staff's data requests and**
5 **Crowned Ridge's testimony, do you find the Application to be complete?**

6 A. Yes. In my opinion, Crowned Ridge II has provided the information required in SDCL
7 Chapter 49-41B and ARSD Chapter 20:10:22.

8
9
10 **VI. NOISE**

11
12 **Q. What noise limit has the Commission required in past wind energy facility**
13 **permits?**

14 A. For all but one of the recent wind permits issued, the Commission has ordered a permit
15 condition limiting noise to 45 dBA for non-participants and 50 dBA for participants.
16 Recently permitted wind projects with this noise limit are: Tatanka Ridge (EL19-026),
17 Sweetland (EL19-012), Triple H (EL19-007), Crowned Ridge I (EL19-003), Deuel
18 Harvest (EL18-053), Dakota Range III (EL18-046), Dakota Range I & II (EL18-003), and
19 Crocker (EL17-055).

20
21 The one project that had a different noise limit was Prevailing Wind Park (EL18-026),
22 where the noise limit was set by the Commission at 40 dBA for non-participating
23 residences and 45 dBA for participating residences if the owner of the residence has not
24 signed a waiver.

25
26 **Q. What is your understanding of why Prevailing Wind Park's noise limit was**
27 **different than all other recent wind projects permitted by the Commission?**

28 A. Throughout all the past permit reviews, Staff's noise expert, Mr. Hessler, has
29 consistently maintained that wind projects should work to achieve an ideal design goal of
30 40 dBA if possible. At the same time, Mr. Hessler acknowledges that in most
31 circumstances it is difficult for wind projects to meet the ideal design goal and for
32 regulatory purposes a permit limit of 45 dBA for non-participants is reasonable.

1 After reviewing Prevailing Wind Park's sound modelling, Mr. Hessler determined that the
2 project could readily achieve the ideal design goal of 40 dBA for nonparticipants and
3 recommended that project be required to meet the ideal design goal. After considering
4 the record before the Commission in Prevailing Wind Park, the Commission determined
5 that a 40 dBA limit for non-participants was appropriate in that case.
6

7 **Q. What does Crowned Ridge II's noise modeling show for the Crowned Ridge II**
8 **project?**

9 A. The updated sound modeling provided by Crowned Ridge II's witness Mr. Haley as
10 Exhibit JH-S-1 demonstrates that all non-participants are modeled to have a sound level
11 of 45 dBA or less and all participants are modeled to have a sound level of 50 dBA or
12 less. For a more detailed review on the sound modeling and appropriate permit limit to
13 set in this case, please refer to Mr. Hessler's testimony.
14

15 **Q. Does Crowned Ridge II's noise modeling account for cumulative impacts from**
16 **adjacent wind projects?**

17 A. Yes. The sound model report provided in Exhibit JH-S-1 identifies that the model
18 accounted for Crowned Ridge I and Deuel Harvest Wind turbines. These projects are
19 adjacent to Crowned Ridge II. The model did not account for Dakota Range turbines,
20 which the report identified that project as being too far away to have a significant
21 cumulative impact on sound levels.
22

23 **Q. What is Staff's proposed noise condition for the Crowned Ridge II project?**

24 A. Crowned Ridge II's witness Mr. Richard Lampeter proposed a noise condition in Exhibit
25 RL-2. The proposed condition is similar to the condition the Commission ordered for
26 Crowned Ridge I. However, Crowned Ridge II is close in proximity to Crowned Ridge I
27 and cumulative impacts should be accounted for in the post-construction monitoring
28 protocol. In order to capture the cumulative impacts, Mr. Hessler proposes a slight
29 modification to the condition provided by Mr. Lampeter. Staff's proposed sound
30 condition is provided as Exhibit DMH-2, which is attached to Mr. Hessler's testimony.
31
32
33
34

VII. Shadow Flicker

Q. What shadow flicker limit has the Commission required in past projects?

A. For all but one of the recent wind permits issued, the Commission has ordered a permit condition limiting shadow flicker to 30 hours per year. Recently permitted wind projects with this shadow flicker limit are: Tatanka Ridge (EL19-026), Sweetland (EL19-012), Triple H (EL19-007), Crowned Ridge I (EL19-003), Deuel Harvest (EL18-053), Dakota Range III (EL18-046), Dakota Range I & II (EL18-003), and Crocker (EL17-055).

The one project that had a different shadow flicker limit was Prevailing Wind Park (EL18-026), where the shadow flicker limit was set by the Commission at 15 hours per year with no more than 30 minutes per day unless the owner of the residence has signed a waiver.

Q. What does Crowned Ridge II's shadow flicker modeling show for the Crowned Ridge II project?

A. The updated shadow flicker modeling provided by Crowned Ridge II's witness Mr. Haley in Exhibit JH-S-2 demonstrates that one participating residence, CR1-C10-P, and one non-participating residence, CR2-C98-NP, are modeled to have shadow flicker over 30 hours per year. For all the other residences, the modeling demonstrates the shadow flicker will be below 30 hours per year.

Q. Did Crowned Ridge II's shadow flicker modeling account for cumulative impacts from adjacent wind projects?

A. Yes. The shadow flicker modeling report provided in Exhibit JH-S-2 identifies that the model accounted for Crowned Ridge I wind turbines. The report notes that the model did not account for the Dakota Range and Deuel Harvest turbines since they are too far away to have a cumulative impact on shadow flicker levels.

Q. What does Crowned Ridge II propose for the residences with shadow flicker modeled at greater than 30 hours per year?

A. Through Crowned Ridge II's supplemental testimonies of Mr. Jay Haley and Mr. Daryl Hart, Crowned Ridge II committed to curtailing turbine CRII-77 to limit the flicker impacts on the nonparticipating residence, CR2-98-NP, to less than 30 hours per year. In

1 addition, Mr. Haley and Mr. Hart committed to curtailing turbine CR11-Alt3 to limit the
2 flicker impacts on the participating residence, CR1-C10-P, to less than 30 hours per
3 year.
4

5 **Q. Does the expected amount of shadow flicker for participating and nonparticipating**
6 **residences due to the Crowned Ridge II project comply with past Commission**
7 **decisions?**

8 A. Yes. The shadow flicker modeling submitted by Mr. Haley and Crowned Ridge II's
9 commitment to curtail two turbines demonstrate the project will comply with a shadow
10 flicker limit of no more than 30 hour per year. This shadow flicker limit was ordered by
11 the Commission for the majority of recent wind projects. However, in order to formally
12 memorialize the commitment to curtail turbines, I recommend that language be included
13 in a permit condition that requires the curtailment of a turbine if the turbine causes
14 shadow flicker to be greater than 30 hours per year on a residence. The permit
15 condition I recommend is:
16

17 Shadow flicker at residences shall not exceed 30 hours per year
18 unless the owner of the residence has signed a waiver. Prior to
19 construction, Applicant shall obtain and file with the Commission a
20 waiver signed by the owner of the residence for any occupied
21 structure which will experience more than thirty hours of shadow
22 flicker per year. If no waiver is obtained, Applicant shall curtail the
23 necessary turbines to limit shadow flicker to no more than 30
24 hours per year.
25
26

27 **VIII. Expected Noise and Shadow Flicker Impacts to Intervenors**
28

29 **Q. Please provide the expected noise and shadow flicker impacts to intervenors.**

30 A. Crowned Ridge II's witness Mr. Haley provided the table below in response to a Staff
31 data request that lists the expected impact to intervenor's residences if all turbines are
32 constructed for a total of 300.6 MWs.
33

	Intervenors for Crowned Ridge Wind II					Dist. To
						Nearest
		UTM NAD83 Z14		Noise	Shadow	Turbine
Receptor #	Name	Easting	Northing	(dBA)	(hr/yr)	(feet)
CR1-C29-NP	CHRISTENSON AMBER KAYE	666571.9	4988867.1	41.1	6:54	2,457
CR1-G70-NP	ROBISH ALLEN E & SHIRLEY	677464.5	4991043.1	30.1	0:00	12,651
CR1-G600-NP	MOGEN PETER & KRISTI	674300.7	5005772.8	28.8	0:00	13,186
CR2-D220-NP	EHLEBRACHT GARRY & CRYAN JODY	670260.3	4967728.0	42.1	3:14	2,211
CR2-D221-NP	GREBER STEVEN W & GREBER MARY C	670351.1	4973543.3	42.8	13:33	2,041
CR2-D222-NP	RALL RICHARD & RALL AMY	672080.5	4973212.3	40.5	13:27	2,264
CR2-D223-NP	KRANZ BRIAN & KRANZ LARETTA TRUST	670227.3	4967454.6	41.2	3:04	2,749

Q. Are the expected impacts to the intervenors below Staff's proposed permit limits?

A. Yes. Crowned Ridge II's modeling demonstrates that the expected noise and shadow flicker impacts on intervenors' residences are below Staff's proposed noise limit of 45 dBA and proposed shadow flicker limit of 30 hours per year.

IX. Turbine Setback Distances

Q. What turbine setback distances will Crowned Ridge II need to meet?

A. Setback distances are set by state law and county ordinances. County ordinances that Crowned Ridge II will need to meet for certain turbines are those implemented by Codrington County, Deuel County, and Grant County.

Q. What turbine setback distance is required by state law?

A. The only setback distance set forth in state law is a setback from property lines. SDCL 43-13-24 requires turbines to be "set back at least 500 feet or 1.1 times the height of the tower, whichever distance is greater, from any surrounding property line." In this case, the setback distance from property lines required by state law would be 534.1 feet for turbines with a 90-meter (295.3 ft) hub height or 500 feet for turbines with a 80-meter (262.5 ft) hub height. This is calculated based on a rotor diameter of 116 meters (380.6 ft) for both turbine heights, which Crowned Ridge II stated will be used. The law does allow for the owner of the property adjacent to the turbine to waive the setback distance.

1 **Q. What turbine setback distances are required by Codington County?**

2 A. Codington County requires the following setbacks that Crowned Ridge II must comply
3 with:

- 4
- 5 1) 550 feet from a participating occupied residence, business, church, or school;
 - 6 2) 1,500 feet from a non-participating occupied residence, business, church, or
7 school (within all Districts other than Town Districts);
 - 8 3) 5,280 feet from a non-participating occupied residence, business, church, or
9 school (within Town Districts);
 - 10 4) 5,280 feet from Municipal Boundaries at the time of the Conditional Use
11 Permit Application;
 - 12 5) 110% the height of the wind turbine from right-of-way or public roads; and
 - 13 6) 110% the height of the wind turbine from any property line.
- 14

15 **Q. Did you verify that Crowned Ridge II's turbine layout complies with the Codington**
16 **County setback requirements?**

17 A. The proposed turbine layout appears to have accounted for the Codington County
18 setback requirements. However, without doing a civil survey of each turbine, property
19 line, right-of-way, residence, and municipal boundary, I cannot verify each individual
20 turbine location complies. That will need to be done by Crowned Ridge II during final
21 micro-siting of each turbine.

22

23 With the GIS shapefiles I had access to, the only turbine that raised a concern for me
24 was CRII-64. It caught my attention because the shapefile I used for the city limits of
25 Kranzburg showed the turbine was sited closer than 1 mile from the city limit boundary.
26 Based on the city limit shapefile I used, the proposed turbine is 5,219 feet from the city
27 limit located in the NW ¼ of the NE ¼ of Section 1, Township 116N, Range 51W. In
28 response to data request 2-18, Crowned Ridge II stated the turbine is 5,288 feet from
29 the city limit and provided a map demonstrating such. The Kranzburg city limit shapefile
30 used in the map provided by Crowned Ridge II shows the city limit being further west in
31 the NW ¼ of the NE ¼ of Section 1, Township 116N, Range 51W than the shapefile I
32 used.

33

1 I will send Crowned Ridge II a follow-up data request to provide the legal description for
2 the municipal boundary for Kranzburg in order to verify which shapefile is correct. Once
3 the municipal boundary discrepancy is resolved, I will update my testimony at the
4 hearing.

5
6 **Q. What turbine setback distances are required by Deuel County?**

7 A. Deuel County requires the following setbacks that Crowned Ridge II must comply with:

- 8
9 1) 1,500 feet from existing participating residences, businesses, and public
10 buildings;
11 2) 4 times the turbine blade height from existing non-participating residences
12 and businesses;
13 3) 3 miles from the Lake Park District at Lake Cochrane;
14 4) 2 miles from the Lake Park District at Lake Alice;
15 5) 1 mile from the Lake Park District at Bullhead Lake;
16 6) 1 mile from the nearest residence located in the municipalities of Altamont,
17 Astoria, Brandt, and Goodwin;
18 7) 1.5 miles from the city limits of Gary, Toronto, and Clear Lake, except the
19 area of Clear Lake located in sections 11, 12, and 14; and
20 8) 110% of the turbine blade height from a public right-of-way and any property
21 line.

22
23 Deuel County's board of adjustments may allow setback distances less than the
24 established distances identified above if the proper waivers are obtained.

25
26 **Q. What is the Deuel County turbine setback distance for non-participating**
27 **residences and businesses for the Crowned Ridge II turbines that will be used for**
28 **this project?**

29 A. The Deuel County setback from non-participating residences and businesses equals
30 1,942.4 feet for the 90-meter hub height turbine and 1,811.2 feet for the 80-meter hub
31 height turbine. This is calculated based on a rotor diameter of 116-meters, which
32 Crowned Ridge II stated will be used for both turbine heights.
33

1 **Q. At the Public Input Meeting a comment was made regarding the turbine setback**
2 **distance from Bemis. Does Deuel County require a setback from Bemis?**

3 A. There is not a specific setback required by Deuel County for the community of Bemis.
4 Given this, the applicable county setback is the distance required for non-participating
5 residences and businesses, which is four times the total height of the turbine. The
6 closest proposed turbine to Bemis is CR11-21 and is approximately 2,640 feet (1/2 mile)
7 from the nearest residence in Bemis.

8
9 **Q. Did you verify that Crowned Ridge II's turbine layout complies with the Deuel**
10 **County setback requirements?**

11 A. The proposed turbine layout appears to have accounted for the Deuel County setback
12 requirements. However, without doing a civil survey of each turbine, property line,
13 residence, and municipal boundary, I cannot verify each individual turbine location
14 complies. That will need to be done by Crowned Ridge II during final micro-siting of
15 each turbine.

16
17 **Q. What turbine setback distances are required by Grant County?**

18 A. Grant County requires the following setbacks that Crowned Ridge II must comply with:

- 19
20 1) 1,500 feet from a participating residence, business, church, school, or
21 building owned/operated by a governmental entity;
22 2) 1,500 feet from a non-participating residence, business, church, school, or
23 building owned/operated by a governmental entity;
24 3) 5,280 feet from municipal boundaries existing at the time of the Conditional
25 Use Permit Application;
26 4) 500 feet or 110% the vertical height of the wind turbine, whichever is greater,
27 from a public right-of-way; and
28 5) 500 feet or 110% the vertical height of the wind turbine, whichever is greater,
29 from any property line.

30
31 Grant County's board of adjustments may allow setback distances less than the
32 established distances identified above if the proper waivers are obtained.
33

1 **Q. Did you verify that Crowned Ridge II's turbine layout complies with the Grant**
2 **County setback requirements?**

3 A. The proposed turbine layout appears to have accounted for the Grant County setback
4 requirements. However, without doing a civil survey of each turbine, property line,
5 residence, and municipal boundary, I cannot verify each individual turbine location
6 complies. That will need to be done by Crowned Ridge II during final micro-siting of
7 each turbine.
8
9

10 **X. Ice Throw**
11

12 **Q. Will Crowned Ridge II use a system to detect ice build-up on turbine blades?**

13 A. Yes. Crowned Ridge addressed this topic in the pre-filed direct testimony of Mark
14 Thompson. Mr. Thompson testified that "an ice detector and ice detection system will be
15 used..." and that "the turbine is capable of detecting ice buildup on the blades by
16 activating sensors that compare wind speed, ambient temperature and rotor (blade) rpm
17 to the power output of the turbine." He went on to further state that if the turbine output
18 is outside of the expected parameters due to icing then the turbine would automatically
19 shut down.
20

21 **Q. Is the ice detection system similar to ones used by other projects recently**
22 **permitted by the Commission?**

23 A. Yes. The ice detection system that Mr. Thompson explained the turbines will have is
24 similar to the ice detection system other projects have planned to use.
25

26 **Q. Since the turbines will have an ice detection system, what permit condition do you**
27 **recommend to minimize impacts due to ice throw?**

28 A. Should ice accumulate on wind turbine blades, there are two methods to minimize the
29 risk of property damage or injury due to ice throw. The first method is to minimize the
30 risk of ice throw through a setback distance. The second method is to minimize the risk
31 of ice throw by shutting down the turbines when ice builds up on the turbine blades. In
32 this case, Crowned Ridge II will have an ice detection system that shuts down the
33 turbines when ice builds up on the turbine blades. Given this, Staff proposes the
34 Commission order the following permit condition:

Applicant will use two methods to detect icing conditions on turbine blades: (1) sensors that will detect when blades become imbalanced or create vibration due to ice accumulation; and (2) meteorological data from on-site permanent meteorological towers, on-site anemometers, and other relevant meteorological sources that will be used to determine if ice accumulation is occurring. These control systems will either automatically shut down the turbine(s) in icing conditions (per the sensors) or Applicant will manually shut down turbine(s) if icing conditions are identified (using meteorological data). Turbines will not return to normal operation until the control systems no longer detect an imbalance or when weather conditions either remove icing on the blades or indicate icing is no longer a concern. Applicant will pay for any documented damage caused by ice thrown from a turbine.

This proposed condition is the same condition the Commission ordered for Crowned Ridge I.

XI. Whooping Cranes

Q. Is there the possibility of whooping cranes to occur in the project area?

A. Yes. In Appendix B of the Application, the United States Fish & Wildlife Service (US FWS) identified that whooping cranes are an endangered species that may occur in the project area, particularly Codrington County.

Q. Did Crowned Ridge II complete any follow-up studies based on the US FWS comments?

A. Yes. Crowned Ridge II completed a whooping crane habitat desktop assessment and found that wetlands considered suitable for whooping cranes comprised only 0.2% of the total project area. In addition, Crowned Ridge II reviewed the 95% core migration corridor and found that the project area is approximately 50 miles east of the corridor.

1 **Q. What measures will Crowned Ridge II implement to protect whooping cranes?**

2 A. In response to Staff data request 2-15, Crowned Ridge II provided the following
3 response when asked about the measures they plan to implement to protect whooping
4 cranes:

5
6 "Crowned Ridge Wind II concludes from the above referenced information that it
7 is relatively less likely for whooping cranes to be present within the Project Area
8 than in areas closer to the migration corridor. However, Crowned Ridge Wind II's
9 Wildlife Conservation Strategy will prescribe that a site-specific worker
10 environmental training plan must be developed and implemented throughout the
11 Project operating life in order to inform workers of the biological resources
12 present on-site, so the impacts can be minimized. All employees and contractors
13 working in the field will be required to attend the environmental training session
14 prior to working on site. This training will include information regarding the
15 sensitive biological resources (with an emphasis on eagles and whooping
16 cranes), restrictions, protection measures, individual responsibilities associated
17 with the Project, and the consequences of non-compliance. Written material will
18 be provided to employees at orientation and participants will sign an attendance
19 sheet to document their participation."
20

21 **Q. Do you agree with the measures Crowned Ridge II plans to implement?**

22 A. Yes. However, I recommend that the Commission require the following permit condition
23 in order to memorialize Crowned Ridge II's commitment provided above and to clearly
24 identify what needs to be included in the Wildlife Conservation Strategy:

25
26 Applicant shall establish a procedure for preventing whooping crane
27 collisions with turbines during operations by establishing and
28 implementing formal plans for monitoring the project site and surrounding
29 area for whooping cranes during spring and fall migration periods
30 throughout the operational life of the project and shutting down turbines
31 and/or construction activities within 2 miles of whooping crane sightings.
32 The South Dakota Game, Fish, and Parks will be consulted on the
33 procedure to minimize impacts to whooping cranes.
34

35 This permit condition was approved by the Commission in the most recent wind energy
36 facility permit issued for Tatanka Ridge (docket EL19-026). The condition not only

requires monitoring for whooping cranes during the migratory season, but also specifies that the protection measure to be implemented is that turbines will be shut down if whooping cranes are observed within 2 miles of a turbine.

XII. Decommissioning

Q. Does Crowned Ridge II have a Decommissioning Plan in place?

A. Yes. Appendix N of the Application provides Crowned Ridge II's plan for decommissioning the wind project.

Q. Do you have any concerns with Crowned Ridge II's Decommissioning Plan?

A. No. The Decommissioning Plan identifies that Crowned Ridge II will remove all turbines and underground facilities to a depth of four feet. The plan also provides Crowned Ridge II's plan for restoring the land. The Decommissioning Plan is consistent with other wind project decommissioning plans reviewed by the Commission in the past.

Q. What will it cost to decommission the project?

A. Crowned Ridge II estimates that the cost to decommission the project will range between \$10 million and \$15 million. On a per turbine cost basis, the cost estimate range is \$75,157 per turbine to \$113,636 per turbine.

Q. What type of financial assurance does Crowned Ridge II plan to have for covering decommissioning costs?

A. Crowned Ridge II identified that they will have a form of financial assurance that is acceptable to each county to cover the anticipated costs of decommissioning. Codrington county may require a performance bond, surety bond, letter of credit, corporate guarantee or other form of financial assurance that is acceptable to the Board. Grant county may require a performance bond, surety bond, escrow account, letter of credit, corporate guarantee or other form of financial assurance that is acceptable to the Board. Deuel county requires Crowned Ridge II to have a decommissioning plan that includes a bond or other adequate security to pay the entire cost of the decommissioning process.

1 **Q. What type of financial assurance has the Public Utilities Commission required for**
2 **recently permitted wind projects?**

3 A. If a project is not owned by an electric utility regulated by the Public Utilities
4 Commission, the Commission has required wind projects to set up an escrow account to
5 cover anticipated decommissioning costs.
6

7 **Q. Who will own the Crowned Ridge II Wind Farm?**

8 A. Currently, Crowned Ridge II LLC is a wholly owned indirect subsidiary of Next Era
9 Energy Resources. After permitting and constructing the project, Crowned Ridge II and
10 the project's associated permits will be transferred to Northern States Power Company
11 (dba as Xcel Energy) at the commercial operation date pursuant to a purchase and sale
12 agreement. Therefore, it is my understanding that Xcel Energy will ultimately own and
13 operate the Crowned Ridge II project.
14

15 **Q. Is Xcel Energy an electric utility regulated by the Public Utilities Commission?**

16 A. Yes.
17

18 **Q. Since Xcel Energy is regulated by the Public Utilities Commission, what type of**
19 **financial assurance do you propose to cover decommissioning costs?**

20 A. As a utility regulated by the Public Utilities Commission, the Commission reviews the
21 cost of service and rate design for Xcel Energy. Imbedded in the cost of service are
22 future decommissioning costs associated with Xcel Energy's power plants. Therefore,
23 the future costs of decommissioning the Crowned Ridge II project will be accounted for
24 in Xcel's cost of service and the Commission will have the ongoing ability to review and
25 approve the decommissioning costs included in rates.
26

27 I propose the following condition be ordered by the Commission for Crowned Ridge II's
28 decommissioning financial assurance:
29

30 If the Project is purchased by Xcel Energy, as stated in Section 1.0 of the
31 Application, Xcel Energy will assume financial responsibility for decommissioning
32 and provide funding for the decommissioning and removal of the Project. As a
33 regulated electric utility, the projected financial cost of decommissioning will be
34 reviewed when Xcel Energy requests recovery of the Project investment and
35 associated decommissioning cost from customers in a rate proceeding. The

Commission may review and adjust the Project decommissioning cost recovered from customers in subsequent Xcel Energy rate proceedings using the most current information available regarding decommissioning. In the event Xcel Energy does not purchase Crowned Ridge II, Applicant shall file a decommissioning plan with a proposal for financial assurance consistent with the provisions in Condition 39 of the EL 19-026 Permit Conditions, at least 60 days prior to construction, for Commission approval. No construction may occur until the Commission approves the decommissioning plan.

This proposed financial assurance condition is consistent with what the Commission ordered for Dakota Range I & II (docket EL18-003), where that project had a similar purchase and sale agreement with Xcel Energy. In response to Staff data request 1-40, Crowned Ridge II stated that the company is willing to agree to a condition similar to what was ordered by the Commission in docket EL 18-003.

XIII. Generator Interconnection Status

Q. Does Crowned Ridge II have a generator interconnection agreement for the project's proposed capacity of up to 300.6 MWs?

A. Not for the entire 300 MWs. At this time, Crowned Ridge II has executed a Generator Interconnection Agreement (GIA) for 200 MWs. Since the project is proposed to have a capacity of up to 300.6 MWs, a GIA for 100 MWs is still outstanding.

Q. What is the status of the GIA for the remaining 100 MWs?

A. Crowned Ridge II's witness Mr. Daryl Hart stated in his supplemental testimony that the additional 100 MWs are currently being studied by MISO and expects that the preliminary results of the study to be released in the first quarter of 2020.

Q. What will MISO's generator interconnection study results tell us?

A. MISO's generator interconnection study results will inform the generator the amount of transmission upgrade costs they will be responsible for if they interconnect to the grid. It is my understanding that MISO's last study cycle results showed that there will be high costs to interconnect to the transmission grid for certain projects. As a result of that study, a number of generators dropped from MISO's interconnection queue.

1 **Q. Is there the possibility of high transmission interconnection costs being assigned**
2 **to the remaining 100 MWs of Crowned Ridge II?**

3 A. There is the possibility that MISO's study will continue to result in high transmission
4 costs. However, the costs may also come back lower than the last study cycle results
5 due to projects dropping out of MISO's generator interconnection queue.
6

7 **Q. How does the outstanding GIA for 100 MWs impact the proposed Crowned Ridge**
8 **II project?**

9 A. In response to the possibility of not being able to economically interconnect 100 MWs of
10 the project to the transmission grid, Crowned Ridge II witness Mr. Daryl Hart filed
11 supplemental testimony that explained their plans for the project and provided maps in
12 Exhibit DH-S-2 showing a 200 MW turbine array and 300 MW turbine array. The 200
13 MW array are the wind turbines that definitely have the ability to be constructed due to
14 the signed GIA. The 300 MW turbine array identifies the turbines that are part of the 200
15 MW array that will be constructed as well as the turbines that are part of the 100 MW
16 array that do not have a GIA at this time.
17

18 The way I think about the potential impact the outstanding GIA has on the project is that
19 the project could end up being constructed in two phases. If the 100 MWs cannot be
20 economically interconnected to the transmission grid, then Phase I would be the
21 construction of the turbines identified in the 200 MW array and this construction would
22 take place on the timeline set forth in the Application. Phase II would be the
23 construction of the turbines identified in 100 MW array on Exhibit DH-S-2, which would
24 take place at some time in the future.
25

26 **Q. If 100 MWs of the Crowned Ridge II project cannot economically interconnect to**
27 **the transmission system based on the next study results, when will it be**
28 **constructed?**

29 A. I am not sure when the remaining 100 MWs of the project would be constructed. If the
30 next MISO study shows, once again, that high transmission upgrade costs are needed to
31 interconnect generation, this tells me that there is not the transmission capacity available
32 in the region to support additional generation. As such, new transmission would need to
33 be constructed and that could take up to 10 years, maybe longer, to develop and
34 construct. However, there is also the possibility that additional projects drop out of

1 MISO's queue if the next study results in high interconnection costs and that may also
2 allow Crowned Ridge II to economically interconnect the remaining 100 MWs without
3 needing new transmission. At this point in time, I don't think anyone can provide a
4 specific date as to when the remaining 100 MWs would be constructed if the study
5 results expected in the first quarter of 2020 comeback with high interconnection costs.
6

7 **Q. What is Crowned Ridge II's plan for the 100 MWs with a GIA outstanding?**

8 A. If MISO's next study doesn't support the interconnection of the 100 MWs, it is my
9 understanding that Crowned Ridge II will defer construction of the 100 MWs until they
10 can economically interconnect to the transmission grid. Mr. Daryl Hart testified that in
11 the event Crowned Ridge II doesn't start construction within four years they will make
12 the proper certification to the Commission in accordance with SDCL 49-41B-27 before
13 constructing the 100 MWs.
14

15 **Q. Is Crowned Ridge II's plan allowed under SDCL Chapter 49-41B?**

16 A. Yes. I am not aware of a state law that establishes an expiration date for permits issued
17 by the Commission under SDCL Chapter 49-41B. Crowned Ridge II's plan for the 100
18 MWs with the GIA outstanding is allowed under SDCL 49-41B-27 which states:
19

20 "Construction, expansion, and improvement of facilities. Utilities which have
21 acquired a permit in accordance with the provisions of this chapter may proceed
22 to improve, expand, or construct the facility for the intended purposes at any
23 time, subject to the provisions of this chapter; provided, however, that if such
24 construction, expansion and improvement commences more than four years after
25 a permit has been issued, then the utility must certify to the Public Utilities
26 Commission that such facility continues to meet the conditions upon which the
27 permit was issued."
28

29 Based on this law, projects that have met the burden of proof and received a permit
30 under SDCL Chapter 49-41B can be constructed at any time as long as the project
31 certifies to the Commission that the facility continues to meet the permit's conditions if
32 construction does not begin within four years of the permit's issuance.
33
34
35

- 1 **Q. Does this conclude your testimony?**
- 2 A. Yes. However, I reserve the right to amend my testimony through supplemental
- 3 testimony, rebuttal testimony or at the evidentiary hearing if needed.

DARREN D. KEARNEY

500 E Capitol Ave · Pierre, SD 57501 · 605-773-3201
Darren.Kearney@state.sd.us

EDUCATION:

UNIVERSITY OF SOUTH DAKOTA, Vermillion, South Dakota

Beacom School of Business

Master of Business Administration (GPA 4.0)

June 2013 – May 2015

UNIVERSITY OF ST. THOMAS, Minneapolis, Minnesota

Opus College of Business

Pursued Master of Business Administration (GPA 3.95)

November 2011 – December 2012

UNIVERSITY OF MINNESOTA, Minneapolis, Minnesota

College of Biological Sciences

Bachelor of Science, Biology (GPA 3.347)

December 2003

EXPERIENCE:

SOUTH DAKOTA PUBLIC UTILITIES COMMISSION, Pierre SD

Utility Analyst

February 2013 - Present

- Ensured public utility company filings are in compliance with South Dakota statutes and regulations.
- Analyzed siting dockets, testified before the Commission, and worked on settlement agreements as appropriate.
- Analyzed energy efficiency, telecom tariff, telecom certificate of authority, electric service territory, and other electric dockets in order to form a position and make recommendations to the Commission on those dockets.
- Reviewed proposed EPA Clean Power Plan rules and authored comments in response to the proposed rules.
- Worked on MISO wholesale electric market, regional transmission planning, and cost allocation issues.
- Attended a number of trainings on electric grid operation, regional transmission planning, public utility policy issues, and ratemaking.

XCEL ENERGY, Minneapolis MN

Plant Environmental Analyst III

October 2009 – February 2013

- Reviewed power plant processes and made modifications as necessary to ensure the plant was in continued compliance with environmental permits and regulations.
- Coordinated environmental related testing (e.g. annual stack tests required by Air Permit/CAA).
- Worked on Title V Air Permit and NPDES Permit renewals/amendments.
- Reviewed plant air and water emissions data and generated compliance reports for Air and NPDES/SDS Permits.
- Performed plant compliance inspections/audits to ensure permits, policies, and procedures were properly executed.
- Provided environmental training to plant staff.
- Conducted root cause investigations on spills and permit non-compliance incidents, developed corrective actions to prevent incident reoccurrence, and then implemented the corrective actions as directed by plant management.
- Acted as point of contact during regulatory agency inspections and internal audits.
- Managed the facility's hazardous waste program for compliance with county waste rules and RCRA.

Environmental Analyst II

August 2006 – October 2009

- Subject matter expert for AST/UST compliance, the Oil Pollution Act of 1990 (SPCC) and Industrial Stormwater.
- Managed an Environmental Incident Response Program that involved coordinating spill cleanups and training individuals on reporting/cleanup requirements for oil/chemical spills and power plant permit non-compliance incidents.

ADECCO TECHNICAL, Edina MN

Contract Biologist - Xcel Energy Environmental Analyst

June 2004 – August 2006

- Developed monitoring plans, conducted field monitoring/sampling, performed statistical analysis on data collected, and authored reports for biological studies at Xcel Energy power plants as required by State and Federal Rules.
- Established knowledge of environmental permits and Federal, State, and Local environmental regulations.

ACHIEVEMENTS

- Academic: Beta Gamma Sigma International Honor Society (Business School)

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

**IN THE MATTER OF THE
APPLICATION BY CROWNED RIDGE
WIND II, LLC FOR A PERMIT OF A
WIND ENERGY FACILITY IN DEUEL,
GRANT AND CODINGTON**

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*

**STAFF'S FIRST SET OF DATA
REQUESTS TO INTERVENORS**

EL19-027

Below, please find Staff's First Set of Data Requests to Intervenor. Please submit responses within 10 business days, or promptly contact Staff to discuss an alternative arrangement.

- 1-1) Provide copies of all data requests submitted to or by you and copies of all responses provided to those data requests. Provide this information to date and on an ongoing basis.
- 1-2) Refer to SDCL 49-41B-22.
 - a. Please specify particular aspect/s of the applicant's burden that you intend to personally testify on.
 - b. Please specify particular aspect/s of the applicant's burden of proof that you intend to call a witness to testify on.
- 1-3) Refer to SDCL 49-41B-25. Identify any "terms, conditions, or modifications of the construction, operation, or maintenance" that you would recommend the Commission order. Please provide support and explanation for any recommendations.
 - a. Specifically, what mitigation efforts would you like to see taken if this Project is constructed.
- 1-4) Please list with specificity the witnesses that you intend to call. Please include name, address, phone number, credentials and area of expertise.
- 1-5) Do you intend to take depositions? If so, of whom?
- 1-6) Please identify every concern you have with the proposed project that you intend to address at the evidentiary hearing. For each concern identified, please provide support for the concern.
- 1-7) Other than intervening in this docket, have you pursued any legal action with respect to this Project?

Dated this 18th day of October 2019.

Amanda M. Reiss

Amanda M. Reiss
Kristen Edwards
Staff Attorneys
South Dakota Public Utilities Commission
500 East Capitol Ave.
Pierre, SD 57501

BEFORE THE PUBLIC UTILITIES COMMISSION
STATE OF SOUTH DAKOTA

In the Matter of the Application by)
CROWNED RIDGE WIND II, LLC *for a*) Docket EL19-027
Permit of a Wind Energy Facility in)
Deuel, Grant and Codington Counties)

INTERVENORS' RESPONSE TO STAFF'S FIRST SET
OF DATA REQUESTS

(On Behalf of Intervenors Garry Ehlebracht, Steven Greber, Mary Greber,
Richard Rall, Amy Rall and Laretta Kranz)

Intervenors hereby respond, by and through their counsel, A.J. Swanson to the following:

- 1-1) Provide copies of all data requests submitted to or by you and copies of all responses provided to those data requests. Provide this information to date and on an ongoing basis.

Response: None as of this writing.

- 1-2) Refer to SDCL § 49-41B-22.

- a. Please specify particular aspects of the applicant's burden that you intend to personally testify on.

Response: Intervenors are each Non-participants in the Crowned Ridge II project, but their homes and properties have each been brought within the so-called "project boundaries" (along with many other unwilling property owners) without their consent, carrying a label as such that is certain to carry a negative connotation for those desiring to be and remain part of a quiet country landscape. This desire, without question, will be sneered at by Applicant and its long list of expert witnesses, and, quite likely, will also not be honored by this agency any more than has been the case at the local governmental level, Deuel County and the Board of Adjustment. However, the fact that a CUP (or special exception permit) has been issued locally does not mean this local action complies with State law regarding "uniformity within a district" as required in SDCL § 11-2-14. Further, the CUP does not confirm that the County has actually been granted or delegated the zoning power to take actions that not only touch and concern the "property of applicant" for zoning relief, but also impose specific quantities or levels of a burden – entirely arising from an activity to be hereafter conducted on the "property of applicant" (the farms and lands of neighbors, but now in the leased hands of Crowned Ridge II). Intervenors' application gives a fair outline of the grounds on which they oppose this matter and as to which they may wish to personally testify. In general, the County, and now this agency, are together confirming an operating license for the use of property, for

which the negative effects are not confined to the physical location of each wind turbine. Legislatively, in developing the ordinance in Deuel County, and then adjudicatively, by approving the CUP in the manner as sought, without apparent or memorable exception, local government power has devised a mandated “separation” or “setback” distance from wind turbines (from which sound begins at a range of about 107 dB(A)), and for which distance is the only cure. In this case, the cure involves allowing the applicant to help itself to as much of the Non-participating Property Owners lands as it may need for setbacks, the only effective limitation imposed upon the applicant being one of mere happenstance – where did the neighbor build his or her residence, and what is the relationship of that use to the location where applicant wishes to erect a wind turbine. The PUC – as we understand the jurisdiction of this agency – is being asked to confirm those use sites, viewed through the looking glass of SDCL § 49-41B-22, entitled “applicant’s burden of proof.” This statute, among other features, invites the impairment of health, safety or welfare, so long as the impairment isn’t “substantial.” These are owner-occupied premises, every one of them, and in each case, their residence is a substantial part of their personal wealth, such as it is. The proper debate isn’t about whether the operation of these wind turbines might end up killing Intervenors (assuming no structural failures, or flinging of blades), but whether the operation of noisy, and shadow-flicker casting turbines creates distress and annoyance to the population, while also creating a servitude (or burden) upon the nearby lands and properties. All one needs to ask is how does applicant itself view these burdens? Please reference Section 5.2 of the Wind Lease & Easement Agreement, commonly called the “Effects Easement.” This is an admission of applicant (who claims to be some successor to the entity deploying such form) that wind turbine operations create “effects,” that such effects are unwelcome, and may also originate from nearby properties, observing no property lines. There are no such easements in place with Intervenors, however – they are not in “privity of contract” with applicant. Thus, applicants own experts amply demonstrate the homes and properties will receive “effects” from these wind turbines. As counsel for Intervenors, my statement to this Commission is this – nothing in law supports the notion that by obtaining a license or permit from local or state governments, applicant is thus free to cast or visit these “effects” (as envisioned by applicant’s own lease form, and as promised by applicant’s own experts) upon Non-participants (such as these Intervenors) without consequences. Nor, for that matter, are the licensing agencies free to grant such special dispensation without running afoul of this foundational concept – “[p]rivate property shall not be taken for public use, or damaged, without just compensation . . .” (SD Constitution, Article VI, § 13). By conferral of a license or permit upon applicant (a license that the agency also has discretion to deny), the agency is taking or damaging private property. As predicted by Section 5.2 of the Wind Lease & Easement Agreement,¹ an

¹ The reader will recall applicant initially contended Section 5.2, among many other sections of the 2013 writing handed to Ms. Kranz, was a confidential writing; while later retreating from that position, the Commission’s order of September 20, 2019 should have put that issue to rest.

“easement” is called for to cast such “effects” upon a property. With licenses and permits in hand, applicant, we predict, will promptly begin to do so, both with impunity and in the absence of privity. As such, these servitudes or burdens upon the lands and residences of Intervenors will thereafter be blessed (and given legal cover) by such licenses and permits. Whether the licenses and permits granted by Deuel County and this Commission suffices to give Crowned Ridge Wind II the continuing right to dump or emit “effects” upon Intervenors’ properties remains to be seen. Intervenors view these actions to be “de facto easements” for such purposes, and as to the issue of whether their properties have been “taken” or “damaged.”

Without narrowing the foregoing focus, Intervenors Steven and Mary Greber intend to question applicant’s experts in particular about site CRH 60, to be constructed *due east* of their home, while the receptor location identified for the Greber home has consistently been shown as placed somewhere on the *west side* of their home.

None of these Intervenors are willing to accept noise or sound levels (including LFN-Infrasound) that are either enhanced or newly introduced into their neighborhoods beyond current ambient levels. Likewise, shadow flicker, projected to be experienced by each of these Intervenors, is a newly introduced “effect” created only by the proximity of this wind farm. A clearer form of the need for an “easement” - *before such “effects” may lawfully be inflicted upon these property owners* - cannot be imagined; see SDCL § 43-13-2(8).

- b. Please specify particular aspects of the applicant's burden of proof that you intend to call a witness to testify on.

Response: Undetermined at the time of this response.

- 1-3) Refer to SDCL § 49-41B-25. Identify any “terms, conditions, or modifications of the construction, operation, or maintenance” that you would recommend the Commission order. Please provide support and explanation for any recommendations.
 - a. Specifically, what mitigation efforts would you like to see taken if this Project is constructed.

Response: Applicant should not be permitted by this agency – notwithstanding the generous terms of the CUP from Deuel County – to cast “effects” upon Intervenors, whether as to their residences or as to their properties in general, as such “effects” are likely to thwart or reduce the opportunity for land uses that are otherwise permitted, lawful and available to each of the Intervenors as property owners within Deuel County, in accord with the zoning ordinance. Further, applicant is not entitled, under the terms of any servitude created by

the hand of Intervenor, to cast “effects” from an operating wind farm onto the nearby properties of Intervenor. Since applicant’s own Wind Lease & Easement Agreement includes “shadow flicker” (or actually, “light, flicker, noise, shadow” as it is referenced in Section 5.2) as an “effect” for which an easement is conferred, including both that which is generated from the grantor’s property as well as adjacent properties, it cannot be denied (not credibly, at least) that such an easement is also appropriate if the same effects are to be cast over the properties of Intervenor. Applicant is not entitled to deal with these essential property rights issue in whatever fashion might favor applicant, to the harm or prejudice of Non-participants.

- 1-4) Please list with specificity the witnesses that you intend to call. Please include name, address, phone number, credentials and area of expertise.

Response: Intervenor has made no decision or determination as to the identity of witnesses to be called. Intervenor may call a legal expert to further detail the “takings” or “damage to property” claims that arise from this endeavor.

- 1-5) Do you intend to take depositions? If so, of whom?

Response: Not at this time. If Dr. W. Ben Johnson of Des Moines, Iowa proves to be available and is willing to testify, Intervenor may seek to depose that potential witness. Dr. Johnson, a cardiologist (board certified in cardiology and cardiac electrophysiology), recently provided testimony instrumental to the decision of Madison County, Iowa supervisors to determine (according to limited news information as is available at this writing) that a 1.5 mile separation distance is appropriate between turbines and residences. Since the Commission is in charge of hiring its own expert witnesses, perhaps contacting Dr. Johnson would be in order. He practices at Mercy Medical Center – Des Moines (411 Laurel St., #A250, Des Moines, IA 50314, telephone 515-235-5000).²

- 1-6) Please identify every concern you have with the proposed project that you intend to address at the evidentiary hearing. For each concern identified, please provide support for the concern.

Response: This application is viewed as an assault on the existing, vested property rights of Intervenor, as well as a threat (even if not reaching the “substantial threat” threshold) to the health, welfare and safety of Intervenor. Why applicant would be vested by the Legislature with some inherent right to invade any aspect of Intervenor’s health, welfare and safety – so long as it is less than a substantial threat - is an unanswered question, from Intervenor’s perspective. Perhaps this agency

² Dr. Johnson’s expertise, we suspect, coincides with the topic cited also in footnote 112 of the 72-page article cited on page 5 of this Response (and which also accompanies this Response) – the cited footnote is to Kasprzak, C. The influence of infrasound noise from wind turbines on EEG signal patterns in humans. *Acoustic and Biomedical Engineering* 2014; 125: A-20-A23.

will endeavor to clearly answer that, so that such conclusions can be further considered in judicial proceedings.

That said, health risks arising from proximity to wind turbine operations remain of direct concern to Intervenor – although being of modest financial means, Intervenor themselves are unable to support research into such issues, and also may not have the means to hire medical (including audiology) experts to provide testimony before this Commission. Perhaps that is more correctly a proper function of this agency, before ruling upon the burdens outlined in SDCL § 49-41B-22.

Intervenor would call to the Commission's attention the article entitled "Wind Turbine Noise and Human Health: A Four-Decade History of Evidence that Wind Turbines Pose Risks," authored by Jerry L. Punch and Richard R. James and published by *HHTM Journal* (Hearing Health & Technology Matters), <https://hearinghealthmatters.org/journalresearchposters/> - this 72-page article accompanies this Response to PUC Staff. At pages 2-3, the authors implore:

What is needed among the scientific community, local and national governmental agencies, and political leaders is honest discourse about methods for reducing carbon emissions in ways that do not turn some rural communities into sacrifice zones. [Citing to Hedges, C., et al, *Days of Destruction, Days of Revolt*, New York: National Books, 2012.]

Punch and James also state, at p. 55:

The anti-wind view is that IWTs should not be installed anywhere because wind is not an economically viable source of renewable energy, that all government subsidies and development efforts should end, and that what we can't hear can hurt us. A pro-health view is that there is enough anecdotal and scientific evidence to indicate that ILFN from IWTs causes annoyance, sleep disturbance, stress and a variety of other AHEs [adverse health effects] to warrant siting the turbines at distances sufficient to avoid such harmful effects, which, without proper siting, occur in a substantial percentage of the population. That view holds that what we can't hear can hurt some of us, and that the precautionary principle must be followed in siting IWTs if such health risks are to be avoided. Industrial-scale wind turbines should not be located near people's homes, educational and recreational facilities, and workplaces. It is our belief that the bulk of available evidence justifies a pro-health perspective. It is unacceptable to consider people living near wind turbines as collateral damage while this debate continues.

Intervenor will add this thought – it is also quite unwise, legally speaking, to consider such people (living near wind turbines, in the class of "Non-Participants") as having no remedy, when they are property owners and, as to such interests, are clearly possessed also of the protections of the U.S. Constitution and the South Dakota Constitution. It suffices, for now, to say that Intervenor do not welcome these invasions, have given no license for an invasion, and maintain that the distance

from their homes (not to mention property lines) is insufficient to protect both health and property interests from the “effects” that are well predicted by applicant’s own experts.

- 1-7) Other than intervening in this docket, have you pursued any legal action with respect to this Project?

Response: Intervenor has pursued a writ of certiorari for review of the approving order of the Board of Adjustment, Deuel County for applicant’s CUP (or SEP); this writ was issued by Circuit Judge Elshere on November 29, 2018, in 19CIV18-000061, *Ehlebracht, et al. vs. Deuel County Planning Commission, sitting as Deuel County Board of Adjustment, et al.* Other than limited discovery initiated by Petitioners, nothing further has transpired in the case. The petition for writ includes many of the same themes that are advanced in the application for intervention (submitted August 6, 2019), or in this response. On June 21, 2019, the U.S. Supreme Court decided the case of *Knick v. Township of Scott*, a decision highly relevant to this situation. Together with a long series of decisions stretching back to about 1987, serving to constrain the powers of local or state governments in the exercise of zoning or similar powers, it is the position of Intervenor that, in addition to protections of the South Dakota Constitution, those afforded by the United States Constitution, as applied to the states, are offended by this kind of zoning activity, facility siting approvals and all related decision-making, which together – in the search for “legal justification and permitting” of an activity sited much too close to homes and property, creates an “effective easement,” requiring that Intervenor should permanently bear (suffer) the servitudes and burdens that Crowned Ridge II’s own experts will assure everyone are about to be coming across the property lines and both into and upon the homes and residences in question. If the State is eager to grant these licenses, then it might as well take on the project itself, since whether applicant is merely granted a necessary license, or whether the State itself operates these turbines, it has in either case – this being a required license under law - “taken” or “damaged” the property of Intervenor.

This Commission is clearly on notice of the fact that applicant intends to cast or dump “effects” of the wind farm operation onto the properties and residences of Intervenor. No such adverse use (as a taking or an injury) has been agreed to by these Intervenor. While litigation currently is limited to the appeal mentioned on the prior page (challenging the CUP issued by Deuel County’s Board of Adjustment), Intervenor are confident this will not be the end of the matter, if this Facility Siting Permit is also granted by the Commission. Without express approval of this agency for the creation of such proximity or nexus to the properties of Intervenor, applicant would not be entitled to construct or operate wind turbines within the vicinity of Intervenor’s properties.

NextEra Energy proposes to spend many hundreds of millions of dollars to develop this (not to mention other) projects in these counties. This “wind farm” will involve 132 turbines, scattered across some 60,000 acres. NextEra’s subsidiary has obtained many “leases and easements” for this purpose (Participating Owners), but there are

many dozens if not hundreds of Non-Participating Owners adjacent to these turbine sites. If the experience of Intervenor holds true for all such Non-Participants, they have entered into no easement, lease or other instrument with NextEra, permitting the use of their lands or the affliction of their residences. Deuel County – and adjacent counties – seem fine with this fact. One can either agree to be afflicted by future wind farm operations, or one can refuse or fail to agree, and yet remain afflicted – it matters not. Whether the rule of law will see this the same way remains to be seen. Since the Facility Siting Permit is an essential “last bolt” for this project to proceed to a launch – since it can’t fly without it – Intervenor trust the Commission will take due care in its deliberations.

Intervenor are reminded of the parable of Nathan, as told in 2 Samuel 12: the rich man, with many flocks, received a visitor from afar. His neighbor was poor, having but one “little ewe lamb,” a beloved creature who was raised within and lived with the poor man’s family, it being “like a daughter to him.” To serve his visitor, the rich man *took* (as in stole!) the poor man’s lamb and prepared it (yes, killed it!) for the benefit of this visitor. King David was told this parable – not realizing the parable was about him, the King responded that the rich man was to restore “fourfold for the lamb, because he did this thing and had no pity.” (The rich man’s death was also decreed, but that’s not germane here.) Big Wind – now in the process of scattering its wealth within these counties – is quite unconcerned about the upcoming plight of these Intervenor. They (NextEra, in the role of *both* rich man and visitor) are now prepared to move forward, being well advanced in those efforts, having asked no man or woman (of these Intervenor) for the privilege (or legal right, in the nature of an easement that would otherwise confirm the right of a servitude) of scattering their effects amongst these local people (well, other than Ms. Kranz who was presented with a proposed lease form back in 2013). The stealing of rights is not just an Old Testament story, as it continues today. We only ask that this Commission – knowing that applicant fully intends to cast or dump these “wind farm effects” over and upon Intervenor – not permit this property theft to actually transpire.

Dated at Canton, South Dakota, this 21st day of October 2019.

Respectfully submitted,

A.J. Swanson
ARVID J. SWANSON, P.C.
27452 482nd Ave.
Canton, SD 57013
605-743-2070

E-mail: aj@ajswanson.com

Attorney for Intervenor,

GARRY EHLEBRACHT, STEVEN GREBER, MARY GREBER, RICHARD RALL, AMY RALL, and LARETTA KRANZ

/s/ A.J. Swanson

A.J. Swanson
State Bar of South Dakota # 1680

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE
APPLICATION BY CROWNED RIDGE
WIND II, LLC FOR A PERMIT OF A
WIND ENERGY FACILITY IN DEUEL,
GRANT AND CODINGTON COUNTIES

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INTERVENOR AMBER
CHIRSTENON'S RESPONSE TO
STAFF'S FIRST SET OF DATA
REQUESTS TO INTERVENORS

EL19-027

Below, please find the Response of Intervenor Amber Christenson to Staff's First Set of Data Requests to Intervenors. .

- 1-1) Provide copies of all data requests submitted to or by you and copies of all responses provided to those data requests. Provide this information to date and on an ongoing basis.

Response: I have not submitted any data requests as of yet, but will provide any requests and responses to Staff. I request the same courtesy. Please provide me with any communication between Staff and the Applicant in the future and any past correspondence, including Condition negotiations, data requests and data responses.

- 1-2) Refer to SDCL 49-41B-22.

- a. Please specify particular aspect/s of the applicant's burden that you intend to personally testify on.

Response: I am still reviewing the application and exhibits and have not come to any conclusions as of yet.

- b. Please specify particular aspect/s of the applicant's burden of proof that you intend to call a witness to testify on.

Response: I am still reviewing the application and exhibits and have not come to any conclusions as of yet.

- 1-3) Refer to SDCL 49-41B-25. Identify any "terms, conditions, or modifications of the construction, operation, or maintenance" that you would recommend the Commission order. Please provide support and explanation for any recommendations.
- a. Specifically, what mitigation efforts would you like to see taken if this Project is constructed.

Response: I am still reviewing the application and exhibits and have not formed a recommendation as of yet.

- 1-4) Please list with specificity the witnesses that you intend to call. Please include name, address, phone number, credentials and area of expertise.

Response: I am still reviewing the application and exhibits and have not come to any conclusions as of yet.

- 1-5) Do you intend to take depositions? If so, of whom?

Response: I was unaware that depositions were an option. I will consider this option as I review the application and exhibits.

- 1-6) Please identify every concern you have with the proposed project that you intend to address at the evidentiary hearing. For each concern identified, please provide support for the concern.

Response: I am still reviewing the application and exhibits and have not come to any conclusions as of yet.

- 1-7) Other than intervening in this docket, have you pursued any legal action with respect to this Project?

Response: This project and Crowned Ridge 1 were permitted as ONE CUP at the county level, so this project is included in a permit violation in Codington county. There is no legal action as of this writing, but a complaint was registered with the zoning officer and the county commissioners.

Dated this 24th day of October 2019.

/s/Amber Christenson
Amber Christenson
16217 466th Ave
Strandburg, SD 57265
605-756-4119

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE
APPLICATION BY CROWNED RIDGE
WIND II, LLC FOR A PERMIT OF A
WIND ENERGY FACILITY IN DEUEL,
GRANT AND CODINGTON COUNTIES

* INTERVENOR ALLEN ROBISH'S
* RESPONSE TO STAFF'S FIRST SET
* OF DATA REQUESTS TO
* INTERVENORS
*
* EL19-027
*

Below, please find the Response of Intervenor Allen Robish to Staff's First Set of Data Requests to Intervenors. .

- 1-1) Provide copies of all data requests submitted to or by you and copies of all responses provided to those data requests. Provide this information to date and on an ongoing basis.

Response: Nothing to date. But I would like to be included in all future data requests and responses between any of the parties. I also would like to have all past requests and responses and any other correspondence between any of the parties.

- 1-2) Refer to SDCL 49-41B-22.

- a. Please specify particular aspect/s of the applicant's burden that you intend to personally testify on.

Response: I don't know yet.

- b. Please specify particular aspect/s of the applicant's burden of proof that you intend to call a witness to testify on.

Response: I have no idea yet.

- 1-3) Refer to SDCL 49-41B-25. Identify any "terms, conditions, or modifications of the construction, operation, or maintenance" that you would recommend the Commission order. Please provide support and explanation for any recommendations.

- a. Specifically, what mitigation efforts would you like to see taken if this Project is constructed.

Response: I have no recommendation as of yet.

- 1-4) Please list with specificity the witnesses that you intend to call. Please include name, address, phone number, credentials and area of expertise.

Response: I have none yet.

- 1-5) Do you intend to take depositions? If so, of whom?

Response: I will take depositions if I think they are needed. But as of now, I don't know who it would be.

- 1-6) Please identify every concern you have with the proposed project that you intend to address at the evidentiary hearing. For each concern identified, please provide support for the concern.

Response: I am still studying the application and don't have an answer yet.

- 1-7) Other than intervening in this docket, have you pursued any legal action with respect to this Project?

Response: I object to the information requested because it is not reasonably calculated to lead to discovery of admissible evidence in this proceeding before the PUC.

Dated this 27th day of October 2019.

/s/Allen Robish
Allen Robish
47278 161st Street
Strandburg, SD 57265
605-676-2434

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE
APPLICATION BY CROWNED RIDGE
WIND II, LLC FOR A PERMIT OF A
WIND ENERGY FACILITY IN DEUEL,
GRANT AND CODINGTON

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STAFF'S FIRST SET OF DATA
REQUESTS TO INTERVENORS

EL19-027

Below, please find Staff's First Set of Data Requests to Intervenor. Please submit responses within 10 business days, or promptly contact Staff to discuss an alternative arrangement.

- 1-1) Provide copies of all data requests submitted to or by you and copies of all responses provided to those data requests. Provide this information to date and on an ongoing basis.

Response: attached

- 1-2) Refer to SDCL 49-41B-22.

- a. Please specify particular aspect/s of the applicant's burden that you intend to personally testify on.

Response: I have not finished evaluating the applicant's vague and incomplete application, that changed on September 20th, 2019. At the current time it is questionable if the applicant knows if it wants a permit for 300 MW or a 200 MW project. That said, I will be looking at all SDCL's and ARSD's in which the applicant is required to meet. These laws and rules were written to protect the health, safety and welfare of the inhabitants and the environment of South Dakota. It is important that the PUC fully evaluate the CRWII application and require the applicant to follow all laws, rules and regulations of township, county, state and federal in order to protect the residents of South Dakota's rights, health, safety, welfare and environment.

- b. Please specify particular aspect/s of the applicant's burden of proof that you intend to call a witness to testify on.

Response: I have not finished evaluating the applicant's vague and incomplete application. I have not made any decisions as to witnesses I intend to call for testimony.

- 1-3) Refer to SDCL 49-41B-25. Identify any “terms, conditions, or modifications of the construction, operation, or maintenance” that you would recommend the Commission order. Please provide support and explanation for any recommendations.
- a. Specifically, what mitigation efforts would you like to see taken if this Project is constructed.

Response: The changes in the application from 300 MW to 200 MW on September 20, 2019 have led to more questions than answers. It is confusing at this point what the project is, 300 MW or 200 MW. The applicant “kind of” through the submission of tabular noise and shadow results informed of a change in the MW and initial application filed on July 9th, 2019. The applicant has not supplied a new turbine location map and proposed project footprint. Is that because the applicant would then need to withdraw this application again and reapply? It is very hard to evaluate a vague application with unknown final turbine locations and presented data without inclusion of methods used. I will update of any terms, conditions or modifications of the construction, operation or maintenance after the applicant provides information through the data request process.

- 1-4) Please list with specificity the witnesses that you intend to call. Please include name, address, phone number, credentials and area of expertise.

Response: I have not finished evaluating the applicant’s vague and incomplete application. I have not made any decisions as to witnesses.

- 1-5) Do you intend to take depositions? If so, of whom?

Response: I have not finished evaluating the applicants vague and incomplete application, that significantly changed on September 20th, 2019. When and if I chose, I will inform all parties, of whom and when if I decide to take a deposition.

- 1-6) Please identify every concern you have with the proposed project that you intend to address at the evidentiary hearing. For each concern identified, please provide support for the concern.

Response: This is not inclusive as I have not finished evaluating the applicants vague and incomplete application, that significantly changed on September 20th, 2019. I reserve the right to present more concerns as they arise. The applicant in the proposed project has decided on its own that it may affect and use property in which it does not have the right to do so through either ownership or lease. The applicant through its own noise and shadow reports admits the proposed project causes effects on land in

which the applicant has no rights to use or effect. This is eminent domain without the process or takings through permitting, both of which are illegal and affect land use and property value as well as the health, safety and welfare of the inhabitant.

1-7) Other than intervening in this docket, have you pursued any legal action with respect to this Project?

Response: I am a petitioner in the Writ of Certiorari filed on January 26th, 2019 filed against Grant County Planning Commission sitting as the Grant County Board of Adjustments. The Return of Writ on April 15th, 2019 included Crowned Ridge Wind, LLC and Crowned Ridge II, LLC. See PUC Docket 19-003.

The CRW/CRWII projects were permitted at the local level as one project in one CUP. There are currently 4 lawsuits against this project. This information is included to urge the PUC to use caution when considering the proposed project and the ramifications of approving the proposed project under such legal challenges.

Dated this 28th day of October 2019.

/s/ Kristi Mogen

Kristi Mogen
15160 471^h Ave
Twin Brooks, SD 57269
307-359-2928

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

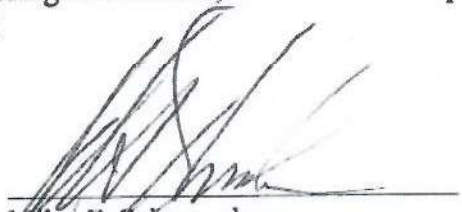
IN THE MATTER OF THE APPLICATION)
BY CROWNED RIDGE WIND II, LLC FOR)
A PERMIT OF A WIND ENERGY)
FACILITY IN DEUEL, GRANT)
AND CODINGTON COUNTIES)

EL19-027

) **APPLICANT'S FIRST SET**
) **OF DATA REQUESTS TO**
) **INTERVENORS**

Below, please find Applicant's First Set of Data Requests to Intervenors:

- 1-1) Provide a copy of all responses, including attachments, to Staff's data requests on the same day they are submitted to Staff.



Miles F. Schumacher
Attorneys for Applicant
Lynn, Jackson, Shultz & Lebrun, PC
110 N. Minnesota Ave., Suite 400
Sioux Falls, SD 57104

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

IN THE MATTER OF THE APPLICATION)	EL19-027
BY CROWNED RIDGE WIND II, LLC FOR)	
A PERMIT OF A WIND ENERGY)	APPLICANT'S RESPONSES TO
FACILITY IN DEUEL, GRANT)	STAFF'S FIRST SET OF DATA
AND CODINGTON COUNTIES)	REQUESTS TO APPLICANT

- 1-1) Provide copies of all data requests submitted by any intervenor to you in this proceeding and copies of all responses to those data requests. Provide this information to date and on an ongoing basis.

Response: Crowned Ridge Wind II, LLC will provide copies of all data requests submitted by any intervenor in this proceeding and provide copies of all responses to those data requests. To date, no data requests have been submitted by an intervenor.

Respondent: Miles Schumacher, Attorney

- 1-2) Provide copies of all pleadings in any civil appeal associated with the county permit(s) related to this project.

Response: Attachment 1 includes all pleadings in any civil appeal associated with the county permit(s) related to this project.

Respondent: Miles Schumacher, Attorney

- 1-3) See pages 73-76 of the Application. Did Applicant measure setback distances from property lines and rights-of-way of public roads using the height of the tower, rather than the tower and blade tip?

Response: Crowned Ridge Wind II measured setback distances from non-participating property lines and rights-of-way of public roads using the total turbine height (tower height + blade length) as required by the county setbacks. Setback distances from adjacent, participating property lines were measured using turbine blade length, given that the counties allow measurement of setback distances using turbine blade length when Crowned Ridge Wind II landowners with a turbine located on their land have entered into a wind easement.

Respondent: Tyler Wilhelm, Senior Project Manager

- 1-4) Confirm that the setbacks accounted for section line roads, which are defined as public highways pursuant to state law.

Response: Confirmed.

Respondent: Tyler Wilhelm, Senior Project Manager

- 1-5) Do the studies submitted with the Application, including but not limited to shadow and noise studies, account for the cumulative impact of both Crowned Ridge I and II and any other existing or planned project in the area?

Response: The shadow and noise studies account for the cumulative impact of both Crowned Ridge I and II as well as Deuel Harvest.

The environmental and culture studies are site specific to the project boundary for Crowned Ridge Wind II, and, therefore, do not include cumulative impacts.

Respondent: Jay Haley, Wind Engineer (sound and shadow flicker studies; Sarah Sappington, Consultant (environmental and culture studies)

- 1-6) Provide copies of agency communication concerning ADLS and confirmations of Determinations of No Hazard for the project.

Response: To date, there has been no communication with the Federal Aviation Administration ("FAA") concerning ADLS for the Crowned Ridge Wind II wind project. As explained in the Application at page 85, Crowned Ridge Wind II intends to apply for the use of an ADLS in the fourth quarter of 2019 once all Determinations of No Hazard have been received from the FAA.

Also, copies of the received Determinations of No Hazard are provided as Attachment 1. The remainder of the Determinations of No Hazard is expected to be received on or before December 10, 2019.

Respondent: Tyler Wilhelm, Senior Project Manager

- 1-7) Provide a copy of the contract/land use agreement signed by landowners, as well as any contracts that differ from the standard contract.

Response: Attachment 1 provides a public version and Attachment 2 provides confidential version of the standard wind easement agreement signed by landowners. There is no contract that differs from the standard agreement. There are, however, other types of standard agreements that pertain to collection easements, temporary construction easements, and participation agreements, which are provided in Confidential Attachment 3.

Respondent: Tyler Wilhelm, Senior Project Manager

- 1-8) Does Applicant offer a “good neighbor” contract? If so, provide a sample.

Response: The Applicant interprets the question to ask whether it is providing non-participants compensation through a written agreement. The Applicant has not been executing “good neighbor” agreements with non-participants. As the Project proceeds, if there a specific need to mitigate an identified impact with a non-participant, the Application may enter into an agreement related to the implementation of the mitigation.

Respondent: Tyler Wilhelm, Senior Project Manager

- 1-9) Provide an update on any pending easements in the project area. When will these easements be signed?

Response: There are no pending easements.

Respondent: Tyler Wilhelm, Senior Project Manager

1-10) Provide GIS shape files for the project and project facilities.

Response: Attachment 1 and Confidential Attachments 2 and 3 provide the GIS shape files for the project and project facilities.

Respondent: Sarah Sappington, Consultant

1-11) Provide the safety manuals for the 117 GE 2.3 MW and 15 GE 2.1 MW wind turbine generators.

Response: The safety manuals for the 117 GE 2.3 MW and 15 GE 2.1 MW wind turbine generators are attached as Confidential Attachment 1.

Respondent: Mark Thompson, Manager Wind Engineering

1-12) Provide a copy of the purchase and sale agreement referenced on page 1 of the Application.

Response: The purchase and sale agreement is provided as Confidential Attachment 1.

Respondent: Daryl Hart, Director Business Development

1-13) Did Applicant base its 30-hour per year shadow flicker limit on any factor other than county ordinance? If so, provide support.

Response: Yes, Crowned Ridge Wind II also based its 30-hour per year shadow flicker limit on the acceptance of this limit in the peer-reviewed scientific literature. Please see Attachment 1.

Respondent: Chris Ollson, Consultant

- 1-14) Has Applicant reached out to non-participating landowners with shadow flicker levels approaching the maximum to mitigate the shadow flicker? Explain.

Response: No. After the Project enters commercial operations, the Crowned Ridge Wind II operations team will conduct conversations with non-participating landowners who have concerns with shadow flicker levels, if any, and discuss possible mitigation actions.

Respondent: Tyler Wilhelm, Senior Project Manager

- 1-15) In the testimony of Wilhelm, he states that property rights have been obtained for 127 of the 132 turbine locations. Explain if the necessary property rights have been obtained for all other aspects of the project including but not limited to collector lines, O&M facility, and MET tower.

Response: Yes, the necessary property rights have been obtained for all proposed turbine locations and all other associated project facilities. Applicant will, however, need to obtain amendments for three existing easement agreements that will expire prior to Project's forecasted construction commencement date.

Respondent: Tyler Wilhelm, Senior Project Manager

- 1-16) What capacity factor was assumed when calculating the predicted tax revenue?

Response: The capacity factor is provided in Confidential Attachment 1.

Respondent: Daryl Hart, Director Business Development

- 1-17) Between the filing of docket EL19-016 and the current Crowned Ridge II filing, several (approximately 27) receptors depicted in the map provided with the sound study switched from participating to non-participating. Please explain the status change.

Response: The status change was due to the current Crowned Ridge Wind II facility permit application using a more current version of county parcel data, which showed a refined level of land ownership changes and parcel divisions.

Respondent: Tyler Wilhelm, Senior Project Manager

- 1-18) Again, refer to the map included with the sound study. The map legend identifies participating landowners in Codington County as purple and participating landowners as blue. Is there a difference in the status of the two, given there are numerous blue parcels in Codington County?

Response: The purple Codington County land parcels are those that have occupied structures on them. The blue parcels do not have occupied structures on them.

Respondent: Jay Haley, Wind Engineer

- 1-19) Provide a listing of receptors by number and landowner name.

Response: The list of receptors by number and landowner name is provided as Attachment 1.

Respondent: Jay Haley, Wind Engineer

- 1-20) Receptor CR1-C9-NP is listed in the sound study as having a sound level of 45.0. Staff research indicates the receptor is owned by a participating landowner. Has this landowner signed a waiver or confirmed to Applicant that they wish for the receptor to be treated as non-participating?

Response: No. The wind easement agreement entered into with the owner of receptor CR1-C9-NP encumbers the Northwest Quarter of Section 25, Township 118 North, Range 51 West, less and except for the approximate 7.75 acre addition which is the location of receptor CR1-C9-NP. Therefore, the wind easement area does not encumber the homestead addition where receptor CR1-C9-NP is located, which requires the receptor to be treated as a non-participating.

Respondent: Tyler Wilhelm, Senior Project Manager

- 1-21) Refer to pages 11 and 12 of the application. Page 11 states that the project will be up to 132 turbines. The total turbines mentioned on pages 11 and 12 are 134, including 1 alternate in Codrington County. Explain what county has the other alternate turbine and why so few alternates are available for this project.

Response: As stated in the application, the project will consist of up to 132 turbine locations and one alternate turbine location located in Codrington County. As explained in the application at page 20, Crowned Ridge Wind II was exploring 4-8 additional turbine locations. The supplemental testimony of Crowned Ridge Wind II due on September 20, 2019 will explain that 5 additional alternate turbine locations have passed the setback, sound, shadow flicker, environmental and culture reviews. Therefore, Crowned Ridge Wind II will have 6 alternate turbine locations, which is no longer a small number.

Respondent: Tyler Wilhelm, Senior Project Manager

- 1-22) Refer to page 20 of the application. Crowned Ridge says exploring the potential for 4-8 more alternates. Are the 4-8 turbines included in the sound and flicker shadow studies? When will the company determine if these turbines will be alternates for this project?

Response: The sound and shadow flicker studies filed with the application did not include the 4-8 additional alternate locations that were under consideration at that time. Crowned Ridge Wind II has completed the necessary reviews on these 4-8 additional alternate turbine locations and has decided to proceed with 5 additional alternate locations. The supplemental testimony of Crowned Ridge Wind II due on September 20, 2019 will explain which five additional alternate turbine locations were selected and the sound and shadow flicker results associated with adding the 5 additional turbine locations.

Respondent: Daryl Hart, Director Business Development

- 1-23) On Figure 3a, indicate which 34 turbine locations will use LNTE blades.

Response: Since the filing of the application, Crowned Ridge Wind II has decided to use LNTE blades on all wind turbines

Respondent: Tyler Wilhelm, Senior Project Manager

- 1-24) Refer to ARSD 20:10:22:12(2). Provide an evaluation of alternative site considered by the applicant. The application only discusses various site configurations within the project area.

Response: Crowned Ridge Wind II has been working for 10 years to evaluate alternative sites, and refine the Project Area. On page 27 of the application, there is an overview of alternative sites considered. More specifically, site evaluations were conducted on alternative locations to the north, south, east, and west of the current Project Area, and each alternative site was not pursued for the following reasons.

To the north of the Project Area, during the early development of the project, a site was considered north of the towns Kranzburg and Goodwin. At that time, the Project was comprised of a smaller Project Area to support a potential power purchase agreement of approximately 200 MW. In 2017, Crowned Ridge Wind II, however, entered into a purchase and sale agreement for 300 MW with Northern States Power, which required

Crowned Ridge Wind II to expand the Project Area to meet the increased name plate capacity. Alternate sites for 300 MWs to the north of the current Project Area were not viable due to the presence and proximity of competing wind projects and the Crowned Ridge Wind, LLC (CRW) wind project. For example, siting turbines too close to a competitor's project or CRW increases the cumulative impacts from sound and shadow flicker and hinders the turbines ability to operate without undue wake.

Alternative sites to the south of the current Project Area were also evaluated and it was determined that shifting further south would result in increased line losses. Line losses occur when turbines are sited greater distances from a project's collector substation, because it requires longer underground collector lines, and, therefore, energy is lost between the turbine and the collector substation. Shifting further south would also likely have required a longer generation tie line.

Evaluation of alternative sites to the east of the Project Area showed that the Project Area would be sited closer to constraints associated with undisturbed native grasslands, the Lake Park districts, identified eagle nests, as well as competitor wind farm easement agreements. Considerations of alternative sites to the west were rejected as being too close to interstate I-29 and the city of Watertown.

Respondent: Tyler Wilhelm, Senior Project Manager

- 1-25) Refer to page 29 of the application. The only project identified by the applicant was Dakota Range I. Are Crowned Ridge I and Deuel Harvest included in all models and analysis in this docket as well? If so, explain why only Dakota Range I is identified on page 29.

Response: The introductory language on page 29 of the application provided an overview of the project area, and mentioned Dakota Range I as an example. More specifically, the Sound Report, Appendix I at pages 1, 8-9 identified that the Crowned Ridge Wind I and Deuel Harvest turbines were included in the cumulative sound impact analysis, while Dakota Range turbines were not included because they are too far away to have any significant cumulative impacts on the Crowned Ridge II wind farm. Also, Shadow Flicker Report, Appendix J, at pages 1 and 8 explains that only Crowned Ridge Wind I was included in the cumulative impact analysis, because the Deuel Harvest and Dakota Range turbines are too far away to have any significant cumulative shadow flicker impacts on the Crowned Ridge Wind II project. Turbines that are more than 2 km (1.25 mi.) away from a receptor will have minimal (less than 30 dBA) noise impacts and no shadow flicker impacts.

The two figures below demonstrate the noise and shadow flicker levels as a function of distance from the wind turbine.

Figure 1 Noise levels as a function of distance from the source wind turbine

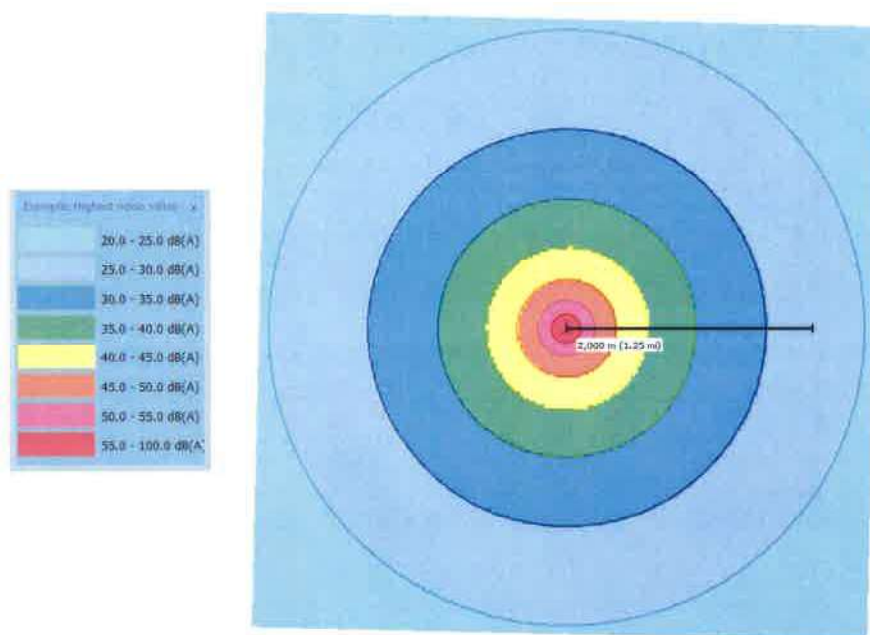
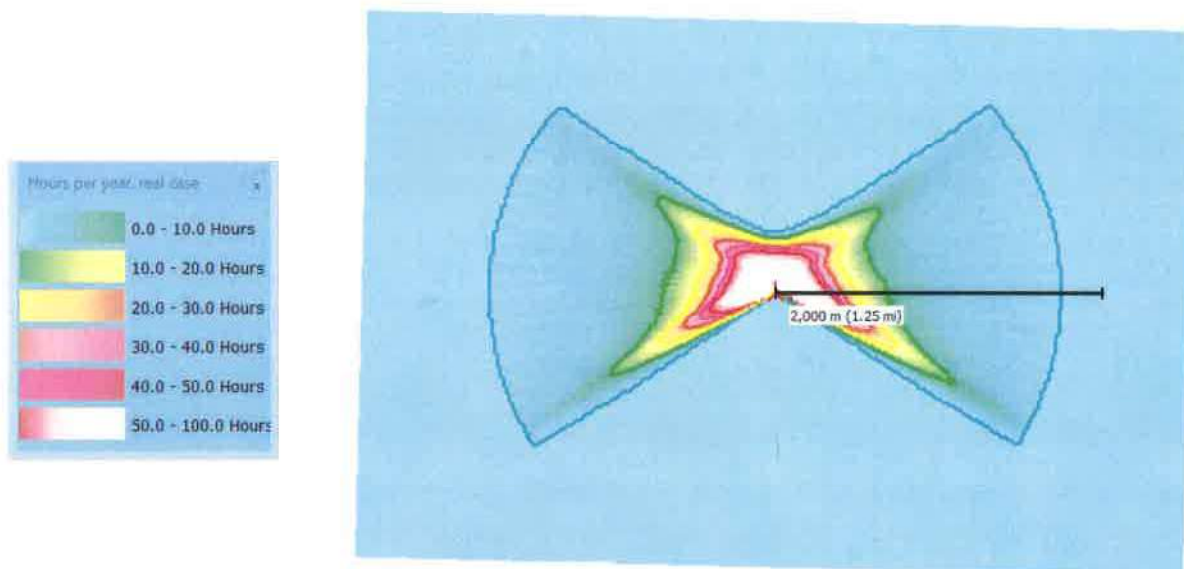


Figure 2 Shadow flicker levels as a function of distance from the source wind turbine.



Also see response to Data Request 1-5.

Respondent: Jay Haley, Wind Engineer

- 1-26) Refer to page 40 of the application and ARSD 20:10:22:15(4), since the applicant will drill for well water, provide the “specifications of the aquifers to be used and definition of their characteristics, including the capacity of the aquifer to yield water, the estimated recharge rate, and the quality of ground water.”

Response: Page 40 of the application states that Crowned Ridge Wind II may explore the need to drill for well water. Since the filing of the Application, Crowned Ridge Wind II has determined that it will not need to drill for well water. Therefore, there is no additional information to be provided on drilling for well water.

Respondent: Mark Thompson, Manager Wind Engineering

- 1-27) Were all the surveys in this docket, including but not limited to avian surveys, bat surveys, etc., completed throughout the entire project area?

Response: Yes, the surveys completed and study areas used for each natural resource (e.g., avian, bats) survey are representative of the entire Project Area. Surveys and study areas covered all potential areas of impact and are shown in the natural resources surveys reports in Appendices D (Bat Acoustic Survey Report); E (Bat Habitat Assessment Report); F (Dakota Skipper-Poweshiek Skipperling Survey Report); G (Raptor Nest Survey Report); and H (Avian Use Survey Report).

Respondent: Sarah Sappington, Consultant

- 1-28) Refer to page 50 of the application. Have all surveys been completed and all amendments/supplements necessary been filed?

Response: The aquatic resources surveys have been completed for all areas of potential impacts described in the application. As described in the application, page 50, Crowned Ridge Wind II is completing an amendment to the aquatic resources report provided as Appendix C to the application to incorporate survey results for efforts that have occurred since preparation of the final application, and the amended report will be submitted to the Commission once complete. Crowned Ridge Wind II expects to file the report with the Commission by November 15, 2019.

Respondent: Sarah Sappington, Consultant

- 1-29) Refer to page 60 of the application. Have all turbine foundations been located to avoid placement within the wetlands deemed suitable for whooping cranes? If not, which turbines are located in suitable wetlands.

Response: Yes. Turbines have been sited outside of all wetlands, including any wetlands that may provide potentially suitable whooping crane (*Grus americana*) stopover habitat.

Respondent: Sarah Sappington, Consultant

- 1-30) What is the distance of the closest turbine to each Lek in the project area?

Response: Turbine number CR11-102 is located approximately 0.33 miles southeast of the only documented prairie grouse lek within the Project Area.

Respondent: Sarah Sappington, Consultant

1-31) Have any Lek surveys been completed since 2016?

Response: No lek surveys have been completed since 2016. As described in the application, section 11.3.1.3.3, throughout agency coordination on the Project Area, the Applicant requested and received lek occurrence data from the South Dakota Game Fish & Parks (SDGFP) (see Appendix B). These locations were documented spatially in Crowned Ridge Wind II's project planning databases to ensure consideration during infrastructure siting. The data provided by SDGFP showed only one lek recorded in 2017 within the Project Area.

Respondent: Sarah Sappington, Consultant

1-32) Per ARSD 20:10:22:17, provide the information as required by this rule as it pertains to aquatic flora.

Response: Crowned Ridge Wind II provided an Aquatic Resources Summary Report as Appendix C of its application and identified the wetland vegetation and wetland hydrology on page 15-16. The application also addresses aquatic ecosystems in Section 12.0, including the impacts and mitigation to aquatic ecosystems in Section 12.2.

Respondent: Sarah Sappington, Consultant

1-33) Refer to ARSD 20:10:22:18(3) and (4), provide information specifically pertaining to those two sections of the South Dakota administrative rules.

Response:

Information and analysis of the compatibility of the proposed facility with present land use of the surrounding area, with special attention paid to the effects on rural life and the business of farming is set forth in Sections 9, 11, and 13 of the application. As summarized in Table 11.1.1 and Figure 13 of the application, the predominant cover type within the Project Area is agricultural (67.21%) followed by grass/pasture (25.93 %), while the predominant land cover type in the Project Construction Easement is agricultural (73.79 %) followed by grass/pasture (21.82 %). Cropland provides minimal habitat for most terrestrial species, though it may provide a food source and cover for some. As summarized in Table 9.2.1.3, areas of prime farmland constitute 44,540.3 acres (66.5%) of the Project Area and 1,401.3 acres (72.3%) of the Project Construction Easement.

Permanent impacts to prime farmland areas after construction has been completed is anticipated to be approximately 56.9 acres (0.13%, Table 9.2) of the Project Area. These permanent impacts represent land that is permanently taken out of potential agricultural production, which is a low percentage, and, therefore, impacts to land use for rural life and farming are anticipated to be minimal. Mitigation measure related to land use are set forth in Sections 9.2.4, 11.1.2, and 13.1.2.

Respondent: Sarah Sappington, Consultant

- 1-34) Refer to ARSD 20:10:22:20, have any variances been permitted for this project, specifically water quality variances?

Response: No water quality variances have been permitted for the project nor are any expected to be needed for the project.

Respondent: Sarah Sappington, Consultant

- 1-35) Refer to ARSD 20:10:22:21, have any variances been permitted for this project, specifically air quality variances?

Response: No air quality variances have been permitted for the project nor are any expected to be needed for the project.

Respondent: Sarah Sappington, Consultant

- 1-36) Refer to Section 17 of the application. Provide an update on if any new leases have been signed or if any current leases have expired since the filing of this permit.

Response: Since the filing of the application five new easement agreements have been obtained and no existing easement agreements have expired. The new easement agreements obtained support three turbine locations, two collection corridors, and one temporary access road needed for construction.

Respondent: Tyler Wilhelm, Senior Project Manager

- 1-37) Does the applicant have an Unanticipated Discovery Plan in place in the event any cultural resources or human remains are discovered during construction? If not, will a plan be created prior to the start of construction if a permit is granted?

Response: An Unanticipated Discovery Plan has been drafted and will be put in place prior to construction commencing on the project in the event that any cultural resources or human remains are discovered during construction.

Respondent: Sarah Sappington, Consultant

- 1-38) Refer to ARSD 20:10:22:24, provide information pertaining to each portion of this rule including but not limited to estimated annual employment expenditures during construction, data related to the first 10 years of operation in one-year intervals, etc.

Response: In the application at page 105, Crowned Ridge Wind II explains that it expects to create 250 temporary construction jobs. The below table provides job

classifications and the approximate hour salary. Given that the duration of construction is less than a year, there is no annual estimate. However, during the 5-9 months of construction, the estimated employment expenditures are between \$10 and \$15 million.

In addition, on page 105 of the application, Crowned Ridge Wind II indicates that it expects to hire 7-12 permanent operation and maintenance workers. As elaborated on in witness Thompson's testimony at pages 9-10, these jobs will included wind technicians, wind technician leaders, and a wind site manager. The jobs are also included in the below table. The annual estimate of expenditures on the permanent operation and maintenance jobs over each of the first ten years of commercial operations is \$655,000 annually.

To seek qualified local labor for construction and operation and maintenance, Crowned Ridge Wind II will conduct local job fairs. Based on the securing of local labor for the construction of Crowned Ridge Wind, the assessment on the use of local labor includes the likely hiring of 10 local construction workers to be employed as heavy equipment operators and general labors. It is not expected that any specialized training will be required prior to hiring these workers.

Project Phase	Job Title	Affiliation	Number On-Site	Approximate Hourly Salary
Construction	Site Superintendent	Crowned Ridge Wind II	1	\$75
Construction	Civil Superintendent	Crowned Ridge Wind II	1	\$50
Construction	Electrical Superintendent	Crowned Ridge Wind II	1	\$50
Construction	Site Administrator	Crowned Ridge Wind II	1	\$30
Construction	Tower Climbers	Crowned Ridge Wind II	2	\$90
Construction	Concrete Crews	General Contractor	18 (6 per crew)	\$15
Construction	Re-Bar Crews	General Contractor	18 (6 per crew)	\$22
Construction	Crane Crews	General Contractor	15 (5 per crew)	\$30
Construction	Main Erection Crane	General Contractor	15 (5 per crew)	\$30
Construction	Laborers	General Contractor	100	\$15
Construction	Office Staff	General Contractor	8	\$20
Construction	Electricians	Subcontractor	20	\$30
Construction	Heavy Equipment Operators	Subcontractor	20	\$20

Construction	Laborers	Subcontractor	30	\$15
Operation	Facility Manager	Xcel Operator	1	\$100,000/year
Operation	Deputy Facility Manager	Xcel Operator	1	\$90,000/year
Operation	Wind Turbine Technicians	Xcel Operator	8	\$25/hour
Operation	Lead Technician	Xcel Operator	1	\$34/hour
Operation	Site Admin	Xcel Operator	1	\$12/hour

Respondent: Daryl Hart, Director Business Development

- 1-39) Refer to ARSD 20:10:22:33, provide the amount of land irretrievably committed for this project.

Response: In the application, Table 11.3 summarizes permanent impacts of the Project as a total of 76.2 acres.

Respondent: Sarah Sappington, Consultant

- 1-40) Will Crowned Ridge II commit to a decommissioning plan and condition similar to that as ordered in EL18-003? If not, explain in detail why. The decommissioning condition in docket EL18-003 states:

Response: Yes, Crowned Ridge Wind II is willing to commit to a decommissioning plan and condition similar to that as ordered in EL18-003.

Respondent: Daryl Hart, Director Business Development

- 1-41) Refer to the Appendix N. On page 13 it says that a decommissioning plan is required to be filed for Board approval in Grant County at least 30 days prior to construction.

- a. Has the company filed this plan with Grant County? If not, when will the decommissioning plan be filed?
- b. Will the decommissioning plan filed with Grant County vary in any way from the plan filed in this application?

Response:

a. Yes.

b. Yes, the decommissioning plan filed with Grant County also considers the decommissioning requirements for the Crowned Ridge Wind, LLC 230 kV transmission line, reactive compensation substation, and other associated transmission facilities located in Grant County and approved in Docket EL-17-050. These transmission facilities are not under review in this docket, and, therefore, would not be part of the decommissioning plan filed as part of the application in this docket.

Respondent: Daryl Hart, Director Business Development and
Tyler Wilhelm, Senior Project Manager

- 1-42) Describe the technology that will be employed at each turbine to detect and assess ice buildup.

Response: The technology that will be employed at each turbine to detect and assess ice buildup is described on pages 7-8 of Mark Thompson's July 9, 2019 direct testimony.

Respondent: Mark Thompson, Manager Wind Engineering

- 1-43) Refer to the sound study in Appendix I and the flicker study in Appendix J, on the map in Appendix A of the studies, provide where each intervenor is located. In the results table in Appendix C of the studies, provide which receptor ID belongs to each intervenor.

Response: A map showing the locations of the intervenors is included as Attachment 1. The receptor ID for each intervenor is as follows:

Intervenors for Crowned Ridge II						Dist. To Nearest Turbine
Receptor #	Name	UTM NAD83 Z14		Noise	Shadow	(feet)
		Easting	Northing	(dBA)	(hr/yr)	
CR1-C29-NP	CHRISTENSON AMBER KAYE	666571.9	4988867.1	38.6	6:56	4,675
CR1-G70-NP *	ROBISH ALLEN E & SHIRLEY	677464.5	4991043.1	30.0	0:00	12,651
CR1-G600-NP *	MOGEN PETER & KRISTI	674300.7	5005772.8	28.7	0:00	13,166
CR2-D220-NP	EHLEBRACHT GARRY & CRYAN JODY	670260.3	4967728.0	43.6	3:14	2,211
CR2-D221-NP	GREBER STEVEN W & GREBER MARY C	670351.1	4973543.3	43.1	14:04	2,041
CR2-D222-NP	RALL RICHARD & RALL AMY	672080.5	4973212.3	42.0	15:12	2,264
CR2-D223-NP	KRANZ BRIAN & KRANZ LARETTA TRUST	670227.3	4967454.6	42.5	3:04	2,749

* Not included in the original appendix tables

Some of the data in the above table is outdated due to array changes that have been made since filing. The table below shows the more current information.

Intervenors for Crowned Ridge II						Dist. To Nearest Turbine
Receptor #	Name	UTM NAD83 Z14		Noise	Shadow	(feet)
		Easting	Northing	(dBA)	(hr/yr)	
CR1-C29-NP	CHRISTENSON AMBER KAYE	666571.9	4988867.1	41.2	6:56	2,451
CR1-G70-NP	ROBISH ALLEN E & SHIRLEY	677464.5	4991043.1	30.0	0:00	12,651
CR1-G600-NP	MOGEN PETER & KRISTI	674300.7	5005772.8	28.8	0:00	13,166
CR2-D220-NP	EHLEBRACHT GARRY & CRYAN JODY	670260.3	4967728.0	43.8	3:14	2,211
CR2-D221-NP	GREBER STEVEN W & GREBER MARY C	670351.1	4973543.3	44.5	14:04	2,041
CR2-D222-NP	RALL RICHARD & RALL AMY	672080.5	4973212.3	42.1	15:12	2,264
CR2-D223-NP	KRANZ BRIAN & KRANZ LARETTA TRUST	670227.3	4967454.6	42.9	3:04	2,749

Respondent: Jay Haley, Wind Engineer

- 1-44) Have all processes related to getting approval for interconnection to the MISO system been completed and costs determined? If no, when will interconnection costs and the interconnection approval process be completed?

Response: For the first 200 megawatts (MW) of Crowned Ridge Wind II, all MISO approvals, studies, and interconnect costs have been provided. Crowned Ridge Wind II has executed a Generation Interconnection Agreement for the first 200 MWs. The last 100 MWs is currently being studied by MISO and SPP in queue position J722. The preliminary studies and associated interconnection costs for queue position J722 will be released in the first quarter of 2020.

Respondent: Daryl Hart, Director Business Development

- 1-45) Has Crowned Ridge II withdrawn any of its interconnection queue positions as a result of the affected systems costs recently provided by MISO? If yes, please explain how much interconnection capacity is available for Crowned Ridge II and what impact the available capacity has on the proposed project.

Response: Crowned Ridge Wind II withdrew MISO queue position J721 in the MISO DPP-FEB-2017 West cycle, but it retained its queue position J722 in the MISO DPP-AUG-2017 West cycle for the last 100 MWs. Also, see response to Data Request 1-44.

Respondent: Daryl Hart, Director Business Development

- 1-46) How many of the 7-12 permanent jobs will be located within the state of South Dakota?

Response: All of the 7-12 permanent jobs will be located within the state of South Dakota.

Respondent: Mark Thompson, Manager Wind Engineering

WIND FARM LEASE AND EASEMENT AGREEMENT

1. **Parties.** This Wind Farm Lease and Easement Agreement (“**Agreement**”) is made and entered as of the ____ day of _____, 2017 (“**Effective Date**”), by and between [*NAME AND MARITAL STATUS*] (collectively, the “**Owner**”), and Crowned Ridge Wind II, LLC, a Delaware limited liability company, (“**Operator**”) an affiliate of NextEra Energy Resources, LLC, a Delaware limited liability company. Owner and Operator are sometimes individually referred to as a “**Party**” and collectively as the “**Parties.**”

[REDACTED]

3. **Option.** Owner grants to Operator an exclusive option (“**Option**”) to acquire the Leases and Easements referenced in Sections 4 and 5 in accordance with the following terms and conditions. Operator shall be entitled to acquire the Lease and the Easements in their entirety or in part, as Operator deems appropriate.

3.1 **Option Term.** The initial period during which Operator may exercise the Option shall be for a term of thirty-six (36) months, commencing on the Effective Date and expiring on the date immediately preceding the third (3rd) anniversary of the Effective Date (“**Initial Option Term**”). Operator shall have a single election to extend the Initial Option Term for an additional twenty-four (24) months (“**Extended Option Term**”) by written notice to Owner at any time prior to the third (3rd) anniversary of the Effective Date, which notice shall be accompanied by the Option Extension Payment (as defined in **Exhibit D**). References herein to the Option Term shall mean the Initial Option Term and, to the extent exercised by Operator, also the Extended Option Term, unless expressly stated otherwise.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Exercise of Option. Operator may exercise the Option by giving written notice to Owner (“Option Notice”) at any time during the Option Term. [REDACTED]

[REDACTED]

[REDACTED]

4. [REDACTED]. Effective upon the exercise of the Option by Operator, Owner grants to Operator, and Operator then accepts from Owner, for the Term referenced in Section 6.1, the following leases over and across the Owner’s Property in accordance with the terms and conditions of this Agreement. [REDACTED]

[REDACTED]

4.1 **Construction Right.** [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

4.2 **Access Right.** [REDACTED]

[REDACTED]

4.3 **Turbine Site Lease.** [REDACTED]

4.4 **Collection Lease.** [REDACTED]

4.5 **Telecommunication Facilities Lease.** [REDACTED]

4.6 **Overhang Right.** [REDACTED]

4.7 **Met Tower Lease.** [REDACTED]

5. **Easements.** Upon the exercise of the Option by Operator, Owner grants to Operator, and Operator accepts from Owner, for the Lease and Easement Term referenced in Section 6.1, the following easements over and across the Owner's Property in accordance with the terms and

conditions of this Agreement. The following easements are for the benefit of Operator and Operator's agents, contractors and employees, are located on the Owner's Property and are collectively referred to as the "**Easements**."

■ **Wind Non-Obstruction Easement.** (a) Owner grants Operator an irrevocable, exclusive easement for the right and privilege to use, maintain and capture the free and unobstructed flow of wind currents over and across the Owner's Property ("**Wind Non-Obstruction Easement**"). Along with the Option Notice, Operator shall deliver to Owner the following legal descriptions which shall become **Exhibit A-2** of this Agreement: (a) a description of the Wind Non-Obstruction Easement property subject to this Agreement; (b) a description of the Wind Non-Obstruction Easement in vertical and horizontal angles; and (c) a description of real property benefiting from the Wind Non-Obstruction Easement. Owner shall not engage in any activity on Owner's Property that might interfere with wind speed or wind direction over any portion of any Turbine or Met Tower Easement Properties, whether located on or off the Owner's Property; cause a decrease in the output or efficiency of any Turbine or accuracy of any meteorological equipment; or otherwise interfere with Operator's operation of the Wind Farm or exercise of any rights or the Leases granted in this Agreement ("**Interference**").

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

5.2 **Effects Easement.** Owner grants to Operator a non-exclusive easement for audio, visual, view, light, flicker, noise, shadow, vibration, air turbulence, wake, electromagnetic, electrical and radio frequency interference, and any other effects attributable to the Wind Farm or activity located on the Owner's Property or on adjacent properties over and across the Owner's Property ("**Effects Easement**").

6. **Term of Agreement.** The term of this Agreement ("**Term**") includes the Option Term referenced in Section 3.1; and the Easement Term referenced in Section 6.1.

6.1 **Lease & Easement Term.**

6.1.1 **Lease & Easement Term.** The Term of the Leases and Easements and the effective date thereof shall commence on the date specified by Operator in the Option Notice ("**Commencement Date**"). The Term shall end fifty (50) years after the Commencement Date, unless terminated as provided in this Agreement.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

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[REDACTED]

19. **Notice.**

19.1 **Writing.** All notices given or permitted to be given hereunder shall be in writing.

19.2 **Delivery.** Notice is considered given either (i) when delivered in person to the recipient named below, (ii) three days after deposit in the United States mail in a sealed envelope or container, postage and postal charges prepaid, return receipt requested or certified mail, addressed by name and address to the party or person intended, or (iii) twenty-four (24) hours from proper and timely delivery to an overnight courier service addressed by name and address to the party or person intended as follows:

Notice to Owner: [NAME AND ADDRESS]
Telephone:

Notice to Operator: Crowned Ridge Wind II, LLC
700 Universe Boulevard
Juno Beach, FL 33408-2657
Attention: Land Services
Phone: (855) 552-9872

19.3 **Change of Recipient or Address.** Either party may, by notice given at any time or from time to time, require subsequent notices to be given to another individual person,

whether a party or an officer or representative, or to a different address, or both. Notices given before actual receipt or notice of change shall not be invalidated by the change.

20. **Miscellaneous Provisions.**

20.1 **Successors & Assigns.** The terms and provisions of this Agreement shall run with the land and be binding on and inure to the benefit of the heirs, successors, assigns and personal representatives of the Parties. [REDACTED]

20.2 **Memorandum.** Simultaneously with the execution of this Agreement, Owner and Operator agree to execute and acknowledge a memorandum of this Agreement satisfactory in form and substance to Operator and Owner. Owner consents to the recordation of the memorandum in the public records of the county where the Owner's Property is located.

20.3 **Entire Agreement.** This Agreement and the attached Exhibits shall constitute the entire agreement between the Parties and supersedes all other prior writings and understandings.

20.4 **Amendments.** This Agreement shall not be amended or modified in any way except by an instrument signed by Owner and Operator and consented to by any Operator Mortgagee. The Parties hereto shall at all times hereafter execute any documents and do any further acts which may be necessary or desirable to carry out the purposes of this Agreement and to give full force and effect to each and all of the provisions hereof.

[REDACTED]

20.6 **Severability.** If any term or provision of this Agreement, or the application thereof to any person or circumstance shall, to any extent, be determined by judicial order or decision to be invalid or unenforceable, the remainder of this Agreement or the application of such term or provision to persons or circumstances other than those as to which it is held to be invalid, shall be enforced to the fullest extent permitted by law. In the event it was determined by Operator that the rights of the parties hereto under this Agreement were to become unenforceable due to the effect of Article XVII, Sections 21-24 of the South Dakota Constitution, the parties agree to amend this Agreement or modify the rights granted herein in order to comply with all applicable laws and to grant to Operator the rights to the extent necessary to construct, operate and maintain the Improvements as contemplated herein.

20.8 **Approvals.** Whenever in this Agreement the approval or consent of either Party is required or contemplated, unless otherwise specified, such approval or consent shall not be unreasonably withheld or delayed.

20.9 **Counterparts.** This Agreement may be executed in multiple counterparts, each of which shall be deemed an original, and all of which together shall constitute a single instrument.

20.10 **Option to Convert.** During the Term of the Leases and Easements granted herein, Owner grants to Operator the option to convert the Leases herein contained to easements, or the Easements to leases, as determined by Operator in its sole discretion.

--

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

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September 12, 2019

South Dakota Public Utilities Commission
Public Utilities Commission Staff
Capitol Building, 1st Floor
500 E. Capitol Ave.
Pierre, SD 57501-5070

RE: Scientific Basis for 30-Hour Shadow Flicker Standard used by Crowned Ridge Wind Farm

Public Utilities Commission Staff:

Since November 2016, Dr. Ollson of Ollson Environmental Health Management (OEHM) has been retained by NextEra Energy Resources (NEER) to aid in the proper siting of the Crowned Ridge Wind II project in South Dakota. Over the past two years Deuel County, Codington County and Grant County have all undertaken updates to their local ordinances governing local siting of wind turbines. Throughout this time Dr. Ollson, on behalf of NEER, provided both written and oral presentations to their Planning and Zoning and County Commissions on science-based appropriate siting requirements to protect the health and welfare of county residents.

OEHM has been asked to provide a response to the South Dakota Public Utilities Commission (PUC) Staff data request:

“Did Applicant base its 30-hour per year shadow flicker limit on any factor other than county ordinance? If so, provide support.”

This report summarizes the information that was provided to each county in development of local ordinances and its scientific basis.

In summary, over the past decade there has been considerable research conducted around the world evaluating health concerns of those living in proximity to wind turbines. This independent research by university professors, consultants and government medical agencies has taken place in many different countries on a variety of models of turbines that have been in communities for numerous years. Based on scientific principles, and the collective scientific findings presented in research articles, OEHM believes that:

1. Shadow flicker is not a health concern (e.g., seizure in photosensitive epileptics), rather it can be considered a nuisance by some non-participating project residents.
2. There is no scientific evidence that shadow flicker impairs quality of life or is of particular nuisance for any duration of time. Limiting shadow flicker to no more than 30-hours a year at non-participating residences is commonplace in those United States jurisdictions that have set standards. It has been effective to reduce complaints associated with those living in proximity to wind projects.

All of the scientific journal articles have been attached to this report for the benefit of PUC Staff.

1 Crowned Ridge Wind II Farm County Ordinance Requirements Limiting Shadow Flicker

Table 1 provides a list of the county ordinances that are applicable to the Crowned Ridge Wind Farm. Codington and Grant counties have identical wording and requirements limiting shadow flicker to no more than 30 hour of actual shadow flicker at any school, church, business and occupied dwelling (regardless of participating or non-participating status). However, both have a provision to waive the requirement of no more than 30 hours a year with landowner agreement. The Deuel County ordinance also limits shadow flicker to no more than 30 hours a year.

Table 1. County Ordinances for Shadow Flicker

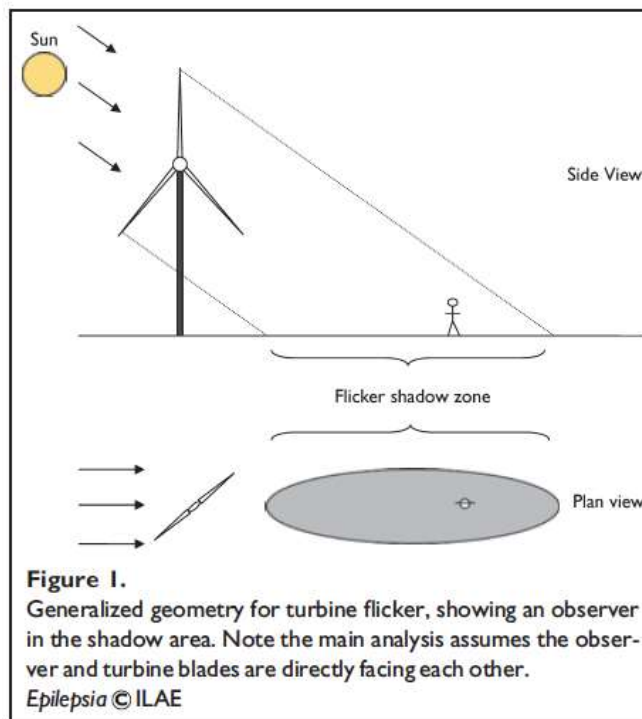
County	Ordinance Section	Shadow Flicker Ordinance Requirement
Codington County	Section 5.22.03.13	Flicker Analysis. A Flicker Analysis shall include the duration and location of flicker potential for all schools, churches, businesses and occupied dwellings within a one (1) mile radius of each turbine within a project. The applicant shall provide a site map identifying the locations of shadow flicker that may be caused by the project and the expected durations of the flicker at these locations from sun-rise to sun-set over the course of a year. The analysis shall account for topography but not for obstacles such as accessory structures and trees. Flicker at any receptor shall not exceed thirty (30) hours per year within the analysis area. a. Exception: The Board of Adjustment may allow for a greater amount of flicker than identified above if the participating or non-participating landowners agree to said amount of flicker. If approved, such agreement is to be recorded and filed with the Codington County Zoning Officer. Said agreement shall be binding upon the heirs, successors, and assigns of the title holder and shall pass with the land.
Grant County	Section 1211.04.9	Flicker Analysis. A Flicker Analysis shall include the duration and location of flicker potential for all schools, churches, businesses and occupied dwellings within a one (1) mile radius of each turbine within a project. The applicant shall provide a site map identifying the locations of shadow flicker that may be caused by the project and the expected durations of the flicker at these locations from sun-rise to sun-set over the course of a year. The analysis shall account for topography but not for obstacles such as accessory structures and trees. Flicker at any receptor shall not exceed thirty (30) hours per year within the analysis area. a. Exception: The Board of Adjustment may allow for a greater amount of flicker than identified above if the participating or non-participating landowners agree to said amount of flicker. If approved, such agreement is to be recorded and filed with the Grant County Register of Deeds. Said agreement shall be binding upon the heirs, successors, and assigns of the title holder and shall pass with the land.
Deuel County	Section 1215.03.13 b.	Limit for allowable shadow flicker at existing residences to no more than 30 hours annually

Over the course of the past two years all three counties undertook a detailed and thorough review of their Wind Energy System (WES) ordinances. Their original ordinances did not include limitations on shadow flicker. On behalf of NEER, Dr. Ollson prepared numerous written submissions on proposed science-based ordinance changes, which included a recommendation of limiting shadow flicker to no more than 30-hours of actual shadow flicker a year at a non-participating residence. Dr. Ollson appeared at countless Planning & Zoning Commission hearings and a number of County Commissioner hearings to answer questions of both the public and the county officials. Ultimately, this limit was adopted by all three jurisdictions.

2 Shadow Flicker Phenomenon and Model Predictions

Shadow flicker occurs when interruption of sunlight by the wind turbine blades. Figure 1 was taken from Smedley et al. (2010) and demonstrates the shadow flicker phenomenon from wind turbines. Shadow flicker is unavoidable for wind turbines, however, it typically only occurs for a limited number of hours a year at a home. This is due to the fact that certain factors must be present:

- a. the sun must be in a precise location in the sky such that sunlight will cast a shadow from the wind turbine;
- b. the wind turbine must be in operation during this period (i.e., the wind must be of sufficient speed for the wind turbine to be operational);
- c. shadow will not be cast on overcast of cloud cover days; and,
- d. the shadow will typically not be cast any further than 10x the rotor diameter of the turbine to any appreciable extent. For most modern turbines this would mean shadow flicker would not extend past one mile.



Shadow flicker most often occurs when the angle of the sun is lower in the horizon at sunrise and sunset. Although it can occur year round it is typically more frequent in the winter months when the sun's angle is lower in the horizon.

Although not all jurisdictions have shadow flicker regulations, conducting shadow flicker modeling has become common practice for proposed wind farm projects across the United States. There are several commercially available software packages, including WindPro that was used to model the Crowned Ridge Wind II Farm (Crowned Ridge Wind Farm PUC Application – Appendix J Shadow Flicker Monitoring Report).

All models initially calculate a “Worst Case or Astronomical” number of hours that a residence may experience shadow flicker. These numbers can then be adjusted to provide a “Realistic, Actual or Expected” number of hours of shadow flicker. It is important to distinguish between these scenarios, as some jurisdictions have adopted standards based on either astronomical or realistic shadow flicker hour predictions.

Worst Case / Astronomical: The models consider that the sun is always shining during daytime hours, the wind turbines are always rotating, and the wind direction from each turbine is such that the wind turbine is always perpendicular to the residences so that shadows could be cast at the residences. This is a predicted extreme theoretical number hours that will not occur at any residence.

Realistic / Expected: The model is run in the astronomical mode and then the results are adjusted for percentage of monthly cloud cover (solar statistics) and operating hours of the wind project. Under these conditions shadow flicker will not be generated and it more accurately predicts the number of hours of shadow flicker at a residence.

There are other obstructions that can limit both the Worst Case and the Realistic modeled numbers of shadow flicker. These include trees, shrubs, and other ancillary non-occupied structures (e.g., barns) that could interrupt the predicted shadow flicker at a home. Neither of the two reporting scenarios takes into account these types of obstructions at residential receptors. Another layer of conservatism is that models are set-up and run in the “greenhouse mode”. This means each residence is oriented to have omni-directional windows and thus it will produce more conservative results since it assumes that there is always a window in direct line of site of each wind turbine and the sun.

The model outputs can show the exact days, the time of day, the duration and turbine of origin of shadow flicker. These values are then summed to provide the annual number of hours of shadow flicker predicted. For the Realistic scenario the percentage of cloud cover and operational downtime is used to adjust these values. The model will also provide the date, time and duration of shadow flicker caused by each turbine.

3 Shadow Flicker is Not a Health Concern but can be a Nuisance

In preparation of this report an updated search of both the primary scientific literature in PubMed and Google was conducted for wind turbine shadow potential health concerns, and report of annoyance or nuisance. Of this body of literature two of the published papers address shadow flicker.

The main health concern that has been raised with shadow flicker is the potential risk of seizures in those people with photosensitive epilepsy. Photosensitive epilepsy affects approximately 5% of people with epilepsy where their seizures can be triggered by flashing light. The Epilepsy Society first investigated this issue in the United Kingdom in the late 2000s. They polled their members and determined that no one had experienced an epileptic seizure living or being in proximity to a wind farm from shadow flicker (Epilepsy Society, 2012).

Following on from this informal polling, two of the United Kingdom's academic experts in epilepsy published scientific research articles in the area. Harding et al. (2008) and Smedley et al. (2010) have published the seminal studies dealing with this concern. Both authors investigated the relationship between photo-induced seizures (i.e., photosensitive epilepsy) and wind turbine shadow flicker. Both studies indicate that flicker from turbines that interrupt or reflect sunlight at frequencies greater than 3 Hz pose a potential risk of inducing photosensitive seizures in 1.7 people per 100,000 of the photosensitive population. For turbines with three blades, this translates to a maximum speed of rotation of 60 revolutions per minute (rpm).

Large, modern, utility scale wind turbines spin at rates well below this threshold and are typically below 20 rpm. For example, the General Electric (GE) turbines being proposed for the Crowned Ridge Wind Farm have a maximum rotational speed of 15.6 rpm (0.78 Hz). Therefore, shadow flicker from these wind turbines is not at a flash frequency that could trigger seizures and not a concern.

The primary focus of the health-based research in proper siting of wind turbines has been focused on sound (audible, low frequency noise and infrasound). This is because exposure to shadow flicker is not commonly raised as a concern surrounding operating wind projects.

In 2011, the Department of Energy and Climate Change (United Kingdom) released a consultant's report entitled "Update of UK Shadow Flicker Evidence Base". The report concluded that

"On health effects and nuisance of the shadow flicker effect, it is considered that the frequency of the flickering caused by the wind turbine rotation is such that it should not cause a significant risk to health."

Therefore, there is nothing in the scientific literature that suggests that shadow flicker should be limited to protect health.

4 Shadow Flicker Guidelines to Reduce Nuisance or Annoyance from Shadow Flicker

Two of the most comprehensive and widely cited published scientific review articles on this topic are Knopper & Ollson (2011) and McCunney et al. (2014). Both papers review the potential health impacts of shadow flicker and concluded that there are no health effects associated with this issue living in proximity to wind turbines. Knopper & Ollson (2011) concluded:

"Although shadow flicker from wind turbines is unlikely lead to a risk of photo-induced epilepsy there has been little if any study conducted on how it could heighten the annoyance factor of those living in proximity to turbines. It may however be included in the notion of visual cues. In Ontario it has been common practice to attempt to ensure no more than 30 hours of shadow flicker per annum at any one residence."

Since 2011, only two studies have been conducted that examined the potential for shadow flicker to lead to increased annoyance for those living near wind turbines. Health Canada recently completed the most comprehensive study of wind turbine health and annoyance issues of its kind in the world (Health Canada, 2014). In 2016, Health Canada published a paper "*Estimating annoyance to calculated wind turbine shadow flicker is improved when variables associated with wind turbine noise exposure are considered*" (Voicescu et al., 2016). By using questionnaires of over 1200 people living as close as 800 feet from a turbine they attempted to determine if they could predict the percentage of people that were highly annoyed by varying levels of hours of shadow flicker (SF) a year or number of minutes on a given day. However, although annoyance did tend to increase with increasing minutes a day they could not find a statistical relationship:

"For reasons mentioned above, when used alone, modeled SF_m results represent an inadequate model for estimating the prevalence of HA_{WTSF} as its predictive strength is only about 10%. This research domain is still in its infancy and there are enough sources of uncertainty in the model and the current annoyance question to expect that refinements in future research would yield improved estimates of SF annoyance."

Recently, in August 2019 the results of the U.S. National Survey of Attitudes of Wind Power Project Neighbors were published "*Monitoring annoyance and stress effects of wind turbines on nearby residents: A comparison of U.S. and European samples*" (Hubner et al., 2019). This research included 1441 residents living near 231 wind farms, across 24 states. People living between 262 feet and up to 3 miles from a turbine were included in the research. Only 3.3% of

U.S. residents reported experiencing shadow flicker outside their homes, and 2.3% inside their homes. The researchers found:

Relatively few participants perceived shadow-flicker on their property, particularly in the U.S.; and,

shadow-flicker and noise were between “slightly” and “somewhat” annoying

The number of hours of shadow flicker were not modeled for this study and relied only on the self-reporting nature of whether they experienced shadow flicker on their property and their level of annoyance. Shadow flicker annoyance levels for US projects were lower than that of European projects. Regardless there was no correlation between shadow flicker levels and low level of annoyance.

Although there is no correlation between the duration of shadow flicker and annoyance OEHM does believe that limits on shadow flicker are prudent to keep nuisance levels to a minimum at non-participating residences. A number of U.S. Counties and States have adopted various ordinances and rules limiting shadow flicker on non-participating land. A no more than 30 hours of shadow flicker modeled on a residence has almost become the universally adopted standard. Erroneously this level of shadow flicker at homes has often been referred to as the “Industry Standard”. It is not the wind turbine proponents that derived this standard; rather it is one that has been adopted in national, state or local statute.

The origins of this standard are traced to Germany in 2002. The German Territorial Committee for Emissions control released the document “Hinweise zur Ermittlung und Beurteilung der optischen Immissionen von Windenergieanlagen, Länderausschuss für Immissionsschutz [Notes on the identification and evaluation of optical emissions from wind turbines], (in German).” The standard was based on limiting the nuisance of local residents. This level is often cited as being below one that would result in nuisance of local residents. They subsequently codified this formal shadow flicker guideline as part of the *Federal Emission Control Act* (Haugen, 2011). Similar standards to this have been adopted internationally with modifications for shadow flicker.

Each jurisdiction that has adopted a shadow flicker restriction at non-participating residence has had to weigh what would be a reasonable level of shadow flicker that they believe would be acceptable and avoid complaints. This is clear from the Koppen et al. (2017) review of international standards for shadow flicker. They state:

However, there are differences in the exact implementation, like the consideration of only the worst case, only the real case or both the worst and the real case shadow impact. Other common differences are the exact definition of shadow flicker sensitive receptors and the zone of influence which has to be considered. This can lead to considerable differences in energy production losses by a shadow flicker control module.

Across the United States many jurisdictions have successfully adopted shadow flicker restrictions based on the “Realistic/Expected” scenario. The following are examples of state-wide legislation.

North Dakota

The North Dakota Public Service Commission requires effects from the impact upon light-sensitive land uses to be managed and maintained at an acceptable minimum (N.D. Admin. Code §69-06-08-01(5)(c)(3)). The North Dakota Public Service Commission has recognized the 30-hour per year standard and evaluates shadow flicker impacts pursuant

to this standard. Justification, similar to what is contained in this report, for continued use of this standard has been provided to the ND PSC during several recent wind project applications and hearings.

Connecticut

Similarly the Regulations of Connecticut State Agencies Section 16-50j-95, part (c) requires:

Shadow flicker shall not occur more than 30 total annual hours cumulative at any off-site occupied structure location from each of the proposed wind turbine locations and any alternative wind turbine locations at the proposed site and any alternative sites.

County Level Ordinances

Counties across the Midwest have updated their wind turbine ordinances in recent years. There are numerous examples of counties that have adopted a no more than 30 hours of actual shadow flicker at non-participating homes, including Codrington, Deuel and Grant Counties.

Eliminating shadow flicker at non-participating homes does not afford any additional protection for health. Therefore, OEHM suggests that no more than 30 hours of shadow flicker a year at non-participating residences is a reasonable limit to avoid annoyance or nuisance complaints. To put this in perspective it represents less than 0.5% of the daylight hours a year.

This standard has a long history of success in many United States jurisdictions that have seen over a decade of wind farm operation. Shadow flicker at operating wind projects is rarely a source of complaint. In the very unlikely event of shadow flicker complaints there are a number of mitigation strategies that can be resolved between the companies and landowners.

5 Conclusions

Over the past decade there has been considerable research conducted around the world on the potential for wind turbines to adversely impact health. This independent research by university professors, consultants and government medical agencies has taken place in many different countries on a variety of models of turbines that have been in the community for a number of years. Based on scientific principles, and the collective findings of scientific articles, shadow flicker does not present a potential health threat. Numerous jurisdictions have adopted a no more than 30 hours a year restriction of total number of hours of actual shadow flicker at a non-participating residence. This standard has a proven track record of reducing potential nuisance effects and should be considered by the South Dakota PUC when evaluating wind project applications.

Sincerely,

OLLSON ENVIRONMENTAL HEALTH MANAGEMENT

Christopher Ollson, PhD
Senior Environmental Health Scientist

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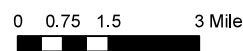
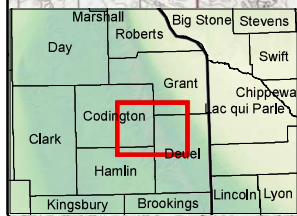
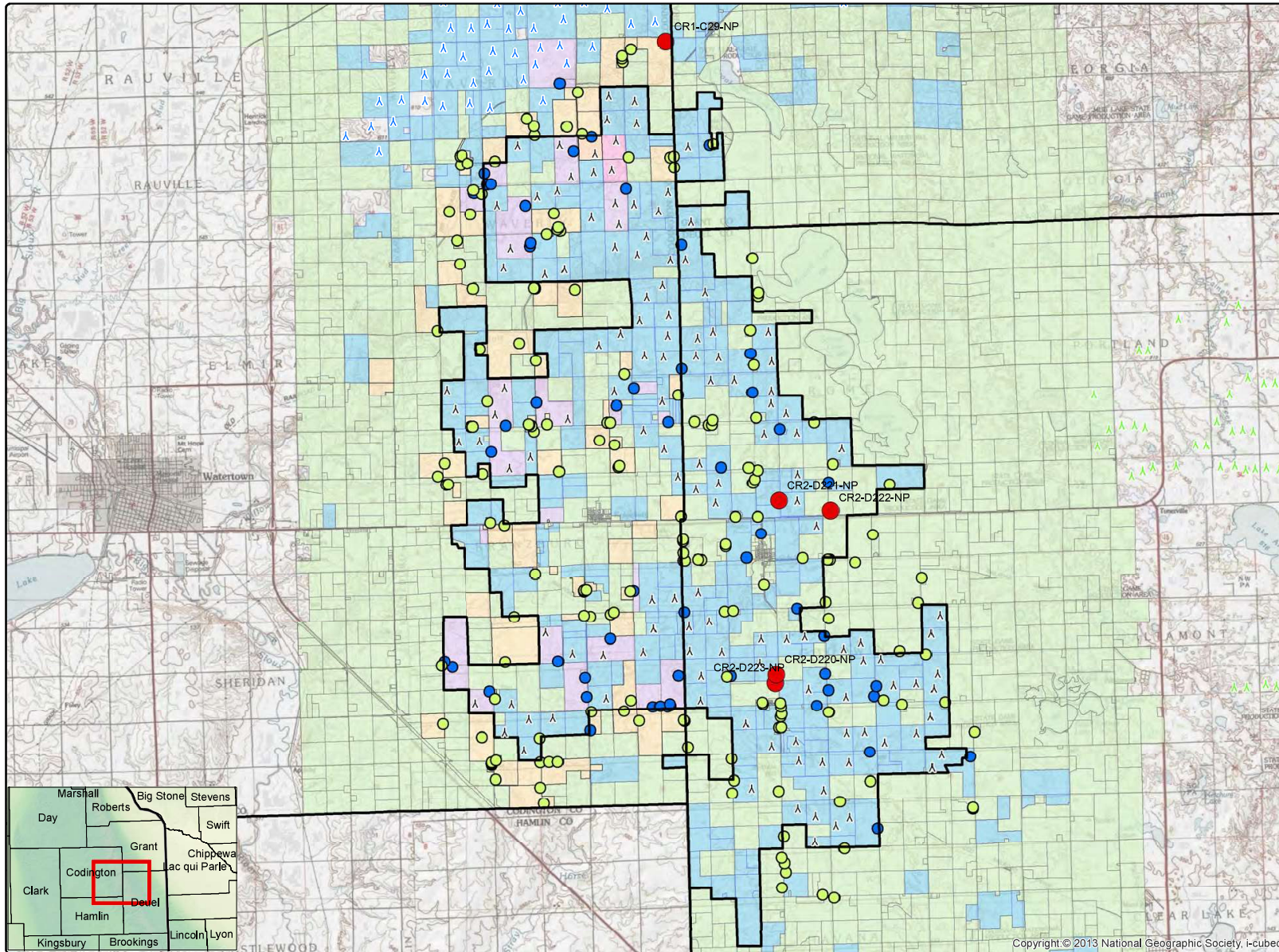
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**Crowned Ridge II Wind Farm
Overview Map**

Client
SWCA Environmental Consultants

Project Description
Wind turbine layout with land parcels within the project footprint and existing occupied structures.

Codington County land parcels within 2 km of a wind turbine.

Location: Watertown, SD
Project #: 20174430
Issue Dates

1	Original	2019.07.27
#	Description	Date

Drawn By: AS **Checked By:** JH

Legend

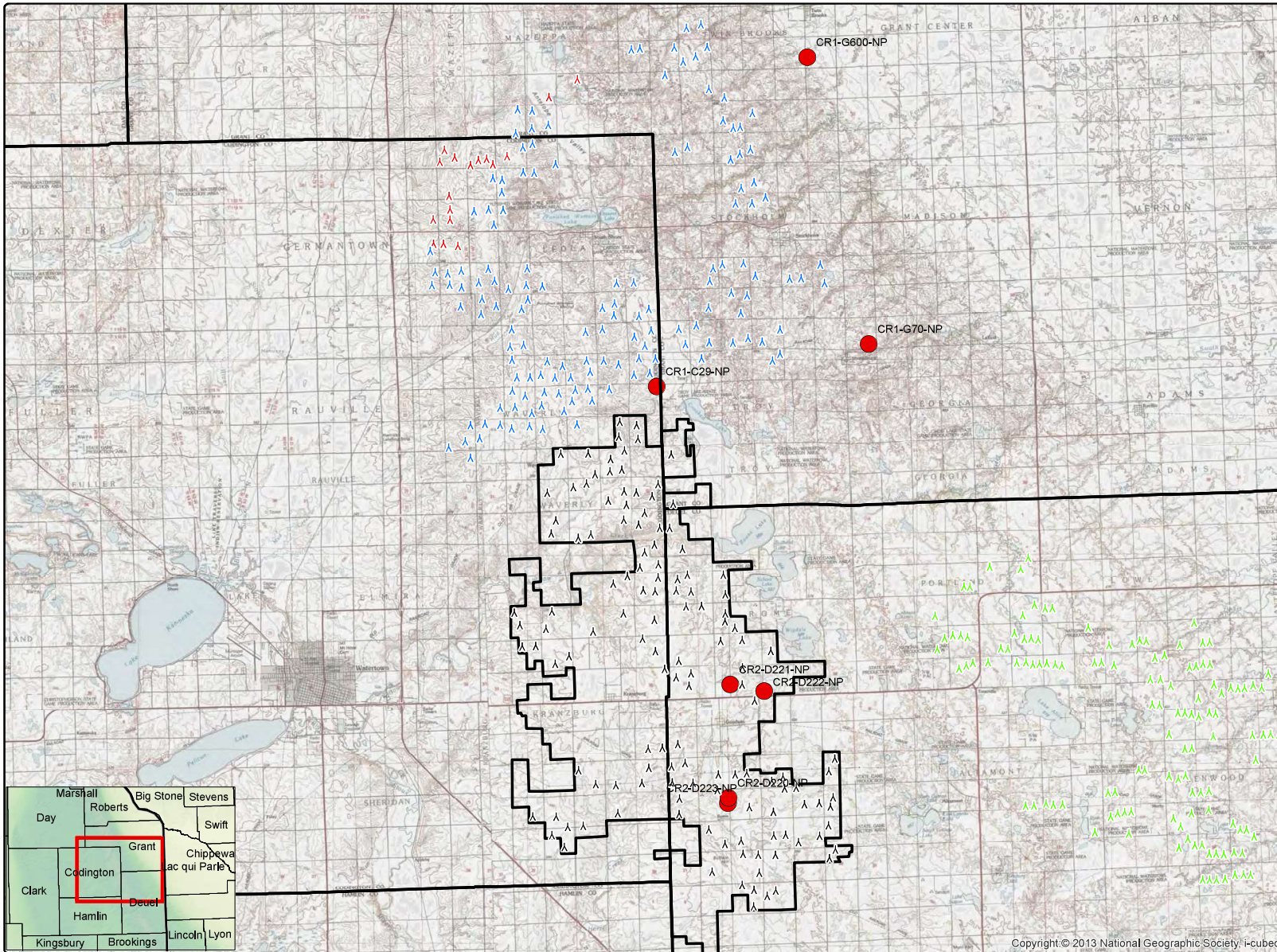
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- ▲ Dakota Range Turbines
- ▲ Crowned Ridge II Turbines
- ▲ Deuel Harvest Turbines
- ▬ County Lines
- ▬ CR II Project Boundary
- CR2 Intervenor
- Non-Participants Shadow
- Participants Shadow
- Non-Participating Codington Parcels
- Participating Codington Parcels
- Non-Participating Parcels
- Participating Parcels
- Pending Parcels

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003449





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**Crowned Ridge II Wind Farm
Intervenor Locations**

Client
SWCA Environmental Consultants

Project Description
Wind turbine layout with Intervenor's home locations.

Location: Watertown, SD
Project #: 20174430

Issue Dates

1	Original	2019.07.27
#	Description	Date

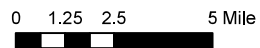
Drawn By: AS **Checked By:** JH

Legend

- ▲ Crowned Ridge Turbines
- ▲ Dakota Range Turbines
- ▲ Crowned Ridge II Turbines
- ▲ Deuel Harvest Turbines
- ▭ County Lines
- ▭ CR II Project Boundary
- CR2 Intervenor

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LAW OFFICES

Lynn, Jackson, Shultz & Lebrun, P.C.

LAWYERS ALSO ADMITTED IN MINNESOTA, IOWA, NORTH DAKOTA, AND WYOMING

www.lynnjackson.com

110 N. MINNESOTA AVENUE
SUITE 400
SIOUX FALLS, SD 57104
605-332-5999
FAX 605-332-4249

135 E. COLORADO BOULEVARD
SPEARFISH, SD 57783-2755
605-722-9000
FAX 605-722-9001

909 ST. JOSEPH STREET
SUITE 800
RAPID CITY, SD 57701
605-342-2592
FAX 605-342-5185

REPLY TO: Sioux Falls 605-332-5999

From the office of Miles F. Schumacher

e-mail address: mschumacher@lynnjackson.com

November 26, 2019

Ms. Patricia Van Gerpen, Executive Director
South Dakota Public Utilities Commission
Capital Building, 1st Floor
500 East Capital Avenue
Pierre, SD 57501-5070

Re: Docket No. EL19-027
Application to the SD PUC for a Facility Permit to Construct
A 300.6 Megawatt Wind Facility

Dear Ms. Van Gerpen:

Please find enclosed Applicant's Supplemental Responses to Staff's Second Set of Data Requests. We recognize that the Responses are not docketed; however, we need to address confidentiality in case the information submitted is used in any other context. Please note that Attachment 2 to data request 1.7, includes confidential financial information, for which Applicant seeks confidential treatment pursuant to ARSD 20:10:01:39 and SDCL 15-6-26(c)(7). Applicant reserves the right to provide additional authority if and when any issue as to appropriateness for confidential treatment arises.

Let me know if you have any questions.

Yours very truly,

LYNN, JACKSON, SHULTZ & LEBRUN, P.C.



Miles F. Schumacher
MFS/kab
Enclosures

003451

WIND FARM LEASE AND EASEMENT AGREEMENT

1. **Parties.** This Wind Farm Lease and Easement Agreement (“**Agreement**”) is made and entered as of the ____ day of _____, 2017 (“**Effective Date**”), by and between [*NAME AND MARITAL STATUS*] (collectively, the “**Owner**”), and Crowned Ridge Wind II, LLC, a Delaware limited liability company, (“**Operator**”) an affiliate of NextEra Energy Resources, LLC, a Delaware limited liability company. Owner and Operator are sometimes individually referred to as a “**Party**” and collectively as the “**Parties.**”

2. **Project.** This Agreement relates to the wind-powered electrical power generation and transmission project known as the “Crowned Ridge II Wind Energy Center” to be located in Codington, Deuel, and Grant Counties, South Dakota (“**Wind Farm**”), which may be wholly or partially located on the Owner’s property legally described on the attached **Exhibit A-1** to this Agreement (“**Owner’s Property**”). Upon Operator’s exercise of the Option (as defined below), the Wind Farm shall include (i) the Leases referenced in Section 4 that are located on the Owner’s Property, (ii) the Easements granted in Section 5, and (iii) the Improvements to be constructed on Owner’s Property referenced in Section 8. The Leases, Easements and Improvements are sometimes collectively referred to as the “**Operator Property**”.

3. **Option.** Owner grants to Operator an exclusive option (“**Option**”) to acquire the Leases and Easements referenced in Sections 4 and 5 in accordance with the following terms and conditions. Operator shall be entitled to acquire the Lease and the Easements in their entirety or in part, as Operator deems appropriate.

3.1 **Option Term.** The initial period during which Operator may exercise the Option shall be for a term of thirty-six (36) months, commencing on the Effective Date and expiring on the date immediately preceding the third (3rd) anniversary of the Effective Date (“**Initial Option Term**”). Operator shall have a single election to extend the Initial Option Term for an additional twenty-four (24) months (“**Extended Option Term**”) by written notice to Owner at any time prior to the third (3rd) anniversary of the Effective Date, which notice shall be accompanied by the Option Extension Payment (as defined in **Exhibit D**). References herein to the Option Term shall mean the Initial Option Term and, to the extent exercised by Operator, also the Extended Option Term, unless expressly stated otherwise.

3.2 **Option Payment.** As initial consideration for the granting of the Option, Operator agrees to pay Owner the amounts set forth in **Exhibit D**.

3.3 **Use of Owner’s Property.** During the Option Term, Operator and its employees, agents and contractors shall have a non-exclusive right to enter upon the Owner’s Property and the right of ingress and egress over and across the Owner’s Property for the purposes of (i) surveying the Owner’s Property; (ii) performing such other tests and studies as Operator may desire in connection with the Option, including, without limitation, environmental, avian and cultural resource assessments, threatened or endangered species assessments, and geotechnical, foundation and soil tests; provided that such activities do not unreasonably interfere with Owner’s use of the Owner’s Property as set out in Section 11.3.; and (iii) installing, maintaining, operating, inspecting and removing one or more wind monitoring devices and all associated activities (including the Met Towers referenced in Section 8.4), and including the performance of

all tests and studies associated therewith. Owner shall not permit any other individual or entity except Operator or its affiliates to install a Met Tower on Owner's Property.

3.4 **Right to Grant Option.** Owner warrants and represents to Operator that (i) the statements in Section 9 concerning Owner's title to the Owner's Property are true and correct; (ii) Owner has the authority to grant this Option to Operator without the consent or approval of any other party; and (iii) there are no other existing options, rights of first refusal, contracts to purchase, leases or mortgages that would prevent Operator from exercising its rights with respect to the Option.

3.5 **Exercise of Option.** Operator may exercise the Option by giving written notice to Owner ("**Option Notice**") at any time during the Option Term. Operator shall specify in the Option Notice the Commencement Date referenced in Section 6.1.1. Along with the Option Notice, Operator shall deliver to Owner a proposed plan of development showing the contemplated locations and routes of the Improvements, which shall serve as the **Exhibit B** to this Agreement. On the Commencement Date, the Leases and Easements referenced in Sections 4 and 5 shall automatically become effective, and Operator and Owner shall be subject to all of the terms and conditions of this Agreement with respect to such Leases and all rights and obligations relating thereto. If Operator only exercises the Option for a portion of the Owner's Property, then the Option granted herein shall remain in full force and effect for any other portion of the Owner's Property that was not included in the Option Notice.

3.6 **Termination of Option.** If Operator fails to exercise the Option within the Option Term, the Option and the rights of Operator as the optionee shall automatically terminate.

4. **Leases.** Effective upon the exercise of the Option by Operator, Owner grants to Operator, and Operator then accepts from Owner, for the Term referenced in Section 6.1, the following leases over and across the Owner's Property in accordance with the terms and conditions of this Agreement. The following leases are for the benefit of Operator and Operator's agents, contractors and employees and located on the Owner's Property and are collectively referred to as the "**Leases.**"

4.1 **Construction Right.** (a) Owner grants Operator rights for purposes of constructing, operating, maintaining, repairing, replacing, and removing all or any part or component of the Improvements whether located on or off Owner's Property. This construction right is referred to as the "**Construction Right**" and the property subject to the burden of this Construction Right is referred to as the "**Construction Property.**" Operator may exercise its right to use all or any part of the Construction Property as and when Operator deems it necessary or advisable to do so to perform the activities for which this Construction Right is granted, including, without limitation, constructing, operating, maintaining, repairing, replacing, and removing laydown areas, staging areas, crane pads and parking for Operator's employees. After each use of the Construction Right, Operator to the extent reasonably possible shall restore the Construction Property to the condition it was in before Operator's use.

(b) When installing, maintaining or removing the nacelle and rotor from any Turbine, whether located on or off of Owner's Property, this Construction Right also shall permit Operator to: (1) (for the purpose of securing tag lines) travel on foot or in a pickup truck, SUV, small forklift or other similar vehicles onto Owner's Property up to seven hundred (700) feet in

any direction from the center of the Construction Property; and (2) drive an erection crane on Owner's Property and make use of earthmoving equipment for purposes of building suitable access routes for such crane. Operator shall be permitted to maintain a 120 foot by 40 foot crane pad at each Turbine Site Property (hereinafter defined) on Owner's Property for purposes of constructing and maintaining the Wind Farm.

4.2 **Access Right.** (a) Owner grants Operator the right of access over the Owner's Property for unobstructed vehicular, equipment and pedestrian ingress to and egress from the Improvements, the Construction Property, the Turbine Site Property, the Collection Property, the Overhang Property, and the Met Tower Property, whether located on or off Owner's Property. This right of access is referred to as the "**Access Right**" and the property subject to the burden of this access right is referred to as the "**Access Property**." Operator shall have the right to travel over, across and along the Access Property by means of existing roads and lanes, and by roads Operator or Owner may construct or improve from time to time on, over, and across the Owner's Property.

(b) Owner reserves the right to use all roads on the Access Property provided, however, that Owner shall not and shall not permit others to obstruct or damage the roads or in any other way interfere with Operator's rights under this Access Right.

4.3 **Turbine Site Lease.** Owner grants Operator a lease to construct, operate, replace, relocate, remove, and maintain a Turbine, Collection Facilities, together with associated roads and parking areas on Owner's Property. This grant is referred to as the "**Turbine Site Lease**" and each Turbine site so leased is referred to as a "**Turbine Site Property**."

4.4 **Collection Lease.** Owner grants Operator a lease for the construction, operation, maintenance, replacement, relocation or removal of Collection Facilities on and under the Owner's Property. This grant is referred to as the "**Collection Lease**" and the property so leased is referred to as the "**Collection Property**."

4.5 **Telecommunication Facilities Lease.** Owner grants Operator a lease for the construction, operation, maintenance, replacement, relocation or removal of Telecommunication Facilities on, over, across, along and under the Owner's Property.

4.6 **Overhang Right.** Owner grants Operator the right and privilege to permit the rotors of Turbines located on adjacent properties to overhang a portion of the Owner's Property. This right is referred to as the "**Overhang Right**" and the property subject to the Overhang Right is referred to as the "**Overhang Property**". Owner shall not interfere with the operation of Turbine rotors that overhang the Overhang Property.

4.7 **Met Tower Lease.** Owner grants Operator a lease to construct, operate, replace, relocate, remove, and maintain a Met Tower and Collection Facilities on Owner's Property. This grant is referred to as the "**Met Tower Lease**" and each Met Tower site so leased is referred to as a "**Met Tower Property**."

5. **Easements.** Upon the exercise of the Option by Operator, Owner grants to Operator, and Operator accepts from Owner, for the Lease and Easement Term referenced in Section 6.1, the following easements over and across the Owner's Property in accordance with the terms and

conditions of this Agreement. The following easements are for the benefit of Operator and Operator's agents, contractors and employees, are located on the Owner's Property and are collectively referred to as the "**Easements.**"

5.1 **Wind Non-Obstruction Easement.** (a) Owner grants Operator an irrevocable, exclusive easement for the right and privilege to use, maintain and capture the free and unobstructed flow of wind currents over and across the Owner's Property ("**Wind Non-Obstruction Easement**"). Along with the Option Notice, Operator shall deliver to Owner the following legal descriptions which shall become **Exhibit A-2** of this Agreement: (a) a description of the Wind Non-Obstruction Easement property subject to this Agreement; (b) a description of the Wind Non-Obstruction Easement in vertical and horizontal angles; and (c) a description of real property benefiting from the Wind Non-Obstruction Easement. Owner shall not engage in any activity on Owner's Property that might interfere with wind speed or wind direction over any portion of any Turbine or Met Tower Easement Properties, whether located on or off the Owner's Property; cause a decrease in the output or efficiency of any Turbine or accuracy of any meteorological equipment; or otherwise interfere with Operator's operation of the Wind Farm or exercise of any rights or the Leases granted in this Agreement ("**Interference**"). Owner reserves the right to erect structures on Owner's Property in compliance with all applicable laws and ordinances except as specifically limited in this Agreement. Owner must consult with and obtain Operator's prior written approval as to the location of all structures greater than forty (40) feet in height located one thousand (1000) feet or less from any Turbine or Met Tower. Approval shall be based on whether, in Operator's sole judgment, informed by appropriate professional engineering and meteorological opinions, the proposed structures at the proposed location are likely to cause Interference.

(b) This grant of easement of the Wind Non-Obstruction Easement expressly includes the right of Operator to enter on any part of Owner's Property to enforce Operator's rights, including the physical removal of trees or structures (except existing trees and structures) causing Interference to the project contemplated by Operator. Operator shall consult with Owner before making any such removals.

5.2 **Effects Easement.** Owner grants to Operator a non-exclusive easement for audio, visual, view, light, flicker, noise, shadow, vibration, air turbulence, wake, electromagnetic, electrical and radio frequency interference, and any other effects attributable to the Wind Farm or activity located on the Owner's Property or on adjacent properties over and across the Owner's Property ("**Effects Easement**").

6. **Term of Agreement.** The term of this Agreement ("**Term**") includes the Option Term referenced in Section 3.1; and the Easement Term referenced in Section 6.1.

6.1 **Lease & Easement Term.**

6.1.1 **Lease & Easement Term.** The Term of the Leases and Easements and the effective date thereof shall commence on the date specified by Operator in the Option Notice ("**Commencement Date**"). The Term shall end fifty (50) years after the Commencement Date, unless terminated as provided in this Agreement.

6.1.2 **Delays During Easement Term.** At Operator's option, the Term may be extended for a period of time equal to the period of time during which operation of the Wind Farm is delayed or suspended because of the occurrence of a Regulatory Suspension or Force Majeure, which are defined as follows:

(i) **"Regulatory Suspension"** shall mean the enactment or application of any law, order, rule, or regulation of the South Dakota Public Utilities Commission, Federal Energy Regulatory Commission, or other local, state, or federal government authority having jurisdiction over the Wind Farm or Operator, or the failure of any such governmental authority to issue an approval or permit pursuant to any such law, order, rule, or regulation, which results in the delay, interruption, or suspension of the production, sale or transmission of electricity from the Turbines; and

(ii) **"Force Majeure"** shall mean causes beyond the reasonable control of and without the fault or negligence of the Party claiming Force Majeure, including but not limited to acts of God, labor unrest (including, but not limited to, slowdowns, picketing, boycotts or strikes), flood, earthquake, storm, fire, lightning, explosion, power failure or power surge, vandalism, theft, the cutting of power, transmission or other lines, wires or cables to the Wind Farm by persons other than Wind Farm employees, epidemic, war, revolution, riot, civil disturbance, sabotage, change in law or applicable regulation subsequent to the Commencement Date and action or inaction by any federal, state or local legislative, executive, administrative judicial agency or body which in any of the foregoing cases, by exercise of due foresight such Party could not reasonably have expected to avoid, and which, by the exercise of due diligence, it is unable to overcome.

The Parties shall be excused from performing their respective obligations under this Agreement and shall not be liable in damages or otherwise if and to the extent that they are unable to so perform or are prevented from performing by a Force Majeure, provided that: (i) the non-performing Party, as promptly as practicable after the occurrence of the Force Majeure, but in no event later than thirty (30) days thereafter, gives the other Party written notice describing the particulars of the occurrence; (ii) the suspension of performance is of no greater scope and of no longer duration than is reasonably required by the Force Majeure; (iii) the non-performing Party uses good faith and commercially reasonable efforts to remedy its inability to perform; and (iv) as soon as the non-performing Party is able to resume performance of its obligations excused as a result of the occurrence, each party shall give prompt written notification thereof to the other Party.

6.2 **Termination by Operator.** Operator, at its option, shall have the right to terminate this Agreement at any time during the Term of the Agreement, as to all or any part of the Operator Property. Termination shall be effective thirty (30) days after written notice of such termination to Owner. If Operator's notice is a full termination of the Operator Property, the Parties shall be relieved of all further duties and obligations under this Agreement, other than (i) the payment of any accrued and unpaid obligations owed by either Party as of the date of termination; (ii) the removal of the Improvements by Operator pursuant to Section 8.9; and (iii) any other obligations and liabilities that are expressly stated in this Agreement to survive such termination. Upon any such partial termination by Operator, the Parties shall be relieved of all further duties and obligations under this Agreement with respect to the portion thereof terminated by Operator, subject to the obligations and liabilities referenced in items (i) through (iii) above that shall continue to be applicable to the terminated portion of this Agreement.

Owner and Operator agree to execute an amendment to this Agreement evidencing such partial termination.

7. **Payments.** If Operator exercises the Option referenced in Section 3, Operator agrees to pay Owner the amounts set forth in **Exhibit D** as consideration for the Leases and Easements and Operator's other rights and interests in the Owner's Property.

8. **Improvements.** Operator shall have the right, at its sole cost and expense, to construct, install, maintain, use, operate, repair, replace, relocate and remove all facilities, structures, equipment, machinery, wires, conduit, cables, poles, materials and property of every kind and character required for the construction and operation of portions of the Wind Farm on the Owner's Property, including, but not limited to, the Turbines, Collection Facilities, Met Towers, and Roadway Improvements referenced in Sections 8.1 through 8.5 (collectively, the "**Improvements**").

8.1 **"Turbines"** shall mean any wind turbine generator or wind machine designed for the generation of electrical power from wind power, including without limitation, the associated towers, support structures, guy wires, braces and directly related equipment.

8.2 **"Collection Facilities"** shall mean all Improvements whose purpose is to deliver electrical power generated by the Turbines to an electrical power grid or other system, including without limitation transformers and overhead and underground electrical collection lines and interconnection facilities.

8.3 **"Telecommunication Facilities"** shall mean all Improvements whose purpose is to provide telecommunication services solely relating to Operator's wind powered projects, including telephone, closed-circuit television, radio, microwave, internet, computer data and other telecommunication services.

8.4 **"Met Tower"** shall mean towers used primarily to gather and transmit meteorological data relating to the Wind Farm, and includes the tower's foundations, guy wires, meteorological data acquisition equipment, power source, and any required data and electrical transmission lines.

8.5 **"Roadway Improvements"** shall mean all improvements that may be necessary to construct, maintain and repair any new and existing roadways, driveways, gates and other means of ingress and egress over, across and along the Access Property, including paving or surfacing of the roadways with asphalt, gravel or other roadway materials, and the construction and installation of culverts, bridges, drainage ditches, gates, cattle guards and similar structures and facilities.

8.6 **Ownership of Improvements.** All Improvements shall at all times remain the property of Operator, and Owner shall have no right, title or interest therein. All Improvements constructed or placed on the Owner's Property by Operator during the Term of this Agreement may be repaired, replaced, relocated, removed, added to or expanded upon by Operator at any time during the Term of this Agreement. Owner expressly waives any statutory lien or common law liens on the Improvements to which Owner might be entitled.

8.7 **Construction Liens.** Operator shall not permit any liens arising out of Operator's use of the Operator Property under this agreement to be filed against the Operator Property. Operator shall, within sixty (60) days after it receives notice of the lien, provide a bond or other security that Owner may reasonably request, or remove such lien from the Operator Property in the manner provided by applicable law.

8.8 **Location of Improvements.** The locations and routes of the Improvements for which the Leases and Easements are being granted cannot be determined until the completion of Operator's inspection, testing, study and surveying of the Owner's Property during the Option Term. Owner and Operator acknowledge and agree that the location and routes of the Improvements may need to be relocated or rerouted by Operator, at any time during the Term of this Agreement, so long as the nature and extent of any such relocated or rerouted Improvements are not materially different and impose no greater burden on the Owner's Property than the original locations or routes and Operator takes appropriate actions to minimize any disruption or inconvenience to Owner and the uses of the Owner's Property reserved to Owner in Section 11.3. Following construction of the Wind Farm, Operator shall provide Owner an "as-built" survey of all Improvements on Owner's Property, which shall serve as **Exhibit C** to this Agreement.

8.9 **Removal of Improvements.** Upon full or partial termination of any of the Leases or Easements, Operator shall remove all physical material pertaining to the Improvements from the affected Operator Property to a depth of thirty-six inches (36") beneath the soil surface, and restore the area formerly occupied by the Improvements to substantially the same physical condition that existed immediately before the construction of the Improvements (the "**Removal Obligations**"). If Operator fails to complete its Removal Obligations within twelve (12) months of full or partial termination of the applicable Lease or Easement, Owner may do so, in which case Operator shall reimburse Owner for costs of fulfilling Operator's Removal Obligations incurred by Owner.

9. **Ownership and Title Matters.** Owner warrants and represents to Operator, both as of the Effective Date, and as of the Commencement Date as follows:

9.1 **Authority.** Owner is the sole owner of the Owner's Property including the Operator Property and has the unrestricted right and authority to sign this Agreement and to grant Operator the Leases and Easements and other rights granted in this Agreement. When signed by both parties, this Agreement constitutes a valid and binding agreement enforceable against Owner in accordance with its terms.

9.2 **Other Agreements.** The Owner's Property is not subject to any other agreements, options, rights of first refusal or other prior right of any party to purchase, lease or acquire leases and easements in the Owner's Property, or create any prior claim or right that would preclude or interfere with Operator's rights and interests under this Agreement and the Leases and Easements.

9.3 **Minerals.** Except as otherwise disclosed in writing by Owner to Operator at the time of the execution of this Agreement by Owner, Owner owns all of the oil, gas and other minerals, and all rights thereto as exist on or under the Owner's Property.

9.4 **Owner Mortgage.** Except as disclosed in writing by Owner to Operator at the time of the execution of this Agreement by Owner, there are no mortgages encumbering the Owner's Property ("**Owner Mortgage**").

9.4.1 **Notice and Opportunity to Cure.** If there is an Owner Mortgage encumbering Owner's Property and Owner receives from the holder thereof ("**Owner Mortgage**") any notice that payments are overdue, Owner shall notify Operator and each Operator Mortgagee (as defined at Section 13.1) by sending a copy of such overdue payment notice to Operator by the earlier of (i) five (5) days after receipt, or (ii) three (3) business days prior to the date by which a default under or in respect of such Owner Mortgage could occur. If Operator or any Operator Mortgagee determines that it would be in Operator's interest to make such payments to Owner Mortgagee on Owner's behalf, whether as a result of receiving such notice or otherwise, Operator shall have the right to make such payments and to credit the payments so made against the Annual Installment Payment next due under the Agreement.

9.4.2 **Subordination, Non-Disturbance and Attornment Agreement.** Within thirty (30) days after Owner receives the Option Notice, Owner shall deliver to Operator an executed and duly acknowledged Subordination, Non-Disturbance and Attornment Agreement ("**SNDA**") in the form prepared and provided by Operator, from each Owner Mortgagee, pursuant to which such Owner Mortgagee agrees, among other things, not to disturb Operator's possession and use of the Owner's Property. Operator shall, at its sole cost and expense, record each such SNDA in the Official Records of the County in which Owner's Property is located. If Owner fails to deliver a SNDA from each Owner Mortgagee, Operator may, at its sole option, either (i) terminate this Agreement immediately upon written notice to Owner, or (ii) take such action as Operator deems reasonably necessary to effect the rights granted to Operator hereunder, including, without limitation, contacting the Owner Mortgagee directly, and off-set all amounts expended in such efforts against the Annual Installment Payments and any other amounts due hereunder or in respect hereof.

10. **Representations and Warranties of Owner.** Owner hereby makes the following further representations and warranties:

10.1 **Physical Condition.** Owner has no actual knowledge of any existing physical conditions of the Owner's Property which would prevent, significantly restrict or make more expensive Operator's development of the Owner's Property for the purposes specified in this Agreement, or which could, with the passage of time, or the giving of notice, constitute a violation of any currently applicable governmental law, ordinance, order, rule or regulation.

10.2 **Legal Restrictions.** Without having made any specific investigation thereof, and without undertaking to do so, Owner has no actual knowledge of any law, regulation, ordinance or order of, or agreement with, any local, state or federal governmental authority which would prohibit or significantly restrict Operator's development of the Owner's Property pursuant to this Agreement. This Agreement does not violate any contract, agreement, instrument, judgment or order to which Owner is a party or which affects the Owner's Property. To the best of Owner's knowledge, the Owner's Property is currently in full and complete compliance with all governmental laws, ordinances, orders, rules and regulations applicable to the Owner's Property.

10.3 **No Litigation.** No litigation is pending and, to the best of Owner's knowledge, no litigation or administrative actions are proposed, threatened or anticipated with respect to any matter affecting the Owner's Property. If Owner learns of any litigation or administrative action proposed, threatened or instituted with respect to the Owner's Property, Owner shall give Operator prompt notice thereof.

10.4 **Survival.** The representations and warranties set forth in this Section 10 shall survive the execution and delivery hereof.

11. **Use, Operation and Maintenance.**

11.1 **Exclusive Use by Operator.** Subject to the limitations in Sections 11.3, Operator shall have the exclusive right (i) to use and possess the Operator Property in connection with the Wind Farm and other similar wind-powered electrical power generation projects; (ii) to investigate, inspect, survey, and conduct tests of the Owner's Property, including, but not limited to, meteorological, environmental, archeological and geotechnical tests and studies; (iii) to use and convert all of the wind resources on the Owner's Property; and (iv) to undertake such other activities on the Owner's Property that may be related to the Wind Farm, including, without limitation, the storage of towers, materials and equipment during the installation and construction of the Turbines and other Improvements; development and operation of communications systems; and site tours of the Wind Farm for visitors and other interested parties.

11.2 **No Required Installation or Operation.** Nothing in this Agreement shall be interpreted as imposing on Operator any obligation to install Turbines or other Improvements on the Owner's Property, or to operate the Wind Farm on the Owner's Property. Operator shall have the sole discretion to determine if and when any Turbines and other Improvements may be constructed on Owner's Property, and if and when to commence the operation of the Wind Farm on the Owner's Property.

11.3 **Uses Reserved by Owner.** Owner expressly reserves the right to use the Owner's Property for all other purposes not granted to Operator under this Agreement, including ranching and agricultural uses, and all recreational uses, provided that no such other use interferes in any way with Operator's use of the Operator Property under this Agreement, including the joint use of the roadways now or hereafter located on the Access Right Property. Owner's reserved rights are further made subject to the following conditions, requirements and limitations:

11.3.1 **Ranching & Agricultural Uses.** Owner and Operator agree to cooperate with each other in a manner that allows Owner to continue the current ranching and agricultural uses of the Owner's Property in a manner that does not unreasonably interfere with Operator's use of the Operator Property.

11.3.2 **Hunting.** If Owner hunts and/or discharges firearms on and near the Operator Property, Owner shall take such precautions as are reasonable to ensure the safety of Operator's site personnel and the protection of Improvements on the Operator Property during and after construction of the Wind Farm.

11.3.3 **Recreational Uses.** Owner may allow Owner's guests to use the Operator Property, except the Turbine and Met Tower Properties, for recreational purposes except at times or under circumstances that adversely affect public health and safety or operation and safety of the Improvements. If Owner uses snowmobiles or other all-terrain vehicles in the vicinity of the Operator Property, it shall take such reasonable precautions so as to ensure the safety of Owner's guests, Operator's site personnel, and the protection of Improvements on the Operator Property during and after construction of the Wind Farm.

11.4 **Permits and Approvals.** Operator shall be responsible, at its sole cost and expense, for obtaining any governmental permits and approvals necessary for the construction and operation of the Wind Farm and the construction and operation of the Improvements, including complying with the provisions of South Dakota's One-Call Notification System, SDCL Chapter 49-7A. Owner shall cooperate with Operator as necessary to obtain any governmental or utility approvals or permits, including, without limitation, signing any applications, provided that Operator shall reimburse Owner for all its reasonable out-of-pocket expenses directly incurred in connection with such cooperation. To the extent permitted by law, Owner hereby waives enforcement of any applicable setback and sideyard requirements and restrictions and any other zoning restrictions pertaining to the amount of land required surrounding Improvements, whether imposed by a government authority or otherwise, applicable to the Wind Farm on the Owner's Property or any such facilities to be placed upon property adjacent to Owner's Property.

11.5 **Compliance with Laws.** Operator shall comply in all material respects with valid laws applicable to the Operator's use of the Owner's Property and the Operator Property. Operator shall have the right, in its sole discretion and at its sole expense, in Operator's name or Owner's name, to contest the validity or applicability to the Owner's Property and the Operator Property of any law, ordinance, statute, order, regulation, property assessment or the like made by any governmental agency or entity. Operator shall control any such contest and Owner shall cooperate with Operator in every reasonable way in such contest, at no out-of-pocket expense to Owner.

11.6 **No Interference.** During the Term of this Agreement, Owner covenants and agrees that neither Owner nor its agents, lessees, invitees, guests, licensees, successors or assigns will (i) interfere with, impair or prohibit the free and complete use and enjoyment by Operator of all rights granted by this Agreement; (ii) take any action which will interfere with or impair the availability, accessibility, flow, frequency, or direction of air and wind over and above the Owner's Property; (iii) take any action which will in any way interfere with or impair the transmission of electric, electromagnetic or other forms of energy to or from the Owner's Property; or (iv) take any action which will interfere with or impair Operator's access to the Owner's Property and the Operator Property for the purposes specified in this Agreement.

11.7 **Care and Appearance.** Operator, in its exercise of the easement and other rights granted hereunder shall, at all times, maintain the Improvements in a reasonably neat, clean and presentable condition, consistent with its current usage. Operator shall not willfully or negligently damage or destroy the Owner's Property, but if tiles are damaged, Operator will replace tiles and restore drainage to original condition. Operator shall keep the Owner's Property clean and free of debris created by Operator, its contractors, or others brought on to the Owner's Property by Operator. Operator shall not use the Owner's Property for storage, except for materials, construction equipment and vehicles directly associated with construction or

maintenance of the Improvements on the Owner's Property or adjacent properties that are part of the Wind Farm.

11.8 **Fences and Gates.** Within a reasonable time following Owner's request, Operator shall repair or replace any fences, gates or cattle guards damaged or removed in connection with Operator's activities on the Owner's Property. Fences removed from the Owner's Property, if replaced, shall be re-built by Operator at its expense in mutually agreeable locations. All fences, gates, and cattle guards that need to be replaced by Operator shall be of similar type and materials to the ones removed. Once completed, all replacement fences, gates and cattle guards shall be owned and maintained by Owner. To minimize the need for temporary fencing, Owner will cooperate with Operator to avoid pasturing animals on or near the Improvements during periods of construction, maintenance or removal activity by Operator.

11.9 **Roadway Maintenance and Repairs.** Operator agrees to maintain and repair all Roadway Improvements located on the Access Easement for the joint use thereof by Operator and Owner for ingress and egress over, across, and along the Access Easement; provided, however, Owner shall reimburse Operator for any costs and expenses incurred by Operator to repair any damage or perform any special maintenance of the roadway caused by Owner or any person using the roadway with Owner's permission, other than Operator.

12. **Taxes.**

12.1 **Owner's Taxes.** Owner covenants and agrees to pay prior to delinquency all real and personal property and other taxes, general and special assessments, and other charges of every description ("**Taxes**") levied or assessed against the Owner's Property and all improvements thereon by governmental authorities, other than Operator's Taxes referenced in Section 12.2 (Taxes, excepting Operator's Taxes, "**Owner's Taxes**").

12.2 **Operator's Taxes.** Subject to timely receipt from Owner of the relevant statement for Taxes pursuant to this Section 12.2, Operator shall pay to Owner prior to delinquency the amount of any increase in the Taxes levied against the Owner's Property attributable to the taxable value of the Operator Property ("**Operator's Taxes**"). Operator shall not be responsible for Taxes attributable to improvements installed by Owner or others on the Owner's Property. Owner shall submit the annual statement for Taxes to Operator within a reasonable time after the date Owner receives the statement from the taxing authority. Operator may elect to have the statement for Taxes sent directly to Operator. In such event, Operator shall pay all Operator's Taxes to the appropriate taxing authority prior to delinquency, and Owner shall pay to Operator Owner's Taxes prior to delinquency (or Operator may pay Owner's Taxes and offset such amount against the Payments). If Operator receives such statement directly, Operator shall submit a copy of the statement for Taxes to Owner within thirty (30) days after the date Operator receives the statement from the taxing authority.

12.3 **Failure to Pay.** In the event either Party fails to pay their share of Taxes prior to delinquency, the other Party shall have the right to pay such Taxes and any accrued penalties or interest, which payments shall increase or be offset against other Payments due under this Agreement.

12.4 **Operator's Right to Contest.** Operator may contest the legal validity or amount of any Operator's Taxes for which it is responsible under this Agreement, and may institute such proceedings as it considers necessary, provided that Operator shall bear all expenses in pursuing such contest or proceeding. With respect to any Taxes which may constitute a lien on the Owner's Property, Operator shall promptly pay such Taxes unless the proceeding in which it contests such Taxes shall operate to prevent or stay the collection of the Taxes so contested or unless Operator removes any such lien by bonding or otherwise. Owner agrees to render to Operator all reasonable assistance in contesting the validity or amount of any such Taxes, including joining in the signing of any reasonable protests or pleading which Operator may deem advisable to file; provided, however, that Operator shall reimburse Owner for its reasonable out-of-pocket expenses, including reasonable attorneys' fees incurred in connection with providing such assistance.

13. **Mortgage of Operator Property.**

13.1 **Right to Mortgage.** Operator may, upon notice to Owner, but without requiring Owner's consent or approval, mortgage, collaterally assign, or otherwise encumber and grant security interests in all or any part of its interest in the Operator Property. These various security interests in all or a part of the Operator Property are collectively referred to as an "**Operator Mortgage**" and holder of such security interest, an "**Operator Mortgagee.**" Any Operator Mortgagee shall use the Operator Property only for the uses permitted under this Agreement. Whenever Operator has granted a security interest under this Section 13, it will give Owner notice of the Operator Mortgage (including the name and address of the Operator Mortgagee for notice purposes) to Owner; provided that failure to give this notice shall not constitute a default under this Agreement, but rather shall only have the effect of not binding Owner to provide such Operator Mortgage notice until the Operator and its address is given to Owner.

13.2 **Notice of Default and Opportunity to Cure.** As a precondition to exercising any rights or remedies related to any alleged default by Operator under this Agreement, Owner shall give written notice of the default to each Operator Mortgagee at the same time it delivers notice of default to Operator, specifying in detail the alleged event of default and the required remedy. Each Operator Mortgagee shall have the right to cure any default as Operator, and/or the right to remove any Improvements or other property owned by Operator or such Operator Mortgagee located on the Owner's Property to the same extent as Operator. The cure period for any Operator Mortgagee shall be the later of (i) the end of the Operator cure period; (ii) thirty (30) days after such Operator Mortgagee's receipt of the default notice; or (iii) if applicable, the extended cure period provided for in Section 13.3. Failure by Owner to give an Operator Mortgagee notice of default shall not diminish Owner's rights against Operator, but shall preserve all rights of the Operator Mortgagee to cure any default and to remove any Improvements or other property of Operator or the Operator Mortgagee located on the Owner's Property.

13.3 **Extended Cure Period.** If any default by Operator under this Agreement cannot be cured without the Operator Mortgagee obtaining possession of all or part of the Operator Property, then any such default shall be deemed remedied if an Operator Mortgagee: (i) within sixty (60) days after receiving notice from Owner as set forth in Section 13.2, acquires possession of all or part of the Operator Property, or begins appropriate judicial or nonjudicial proceedings to obtain the same; (ii) diligently prosecutes any such proceedings to completion;

and (iii) after gaining possession of all or part of the Operator Property performs all other obligations as and when the same are due in accordance with the terms of this Agreement. If an Operator Mortgagee is prohibited by any court or by operation of any bankruptcy or insolvency laws from commencing or prosecuting the proceedings described above, the sixty (60) day period specified above for commencing proceedings shall be extended for the period of such prohibition.

13.4 **Operator Mortgagee Liability.** Any Operator Mortgagee whose interest in the Operator Property is held solely for security purposes, shall have no obligation or liability under this Agreement unless and until the Operator Mortgagee succeeds to absolute title to the Operator Property and the rights of Operator under this Agreement. An Operator Mortgagee shall be liable to perform obligations under this Agreement only for and during the period it directly holds such absolute title.

13.5 **Certificates & Other Documents.** Owner shall execute any estoppel certificates (certifying as to truthful matters, including without limitation that no default then exists under this Agreement, if such be the case), consents to assignment and non-disturbance agreements as Operator or any Mortgagee may reasonably request from time to time. Owner and Operator shall cooperate in amending this Agreement from time to time to include any provision that may be reasonably requested by Operator or any Operator Mortgagee to implement the provisions contained in this Agreement or to preserve an Operator Mortgagee's security interest.

13.6 **Operator Mortgagee's Right to Enforce Mortgage & Assign.** Each Operator Mortgagee shall have the right, in its sole discretion: (i) to assign its Operator Mortgage; (ii) to enforce its lien and acquire title to all or any portion of the Operator Property by any lawful means; (iii) to take possession of and operate all or any portion of the Operator Property and to perform all obligations to be performed by Operator under this Agreement, or to cause a receiver to be appointed to do so; and (iv) to acquire all or any portion of the Operator Property by foreclosure or by an assignment in lieu of foreclosure and thereafter, without Owner's consent, to assign or transfer all or any portion of the Operator Property to a third party. Any Operator Mortgagee or other party who acquires Operator's interest in the Operator Property pursuant to foreclosure or assignment in lieu of foreclosure shall not be liable to perform the obligations imposed on Operator by this Agreement which are incurred or accruing after such Operator Mortgagee or other party no longer has ownership or possession of the Operator Property.

13.7 **New Agreement.** If the Operator Property is foreclosed upon or there is an assignment in lieu of foreclosure, or if this Agreement is rejected or disaffirmed pursuant to bankruptcy law or other law affecting creditor's rights and, within ninety (90) days after such event, Operator or any Operator Mortgagee or other purchaser at a foreclosure sale shall have arranged to the reasonable satisfaction of Owner for the payment of all Annual Installment Payments or other charges due and payable by Operator as of the date of such event, then Owner shall execute and deliver to Operator or such Operator Mortgagee or other purchaser at a foreclosure sale, or to a designee of one of these parties, as the case may be, a new agreement ("New Agreement") which (i) shall be for a term equal to the remainder of the Term of this Agreement before giving effect to such rejection or termination; (ii) shall contain the same covenants, agreements, terms, provisions and limitations as this Agreement (except for any requirements that have been fulfilled by Operator or any Operator Mortgagee or other purchaser at a foreclosure sale prior to rejection or termination of this Agreement); and (iii) shall include

that portion of the Operator Property in which Operator or such other Operator Mortgagee or other purchaser at a foreclosure sale had an interest on the date of rejection or termination. If more than one Operator Mortgagee makes a written request for a New Agreement pursuant to this provision, the New Agreement shall be delivered to the Operator Mortgagee requesting such New Agreement whose Operator Mortgage has lien priority, and the written request of any other Operator Mortgagee whose lien is subordinate shall be void and of no further force or effect. The provisions of this Section 13.7 shall survive the termination, rejection or disaffirmation of this Agreement and shall continue in full force and effect thereafter to the same extent as if this Section 13.7 were a separate and independent contract made by Owner, Operator and each Operator Mortgagee, and, from the effective date of such termination, rejection or disaffirmation of this Agreement to the date of execution and delivery of such New Agreement, such Operator Mortgagee or other purchaser at a foreclosure sale may use and enjoy the Operator Property without hindrance by Owner or any person claiming by, through or under Owner; provided that all of the conditions for the New Agreement as set forth above are complied with.

13.8 **Operator Mortgagee's Consent to Amendment, Termination or Surrender.** Notwithstanding any provision of this Agreement to the contrary, the Parties agree that so long as any Operator Mortgage remains outstanding, this Agreement shall not be modified or amended, and Owner shall not accept a surrender, cancellation or release of all or any part of the Operator Property from Operator, prior to expiration of the Term of this Agreement, without the prior written consent of the Operator Mortgagee holding such Operator Mortgage. This provision is for the express benefit of and shall be enforceable by each Operator Mortgagee as if it were a party named in this Agreement.

14. **Assignment and Sublease.** Operator shall have the right, without Owner's consent, to sell, convey, lease, grant an easement, or assign all or any portion of the Operator Property, on either an exclusive or a non-exclusive basis, or to grant subleases, co-leases, sub-easements, licenses or similar rights with respect to the Operator Property (collectively, "**Assignment**"), to one or more persons or entities (collectively "**Assignee**"). Each Assignee shall use the Operator Property only for the uses permitted under this Agreement. When Operator makes any Assignment under this Section 14, Operator shall give notice to Owner of such Assignment (including the interest conveyed by the Assignment and address of the Assignee for notice purposes) to Owner; provided Operator's failure to give such notice shall not constitute a default under this Agreement, but rather shall only have the effect of not binding Owner with respect to such assignment or conveyance until such notice is given. Any Assignment by Operator shall release Operator from obligations subject thereof accruing after the date that liability for such obligations is assumed by the Assignee.

15. **Hazardous Materials.**

15.1 **Owner's Covenants Regarding Hazardous Materials.** Owner represents and warrants that, to the best of Owner's knowledge, the Owner's Property is not and has not been in violation of any federal, state or local environmental health or safety laws, statute, ordinance, rule, regulation or requirement ("**Environmental Laws**"), and Owner has not received any notice or other communication from any governmental authorities alleging that the Owner's Property is in violation of any Environmental Laws. "**Hazardous Materials**" shall mean any asbestos containing materials, petroleum, explosives, toxic materials, or substances regulated as hazardous wastes, hazardous materials, hazardous substances, or toxic substances under any

federal, state, or local law or regulation. Owner represents and warrants that, except as disclosed to Operator in writing, to the best of Owner's knowledge, no underground storage tanks and no Hazardous Materials are or were located on the Owner's Property during or prior to Owner's ownership of the Owner's Property. Owner shall not violate in a material way any Environmental Law relating to the Owner's Property.

15.2 **Operator's Covenants Regarding Hazardous Materials.** Operator shall, at Operator's sole cost and expense, promptly take removal or remedial action required by Environmental Law with regard to any material violation of any Environmental Law with regard to any Hazardous Materials brought onto the Owner's Property by Operator or its employees, agents, or contractors. Owner shall cooperate with Operator with regard to any scheduling or access to the Owner's Property in connection with any action required hereunder.

15.3 **Operator's Indemnity Regarding Hazardous Materials.** Operator shall indemnify, defend, protect and hold Owner harmless from any liability based on: (i) the release of Hazardous Materials in, on, under or about the Owner's Property caused by Operator or its employees, agents, or contractors, or (ii) the violation by Operator or its employees, agents, or contractors of any Environmental Law. The indemnity obligations set forth herein shall be in addition to those set forth in Section 16, and shall survive termination of this Agreement.

16. **Indemnity.**

16.1 **Indemnity by Operator.** Operator shall defend, indemnify, protect and hold Owner harmless from and against all liabilities, costs, expenses, obligations, losses, damages, claims, including reasonable attorneys' fees (collectively "**Liability**"), resulting from the negligence, willful misconduct, or breach of this Agreement by Operator, its agents, contractors or employees, invitees, licensees and permittees; provided, however, that such Liability is not due to any negligence, willful misconduct, or breach by Owner, its agents, contractors or employees, invitees, licensees or permittees.

16.2 **Indemnity by Owner.** Owner shall defend, indemnify, protect, and hold Operator harmless from and against all Liability resulting from the negligence, willful misconduct, or breach of this Agreement by Owner, its agents, contractors or employees, invitees, licensees and permittees; provided, however, that such Liability is not due to any negligence, willful misconduct, or breach by Operator, its agents, contractors, employees, invitees, licensees, or permittees.

16.3 **Survival.** The obligations of the Parties under this Section 16 shall survive expiration or other termination of this Agreement.

17. **Confidentiality.** This Agreement includes confidential and proprietary information relating to Operator and the Wind Farm. In addition, from time to time operator may deliver to owner additional confidential and proprietary information relating to the Wind Farm ("**Additional information**"). Subject to any applicable state or federal law, Owner agrees not to provide copies of the Agreement or additional information or disclose the terms of the Agreement or additional information, in whole or in part, to any person or entity, except as expressly authorized in this Section 17. Operator authorizes Owner to provide copies of the Agreement and additional information and disclose the terms thereof to Owner's family,

attorney, accountant, financial advisor and any existing or prospective mortgagee, lessee, or purchaser, so long as they likewise agree not to provide copies of the Agreement or additional information or disclose the terms thereof to any unauthorized person or entity.

18. **Default and Remedies.**

18.1 **Operator Payment Default.** If Operator shall fail to pay any amounts set forth in **Exhibit D** which failure continues for more than thirty (30) days from receipt of written notice from Owner that such amount is due, then Operator shall be in default (“**Operator Payment Default**”) and Owner shall have the following remedies:

18.1.1 **Collection of Payments.** With or without terminating this Agreement, Owner may file a lawsuit against Operator to collect any unpaid amounts set forth in **Exhibit D** together with interest thereon that accrues during the continuance of the Operator Payment Default, calculated at a rate (“**Default Rate**”), which is the lesser of (i) the prime interest rate at The Chase Manhattan Bank (or its successor) plus two percent (2%) per annum, or (ii) the maximum lawful rate. Owner shall also be entitled to recover all court costs and reasonable attorneys’ fees that may be incurred by Owner in collecting such amounts.

18.1.2 **Terminate Agreement.** Owner may not terminate this Agreement because of any Operator Payment Default without first giving Operator written notice of its intention to terminate the Agreement (“**Termination Notice**”), to be effective on a date to be specified by Owner that is at least thirty (30) days after the date of the Termination Notice. If, by the date specified in the Termination Notice, Operator fails to pay the amount required to cure the Operator Payment Default (including interest at the Default Rate that accrues during the continuance of the Operator Payment Default, Owner’s termination of this Agreement shall become effective on the date specified in the Termination Notice. Upon such termination, the Parties shall be relieved of all further duties and obligations under this Agreement, other than (i) the payment of any accrued and unpaid obligations owed by either Party as of the date of termination (including the amount owed by Operator with respect to the Operator Payment Default and interest payable with respect thereto); (ii) the removal of the Improvements by Operator pursuant to Section 8.9; and (iii) any other obligations and liabilities that are expressly stated in this Agreement to survive such termination. Owner’s right to terminate this Agreement pursuant to this Section 18.1.2 is subject to and conditioned upon Owner giving any Operator Mortgagee written notice and opportunity to cure the Operator Payment Default as provided in Section 13.2.

18.2 **Other Operator Default.** The breach by Operator of any provision hereof, other than an Operator Payment Default as set forth in Section 18.1 (“**Other Operator Default**”), may only result in a cause of action by Owner under applicable law and, other than as set forth in this Section 18.2. Owner hereby waives all other rights it may have, in law or in equity, to terminate this Agreement prior to the expiration of the Term. In the event of any such breach by Operator, Owner shall, at least thirty (30) days prior to commencing any cause of action, give written notice of the cause of breach to Operator, and any Operator Mortgagee (of which it has been notified in writing) concurrently, specifying in detail the alleged event of breach and the required remedy; provided, however, that if the nature or extent of the obligation is such that more than thirty (30) days is required, in the exercise of commercially reasonable diligence, for performance of such obligation(s), then the Operator shall not be in default if it commences such

performance within such thirty (30) day period and thereafter pursues the same to completion with commercially reasonable diligence. If Operator does not cure or commence curing such breach within thirty (30) days of receipt of notice, the Operator Mortgagee shall have the absolute right to substitute itself for Operator and perform the duties of Operator hereunder for the purposes of curing such breach. Owner expressly consents to such substitution, agrees to accept such performance, and authorizes the Operator Mortgagee (or its employees, agents, representatives or contractors) to enter upon the Owner's Property to complete such performance with all the rights, privileges and obligations of Operator hereunder. Owner may cure any default by Operator after Operator's cure period has expired. If Owner at any time by reason of Operator's default, pays any sum or performs any act that requires the payment of any sum, the sum paid by Owner shall be due immediately from Operator to Owner, together with interest on such sum calculated at the Default Rate.

18.3 **Owner Default.** Owner shall be in default of this Agreement if it shall fail to meet any of its obligations under the terms of this Agreement and shall not cure such default within thirty (30) days after receiving notice thereof from Operator (or if such default cannot be cured through the exercise of reasonable diligence within such thirty (30) day period, if Owner fails to commence corrective action within such thirty (30) day period and thereafter diligently prosecutes same to completion) ("**Owner Default**"). Upon the occurrence of an Owner Default, Operator shall have the option to pursue any one or more of the following remedies without any further notice or demand whatsoever: (i) terminate this Agreement without being liable for prosecution or any claim of damages therefor; and (ii) pursue any and all other action or remedies that may be available to Operator at law or in equity, including but not limited to all loss or damage which Operator may suffer by reason of a termination of this Agreement and the loss of the value of the Operator Property.

19. **Notice.**

19.1 **Writing.** All notices given or permitted to be given hereunder shall be in writing.

19.2 **Delivery.** Notice is considered given either (i) when delivered in person to the recipient named below, (ii) three days after deposit in the United States mail in a sealed envelope or container, postage and postal charges prepaid, return receipt requested or certified mail, addressed by name and address to the party or person intended, or (iii) twenty-four (24) hours from proper and timely delivery to an overnight courier service addressed by name and address to the party or person intended as follows:

Notice to Owner: [NAME AND ADDRESS]
Telephone:

Notice to Operator: Crowned Ridge Wind II, LLC
700 Universe Boulevard
Juno Beach, FL 33408-2657
Attention: Land Services
Phone: (855) 552-9872

19.3 **Change of Recipient or Address.** Either party may, by notice given at any time or from time to time, require subsequent notices to be given to another individual person,

whether a party or an officer or representative, or to a different address, or both. Notices given before actual receipt or notice of change shall not be invalidated by the change.

20. **Miscellaneous Provisions.**

20.1 **Successors & Assigns.** The terms and provisions of this Agreement shall run with the land and be binding on and inure to the benefit of the heirs, successors, assigns and personal representatives of the Parties. Operator in its discretion may authorize other persons or entities to use the Operator Property for the purposes stated in this Agreement.

20.2 **Memorandum.** Simultaneously with the execution of this Agreement, Owner and Operator agree to execute and acknowledge a memorandum of this Agreement satisfactory in form and substance to Operator and Owner. Owner consents to the recordation of the memorandum in the public records of the county where the Owner's Property is located.

20.3 **Entire Agreement.** This Agreement and the attached Exhibits shall constitute the entire agreement between the Parties and supersedes all other prior writings and understandings.

20.4 **Amendments.** This Agreement shall not be amended or modified in any way except by an instrument signed by Owner and Operator and consented to by any Operator Mortgagee. The Parties hereto shall at all times hereafter execute any documents and do any further acts which may be necessary or desirable to carry out the purposes of this Agreement and to give full force and effect to each and all of the provisions hereof.

20.5 **Legal Matters.** This agreement shall be governed by and interpreted in accordance with the then existing laws of the State of South Dakota and the County where the Owner's Property is located shall be considered the proper forum or jurisdiction for any disputes arising in connection with this Agreement. The parties agree to first attempt to settle any dispute arising out of or in connection with this Agreement by good-faith negotiation. If the Parties are unable to resolve amicably any dispute arising out of or in connection with this Agreement, each shall have all remedies available at law or in equity including attorney's fees awarded to the prevailing party. **Each Party waives all right to trial by jury and specifically agrees that trial of suits or causes of action arising out of this Agreement shall be to the court of competent jurisdiction.** Time is of the essence with regard to the terms and conditions of this Agreement.

20.6 **Severability.** If any term or provision of this Agreement, or the application thereof to any person or circumstance shall, to any extent, be determined by judicial order or decision to be invalid or unenforceable, the remainder of this Agreement or the application of such term or provision to persons or circumstances other than those as to which it is held to be invalid, shall be enforced to the fullest extent permitted by law. In the event it was determined by Operator that the rights of the parties hereto under this Agreement were to become unenforceable due to the effect of Article XVII, Sections 21-24 of the South Dakota Constitution, the parties agree to amend this Agreement or modify the rights granted herein in order to comply with all applicable laws and to grant to Operator the rights to the extent necessary to construct, operate and maintain the Improvements as contemplated herein.

20.7 **Tax Credits.** If under applicable law Operator becomes ineligible for any tax credit, benefit or incentive for alternative energy expenditure established by any local, state or federal government, then, at Operator's option, Owner and Operator shall amend this Agreement or replace it with a different instrument so as to convert Operator's interest in the Operator Property to a substantially similar interest that makes Operator eligible for such tax credit, benefit or incentive, so long as Owner's interests are not impaired.

20.8 **Approvals.** Whenever in this Agreement the approval or consent of either Party is required or contemplated, unless otherwise specified, such approval or consent shall not be unreasonably withheld or delayed.

20.9 **Counterparts.** This Agreement may be executed in multiple counterparts, each of which shall be deemed an original, and all of which together shall constitute a single instrument.

20.10 **Option to Convert.** During the Term of the Leases and Easements granted herein, Owner grants to Operator the option to convert the Leases herein contained to easements, or the Easements to leases, as determined by Operator in its sole discretion. Operator may exercise such option by giving the Owner thirty (30) days written notice of its intent to exercise such option. The terms and conditions of such easements and/or leases shall be the same as the terms and conditions of the Leases and Easements, including the annual payments as set forth in **Exhibit D** of this Agreement.

[SIGNATURES ON FOLLOWING PAGE]

Owner:

[NAME]

[NAME]

Operator:

Crowned Ridge Wind II, LLC
a Delaware limited liability company

By: _____
Jason Utton
Authorized Representative

EXHIBIT A-1

Legal Description of Owner's Property

HOLDING PAGE FOR EXHIBIT A-2

**Legal Description of Wind Non-Obstruction Easement Property and Description of Wind
Non-Obstruction Easement in Vertical and Horizontal Angles & Legal Description of Real
Property Benefiting from Wind Non-Obstruction Easement
To be Delivered with Option Notice**

HOLDING PAGE FOR EXHIBIT B

Preliminary Lease & Easement Plan
To be Delivered with Option Notice

HOLDING PAGE FOR EXHIBIT C

As Built Lease & Easement Plan

[REDACTED]

[REDACTED]

[REDACTED]

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

IN THE MATTER OF THE APPLICATION)
BY CROWNED RIDGE WIND II, LLC FOR)
A PERMIT OF A WIND ENERGY)
FACILITY IN DEUEL, GRANT)
AND CODINGTON COUNTIES)

EL19-027

) **APPLICANT'S RESPONSES TO**
) **STAFF'S SECOND SET OF DATA**
) **REQUESTS TO APPLICANT**

- 2-1) Referring to Crowned Ridge's response to Staff data request 1-15 and the supplemental testimony of Tyler Wilhelm, please identify the project facilities that need to have the three expiring easements renewed. If the landowners choose not to renew the easement, please identify the impact that will have on the project.

Response: Since Crowned Ridge Wind II's filed response to Staff Data Request 1-15 and the supplemental testimony of Tyler Wilhelm, one of the three easement agreements slated to expire prior to construction was renewed. In the event the other two project landowners do not renew their easement agreements prior to expiration, the following are the impacts to the project:

- Turbine location CRII-131 and all associated infrastructure would be removed from the landowner's property and one of the project's alternate turbine locations would be utilized; and
- An underground collection easement would be removed from the landowner's property and the collection easement would be relocated onto adjacent, participating landowner's property located within Section 12, Township 117 N., Range 51 W. and Section 7, Township 117 N., Range 50W.

Respondent: Tyler Wilhelm, Senior Project Manager

- 2-2) Referring to section 9.2.2.1 of the Application, please identify if the soil types observed during Geotech testing are susceptible to erosion. Further, please quantify the construction easement acres that contain erosion-susceptible soil types.

Response: Different types of soil erosion can occur, but the two primary types in the Project Area are water erosion and wind erosion. The U.S. Natural Resources Conservation Service (NRCS) utilizes the Revised Universal Soil Loss Equation (RUSLE2) for estimating soil erosion losses for a specific site or area. Additionally, the NRCS uses the Wind Erosion Protection System (WEPS) computer simulation to predict soil erosion losses due to wind. For the purposes of this data request, the response will focus on water erosion susceptibility of soils within the Construction Easement as it is defined in the Application.

Water erosion involves three processes: (1) generating water runoff due to poor soil infiltration; (2) soil particle detachment by raindrop impacts and/or running water; and, (3) transport of the soil particles by running water. For erosion to occur individual soil particles must be fine enough to move and there must be water running across the surface to pick up these particles.

As outlined below, many factors contribute to the erosion susceptibility of soils, such as vegetative cover, soil type and structure, the slope of the land and the length of slope, and rainfall intensity.

Vegetative cover – bare soils will erode more readily than soils with a vegetative cover, because there is nothing protecting the bare soil from raindrop impacts and water runoff. The more robust the vegetative cover, the more protection it offers.

Soil type and structure – Some soils are more prone to erosion than other soils, all other factors being equal. Soils with poorly structured surfaces that offer little resistance to raindrop impact are easily broken into tiny particles. Fine sands, sandy loams, and loams fall into this category. Soils with impermeable layers at shallow depths allow water to accumulate on top of those layers, which increases the likelihood that runoff will occur. Soils which are well drained because they are deep and sandy, or well structured, have a low risk of water erosion because water rarely runs off. Soils with a granular structure (e.g., sands) resist soil transport by overland flow because the particles are too big and heavy; however, in channel flow or watercourse flow, these soils are very susceptible to erosion, because interparticle coherence is low and the flowing water has sufficient energy to move the granules.

Land slope and length – The slope of the land surface and the length of slope affect the erosion susceptibility of a soil at a location. Steeper slopes tend to increase the volume of water runoff, while longer slopes allow the flowing water to increase in velocity, both of which tend to increase erosion of the soil surface.

Rainfall intensity – Rainfall intensity affects the erosion potential of a soil. When the rainfall intensity is greater than the soil infiltration rate, runoff will generally occur, thereby removing soil particles.

The NRCS has incorporated the above factors into the development of the Hydrologic Soil Groups that contain erosion-susceptible soil types:

Group A – sand, loamy sand or sandy loam soils, with low runoff potential and high infiltration rate, even when thoroughly wetted. These soils are primarily deep, well- to excessively- drained sands or gravels and have a high rate of water transmission. This group has the lowest runoff potential.

Group B – silt loam or loam soils, with moderately fine to moderately coarse textures, and a moderate infiltration rate, when thoroughly wetted. These soils are primarily moderately deep to deep, moderately well to well drained.

Group C – sandy clay loam soils, with low infiltration rates when thoroughly wetted. These soils typically have a layer that impedes downward movement of water and the soils have a moderately fine to fine structure.

Group D – clay loam, silty clay loam, sandy clay, silty clay or clay soils, with very low infiltration rates when thoroughly wetted. These are primarily clay soils with a high swelling potential, soils with a permanent high water table, soils with a claypan or clay layer at or near the surface and shallow soils over nearly impervious material. This group has the highest runoff potential.

A review of the geotechnical boring logs and NRCS Soil Survey Geographic Database (SSURGO) soils data reveals the following breakdown of Hydrologic Soil Groups within the Construction Easement:

Hydrologic Soil Group*	Acres	Percent
A	2.81	0.15
B	145.85	7.58
B/D	27.06	1.41
C	1,554.16	80.74
C/D	195.05	10.13
Total	1,924.93	100.00%

* Note: Two Hydrologic Soil Group designations indicates that the soil series can fall into either category, depending the percent slope at a specific location.

As summarized in the foregoing table, the majority (80.74%) of the soils in the Construction Easement fall into Group C, while approximately 9.14% of the soils fall into Group A and Group B, approximately 1.41% fall into Group B and Group D, and between 10.13% fall into Groups C/D. While all of the Hydrologic Soil Group soils are susceptible to erosion, those in Group D will have the greatest potential for erosion. Implementation of erosion and sediment control best management practices during construction as noted in the Application (see Section 2.1, Section 9.2.4, Section 10.1.2, Section 10.2.2, Section 11.3, Section 12.2, Section 15.2), and as required by the Stormwater Pollution Prevention Plan, will be used so that soil erosion and sedimentation are minimized.

Respondent: Sarah Sappington, Consultant

- 2-3) Referring to section 10.2.1 of the Application, since turbines CRII-5 and CRII-79 are located in the Willow Creek and Stray Horse Creek floodplain does CRW II need to obtain a floodplain development permit? Please explain.

Response: The Application, Section 10.2.1.4, states: As shown on Figure 12, Willow Creek and Stray Horse Creek cross the Project Area and both have FEMA Flood Zone A associated with them. *One tower (CRII-79) is located in the Willow Creek floodplain and 2 towers (CRII-5 and CRII-79) are located in the Stray Horse Creek floodplain.* The Project Construction Easement crosses Willow Creek floodplain once and the Stray Horse Creek three times.” (italics added for emphasis)

By this response, Crowned Ridge Wind, LLC updates the italicized sentence as follows:

Proposed turbine CRII-5 is in the Stray Horse Creek watershed in Deuel County, but is not within a mapped floodplain. Additionally, Deuel County does not have a Floodplain Development Permit program and thus, no floodplain permit is required. Proposed turbine CRII-79 is in the Willow Creek watershed in Codington County, which does have a Floodplain Development Permit program, but the turbine is not within a mapped floodplain, and thus, no permit is required.

Additionally, Crowned Ridge Wind II will avoid placing collection lines in floodplains, where feasible. Where avoidance is not feasible, Crowned Ridge Wind II will bore collection lines within floodplains and will pursue a floodplain permit if needed in Codington County.

Respondent: Sarah Sappington, Consultant

- 2-4) In accordance with ARSD 20:10:22:15 (3), (5), and (6), please confirm that: 1) there will not be a direct water discharge site for the proposed facility or pipelines/channels required, 2) the facility does not need to store, reprocess, and cool heated water, and 3) deep well injection will not be used.

Response:

- 1) Confirmed, no direct water discharge will be required for this project; however, dewatering of excavations and other areas that hold water may be required. Approval for these activities will be obtained through the state via water discharge permit(s).
- 2) Confirmed, the project does not anticipate the need to store or process water on site.

- 3) Confirmed, no deep well injections will be needed. Water needed for construction activities (typically for dust control and compaction) will be sourced locally and permitted through state water use permit(s). These permit(s) will be obtained before the start of construction.

Respondent: Mark Thompson, Manager Wind Engineering

- 2-5) Referring to Section 11.3.2.3 of the Application, is the intent of the last sentence of the section to state that a *third* year of post-construction may be implemented?

Response: No. The Applicant plans to conduct 2 years of systematic post-construction mortality monitoring to confirm low-risk expectations and to confirm operational trends are consistent with those observed for other projects in the region. The primary objective for post-construction monitoring will be to estimate the mortality rate during operation of the Project.

Respondent: Sarah Sappington, Consultant

- 2-6) Referring to Section 11.3.2.5 of the Application, is the Applicant committing to site turbines 1.5 miles from all eagle nests even if a new eagle nest is found within 1.5 miles of a wind turbine site prior to starting construction in 2020?

Response: Yes. Crowned Ridge Wind commits to siting turbines at least 1.5 miles away from all confirmed active bald eagle nests identified prior to the start of construction.

Respondent: Tyler Wilhelm, Senior Project Manager; Sarah Sappington, Consultant

- 2-7) Referring to Section 11.3.2.5 of the Applications, please explain what is meant by “site turbines with consideration of SDGFP-documented leks.” Did CRW II implement a buffer around SDFP-documented leks? If so, please identify the buffer distance and provide justification for that buffer.

Response: In April 2017, the South Dakota Game, Fish, and Parks (SDGFP) asked that the Applicant consider placing a 1-mile buffer around leks when siting and placing infrastructure. The Applicant sited infrastructure in consideration of avoiding or minimizing impacts to known lek locations to the extent practical. All turbines are sited more than 0.3 miles from known lek locations. We believe this buffer is sufficient because there are existing features and/or disturbances not related to the Project already existing in the project area, including roadways, within 0.3 mile of lek centroids. Given the constraints in the Project Area, the Applicant elected to use a reduced buffer. The SDGFP also recommends that construction during the lekking period (March 1 to June 30) avoid known leks by two miles. The Applicant will follow this recommendation during construction activities, thereby minimizing potential affects to known leks as a result of construction activities. We believe the combination of avoidance of construction during the lekking period and the siting buffer from turbines are sufficient measures to avoid and minimize potential impacts on prairie grouse leks.

Respondent: Sarah Sappington, Consultant

- 2-8) Please quantify the indirect impacts expected to avian species and provide a summary of any expected indirect impacts.

Response: The Applicant is preparing a Wildlife Conservation Strategy (WCS) that will quantify the indirect impacts expected to avian species. The WCS will be filed with the Commission prior to start of construction and will be implemented during construction and operation. Because the WCS is still being prepared, the Applicant does not yet have this quantification at this time. The Application describes the indirect impacts that have potential to occur as a result of the Project. Section 11.1.2, page 48, states “indirect impacts could include the spread of noxious weed species resulting from construction equipment introducing seeds into new areas, or erosion or sedimentation due to ground-clearing in construction areas.” Section 11.3.2.3, page 65, states “Impacts to avian species can be direct (e.g., turbine strike mortality) or indirect (e.g., loss [or] degradation of habitat).” Section 11.3.2.4, page 66, indicates that “Impacts to bat can be direct (e.g., turbine strike mortality) or indirect (e.g., loss or degradation of habitat).” Below is a summary of indirect impacts.

Disturbance/Displacement

In addition to mortality associated with wind farms, concerns have been raised that some bird species may avoid areas near turbines after the wind farm is in operation (Drewitt and Langston 2006). For example, at the Buffalo Ridge wind energy facility in

Minnesota, densities of male songbirds were significantly lower in Conservation Reserve Program (CRP) grasslands containing turbines than in CRP grasslands without turbines though the causal mechanism was not studied (Leddy et al. 1999). Reduced abundance of grassland songbirds was found within 50 meters of turbine pads for a wind farm in Washington and Oregon, and the investigators attributed displacement to the direct loss of habitat or reduced habitat quality and not to the presence of turbines (Erickson et al. 2004). Research at three sites in North and South Dakota (Shaffer and Buhl 2016) suggests that certain grassland songbird species (seven of nine studied; one species was unaffected; one species was attracted) may avoid turbines by as much as 300 meters. Displacement and attraction were observed to continue through the five-year study period. None of these studies have addressed whether these avoidance effects are temporary (i.e., the birds may habituate to the presence of turbines over time) or permanent. Pearce-Higgins et al. (2012) found little evidence for a post-construction decline for ten species of birds at wind projects in upland habitats in the United Kingdom. Project construction activities and the presence of turbines and other Project features may disturb or displace birds, particularly species of habitat fragmentation concern. Some species detected during avian use surveys may breed in the Project Area, suggesting at least some potential for impact to breeding birds. However, the impacts to birds from disturbance or displacement from the Project are likely to be low based on relatively low bird use in the Project area. The heavy agricultural use within the Project Area suggests that the additional disturbance and habitat loss caused by construction and operation of the Project will not cause birds to avoid the Project Area, nor should it alter the current use of habitat by bird species within the Project Area. The risk of disturbance/displacement will be further reduced through avoidance and minimization measures undertaken by the Applicant during the design, construction, and operational phases of the Project. Sharp-tailed grouse and greater prairie-chicken could be affected by Project development if Project infrastructure disturbs or displaces grouse from leks or areas of preferred habitat (grasslands). Current research suggests that certain grouse species may avoid anthropogenic structures (Hagen et al. 2011) but the effect of tall structures on birds is still not well understood (Walters et al. 2014). Males may tolerate various types of disturbance more than females (Connelly et al. 1998). The Project Area, however, is largely used for agricultural purposes and already is disturbed or fragmented in areas surrounding leks, and any impacts to native grassland habitat will be restored with native vegetation (weed-free) seed mixes. The risk of disturbance/displacement further will be reduced through avoidance and minimization measures undertaken during the design, construction, and operational phases of the Project.

Habitat Loss and Fragmentation

Birds, including grassland specialists and prairie grouse species, may be indirectly affected by habitat loss and fragmentation due to Project development. Habitat fragmentation can exacerbate the consequences of habitat loss for birds by decreasing patch area and increasing edge habitat. Habitat fragmentation can reduce bird productivity through increased nest predation and parasitism and reduced pairing success of males (Robinson et al. 1995). However, the increase in the amount of habitat loss and fragmentation as a result of Project construction will be minimized by the use of existing roads to the extent possible and lands already altered by agriculture, as well as restoring any native prairie impacts with native vegetation (weed-free) seed mixes.

Respondent: Sarah Sappington, Consultant

- 2-9) Referring to section 13.2.1, will any turbines be placed on any lands enrolled in CRP or other USDA federal programs? If so, did CRW II get the appropriate authorization from the USDA to place infrastructure on those lands?

Response: Based on the Natural Resources Conservation Service (NRCS) easement layer from the United States Department of Agriculture (USDA), no turbines will be placed on land enrolled in the following USDA programs: (1) Agricultural Conservation Easement Program – Wetland Reserve Easement (ACEP-WRE), (2) Emergency Watershed Protection Program – Floodplain Easement Program (EWPP-FPE), (3) Emergency Watershed Reserve Program (EWRP), (4) Wetlands Reserve Program (WRP), and (5) Grassland Reserve Program (GRP). The USDA Conservation Reserve Program (CRP) is not a part of the NRCS easement layer and it is administered directly between the local USDA Farm Service Agency (FSA) office and participating landowners. For those landowners with turbines and previously enrolled land in the CRP, CRW II will obtain the necessary data and relocate any turbines located on lands enrolled in CRP before construction, such that no turbines will be located on lands enrolled in CRP. CRW II will reimburse the landowner for any additional program costs as a result of removing the land from CRP. CRW II will work with the landowners and with the local FSA office to conduct the necessary surveys for removal of lands from the CRP once all applicable permits have been obtained for the project and commencement of construction is permitted.

Respondent: Tyler Wilhelm, Senior Project Manager

- 2-10) Referring to Section 16 of the Application, please include a discussion on concrete batch plant air emissions and permit requirements. If a batch plant will not be used, then please identify such.

Response: A batch plant will be used on site and an “Air Quality Relocation Permit” will be obtained from the South Dakota Department of Environment and Natural Resources prior to the start work on turbine foundation.

Respondent: Mark Thompson, Manager Wind Engineering

- 2-11) Referring to response to Staff DR 1-6, please identify the turbines that have the Determinations of No Hazard pending at the FAA.

Response: The turbine locations pending Determinations of No Hazard before the FAA are the following locations:

Turbine #
CRII - 74
CRII - 111
CRII - 126
CRII - 129
CRII - 133
CRII - Alt2
CRII - Alt3
CRII - Alt5
CRII - Alt6
CRII - Alt8
CRII - Alt9

Respondent: Tyler Wilhelm, Senior Project Manager

- 2-12) Referring to Appendixes D and E of the Application, please explain how the acoustic detector location point CR2-A (as identified in Appendix D) would accurately identify the species and abundance of bats present in the project area when most of the suitable habitat is on the western edge of the project area (as identified in Appendix E). Further,

please explain why location CR2-A was chosen for the acoustic survey and the suitable habitat was not surveyed as well.

Response: The specific objective of the acoustic surveys was to assess relative bat activity and its variation across seasons for all bats that may be present in habitat where construction of turbines is likely, and then determine if the observed activity is similar to that at operational wind energy facilities in the same region. These objectives are in keeping with the U.S. Fish and Wildlife Service's (USFWS) Wind Energy Guidelines (WEG) recommendations for acoustic bat surveys (USFWS 2012). The WEG recommend placing detectors on meteorological towers within a project area. The CR2-A detector location was the only meteorological tower within Crowned Ridge Wind II Project Area that was available at the time of survey.

It is not possible to determine abundance through acoustic survey, because one bat producing 100 calls is indiscernible from 100 bats producing one call each. Rather, relative activity (i.e., total number of calls divided by the number of nights of survey) is the accepted measure for these types of surveys (e.g., American Wind Wildlife Institute [AWWI] 2018; Hein et al. 2013). These numbers are not reported by individual species, rather they are grouped by all bat activity in order to compare between studies.

Additional acoustic surveys are being conducted adjacent to the forested habitat identified in Appendix E following recent recommendations provided to Crowned Ridge Wind II by USFWS during our ongoing coordination with the agency.

Respondent: Sarah Sappington, Consultant

- 2-13) Referring to Appendix H of the Application, please explain why the western side of the project area did not have any point count surveys conducted in it.

Response: The avian use survey was completed in 2017 for an earlier iteration of the project area, which is shown in the Application Appendix H, Figure 1 ("study area"). Within the study area, SWCA used a spatially balanced sampling design to establish 29 circular point count locations, each with a survey area of 800 meters (m) (2,625 feet) in radius, throughout the study area (Application Appendix H, Figure 1). This sampling method captured the variability in habitat and vegetation conditions, topography, and potential turbine numbers and densities within the study area. The final Project Area boundary extended further west than the avian use survey study area; however, the areas surveyed are representative of the final Project Area.

Respondent: Sarah Sappington, Consultant

- 2-14) Referring to Exhibit JH-S-2 attached to Jay Haley's supplemental testimony, please explain why only 131 receptors (occupied structures) were modeled for Codington County whereas the updated Sound Study, Exhibit JH-S-1, modeled 152 receptors (occupied structures) for Codington County.

Response: All 131 shadow receptors are within the 2 kilometer (km) turbine buffer zone. There are, however, an additional 21 noise receptors that are beyond the 2 km buffer zone. The noise receptors beyond the buffer zone are included in the analysis because they are on a Codington parcel that is within the 2 km buffer. That said, Attachments 1 and 2 to this response have updated JH-S-2 and JH-S-4, respectively, to include the results for 152 shadow receptors in Codington County. The updated results continue to indicate that no shadow flicker receptors will experience more than 30 hours of shadow flicker per year with the exception of CR1-C10-P (Participant) and CR2-C98-NP (Non-Participant) for the 300 MW array and CR2-C98-NP for the 200 MW array as explained in my Direct and Supplement Testimonies.

Respondent: Jay Haley, Wind Engineer

- 2-15) What measures will Crowned Ridge implement in the Wildlife Conservation Strategy (or Bird and Bat Conservation Strategy) to mitigate potential impacts to whooping cranes due to the risk of collisions? Specifically, will Crowned Ridge train its employees to identify whooping cranes and take action if they are near the project area and, if so, what action will those employees take?

Response: The Application, Section 11.3.1.2.6, states the following:

The Project Area is approximately 50 miles east of the 95% core migration corridor (as delineated by Pearse et al. 2018a and 2018b) at its closest, indicating that it is relatively less likely for the species to be present within the Project Area than in areas closer to the migration corridor. According to the USFWS Whooping Crane Tracking Project Database, the closest whooping crane

observation is from 1973, approximately 23.5 miles northwest of the Project Area.

Additionally, a whooping crane habitat desktop assessment was conducted to identify potentially suitable in the Project Area plus a 1-mile buffer (see Section 11.3.1.4.1.2). The assessment found that wetlands considered suitable comprised only 0.2% of the total Project Area (Section 11.3.1.4.2.2).

Crowned Ridge Wind II concludes from the above referenced information that it is relatively less likely for whooping cranes to be present within the Project Area than in areas closer to the migration corridor. However, Crowned Ridge Wind II's Wildlife Conservation Strategy will prescribe that a site-specific worker environmental training plan must be developed and implemented throughout the Project operating life in order to inform workers of the biological resources present on-site, so the impacts can be minimized. All employees and contractors working in the field will be required to attend the environmental training session prior to working on site. This training will include information regarding the sensitive biological resources (with an emphasis on eagles and whooping cranes), restrictions, protection measures, individual responsibilities associated with the Project, and the consequences of non-compliance. Written material will be provided to employees at orientation and participants will sign an attendance sheet to document their participation.

Respondent: Sarah Sappington, Consultant

- 2-16) Referring to receptor CR2-D221-NP in the Final Sound and Shadow Flicker studies, the receptor coordinates appear to be on the west side of the residence. Please explain what impact there is to the modeled sound level and shadow flicker duration if the receptor coordinates are changed to the east side of the residence and closer to turbine CR11-60.

Response: The following are the results when receptor is moved to east side of home.

Receptor	UTM NAD83 Zone 14		Noise (dBA)	Shadow Flicker (hr/yr)
	Easting (m)	Northing (m)		
CR2-D221-NP	670,365.59	4,973,541.32	42.9	14:22

Respondent: Jay Haley, Wind Engineer

- 2-17) The sound and shadow flicker results for receptor CR1-C29-NP appear to account for turbines CR1-67 and CR1-68. Since construction is underway for the first 200 MWs of Crowned Ridge I, please provide the current plans for turbines CR1-67 and CR1-68 and when Crowned Ridge I will know if those alternate turbines will be need to be constructed.

Response: Crowned Ridge Wind turbine locations CR1-67 and CR1-68 are designated as alternate turbine locations, and, currently, Crowned Ridge Wind has no plans to consider these locations as primary turbine locations. The potential for these turbines to be utilized as primary turbine locations cannot be ruled out until all primary turbine locations have been cleared of potential constructability concerns and all foundations have been poured which is expected to be completed November 20, 2019.

Respondent: Tyler Wilhelm, Senior Project Manager

- 2-18) Please verify that turbine CR11-64 is at least 1-mile away from the Kranzburg City Limits, particularly the northeast corner of the city limits in the NW $\frac{1}{4}$ of the NE $\frac{1}{4}$ of Section 1, Township 116N, Range 51W.

Response: Turbine CR11-64 is located 5,288 feet from the Kranzburg City Limit identified as the NW $\frac{1}{4}$ of the NE $\frac{1}{4}$ of Section 1, Township 116N, Range 51W. Attachment 1 is a map that shows the setback distance of turbine CR11-64 from the Kranzburg City Limit.

Respondent: Tyler Wilhelm, Senior Project Manager

Table C-1: Crowned Ridge II 300 MW Shadow Flicker Tabular Results Sorted by Receptor ID

Realistic case shadow results at occupied structures

Results using GE 2.3-116-90 m HH, GE 2.1-116-80 m HH WTG's

UTM NAD83 Zone 14

Codington County

Receptor ID	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)	7/9/19 App. J Real Case Results	Distance to Nearest Turbine (ft)
CR2-C1-NP	Non-P	662,198.00	4,980,622.00	591.0	3:51	3:51	1,909
CR2-C2-NP	Non-P	662,238.00	4,980,604.00	590.9	1:03	1:03	1,880
CR2-C3-NP	Non-P	664,345.00	4,964,571.00	556.0	0:00	0:00	7,497
CR1-C4-NP	Non-P	659,744.00	4,984,749.00	606.0	0:00	0:00	5,981
CR1-C5-NP	Non-P	659,958.00	4,984,794.00	604.8	0:00	0:00	5,659
CR1-C7-NP	Non-P	660,893.00	4,984,861.00	593.2	0:00	0:00	3,022
CR2-C7-NP	Non-P	665,694.00	4,966,179.00	570.0	0:00	0:00	4,409
CR1-C8-P	Participant	660,532.00	4,984,445.00	599.4	0:00	0:00	3,740
CR1-C9-NP	Non-P	665,352.00	4,985,004.00	609.0	18:09	18:08	2,280
CR1-C10-P	Participant	663,510.00	4,985,195.00	609.0	38:20	38:22	1,634
CR2-C10-NP	Non-P	665,189.00	4,966,505.00	570.0	0:00	0:00	2,438
CR1-C11-P	Participant	664,111.00	4,985,679.00	609.0	10:27	10:27	1,860
CR1-C12-NP	Non-P	662,222.00	4,985,736.00	603.0	17:08	17:08	2,201
CR1-C12-1-NP	Non-P	662,199.00	4,986,047.00	606.0	10:34	10:34	2,818
CR1-C13-NP	Non-P	663,792.00	4,985,785.00	612.0	18:58	18:16	2,589
CR1-C15-NP	Non-P	663,291.00	4,986,026.00	615.0	2:16	2:20	2,175
CR2-C16-NP	Non-P	665,418.00	4,966,866.00	567.0	7:30	7:29	2,756
CR1-C16-NP	Non-P	661,960.00	4,986,288.00	606.0	6:17	6:17	2,648
CR1-C18-P	Participant	663,651.00	4,987,157.00	610.4	5:58	5:58	3,409
CR1-C20-P	Participant	663,054.00	4,987,455.00	606.0	14:38	14:38	2,336
CR1-C21-P	Participant	660,756.00	4,984,086.00	594.0	1:00	1:00	2,388
CR1-C22-P	Participant	660,755.00	4,984,082.00	594.0	1:01	1:01	2,375
CR2-C22-NP	Non-P	661,202.00	4,972,711.00	597.0	0:00	0:00	6,247
CR2-C23-NP	Non-P	664,069.00	4,969,661.00	594.0	0:58	0:58	4,439
CR1-C23-P	Participant	660,619.00	4,984,078.00	595.8	0:00	0:00	2,523
CR1-C24-NP	Non-P	660,176.00	4,983,887.00	601.1	7:45	7:45	3,038
CR2-C24-NP	Non-P	661,541.00	4,969,653.00	600.0	3:21	3:21	3,809
CR1-C25-P	Participant	660,189.79	4,983,788.29	602.3	6:43	6:43	2,838
CR2-C26-P	Participant	664,733.00	4,968,915.00	591.0	6:09	6:09	1,959
CR2-C27-P	Participant	662,985.00	4,968,167.00	582.0	18:06	18:06	1,726
CR1-C28-NP	Non-P	665,429.00	4,988,598.00	590.9	2:43	2:43	2,831
CR2-C28-P	Participant	659,208.00	4,968,159.00	572.8	0:00	0:00	5,630
CR1-C29-NP	Non-P	666,572.00	4,988,867.00	575.9	6:54	*	2,457
CR2-C29-NP	Non-P	661,223.00	4,968,144.00	595.2	0:00	0:00	4,639
CR2-C30-NP	Non-P	659,100.00	4,968,023.00	568.6	0:00	0:00	5,502
CR1-C31-NP	Non-P	665,939.00	4,988,950.00	585.4	0:00	0:00	2,126
CR2-C31-P	Participant	663,117.00	4,972,923.00	606.0	0:00	0:00	7,579
CR2-C32-P	Participant	659,469.00	4,967,984.00	575.2	0:00	0:00	4,678
CR2-C33-P	Participant	663,878.00	4,967,612.00	576.1	2:28	2:28	2,999

* Not included in original submittal

Table C-1: Crowned Ridge II 300 MW Shadow Flicker Tabular Results Sorted by Receptor ID

Realistic case shadow results at occupied structures

Results using GE 2.3-116-90 m HH, GE 2.1-116-80 m HH WTG's

UTM NAD83 Zone 14

Codrington County

continued

Receptor ID	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)	7/9/19 App. J Real Case Results	Distance to Nearest Turbine (ft)
CR2-C34-P	Participant	663,934.00	4,966,991.00	570.1	14:11	14:11	2,133
CR2-C35-NP	Non-P	658,964.00	4,974,334.00	566.8	0:00	0:00	4,432
CR2-C36-NP	Non-P	660,475.00	4,974,426.00	578.6	8:20	8:20	2,992
CR2-C37-NP	Non-P	663,037.00	4,974,496.00	606.0	9:34	9:34	3,537
CR2-C38-NP	Non-P	660,874.00	4,966,929.00	585.5	25:57	25:57	1,906
CR2-C39-NP	Non-P	664,089.00	4,966,486.00	566.2	2:27	2:27	2,178
CR2-C40-NP	Non-P	659,189.00	4,974,765.00	578.3	1:38	1:38	2,841
CR2-C41-P	Participant	660,770.00	4,975,147.00	596.4	17:22	17:22	1,532
CR2-C42-NP	Non-P	664,887.00	4,975,388.00	597.0	12:14	12:14	3,566
CR2-C43-NP	Non-P	664,382.00	4,975,544.00	597.0	1:42	1:42	4,232
CR2-C44-NP	Non-P	659,145.00	4,966,062.00	561.4	0:43	0:43	4,183
CR2-C45-P	Participant	664,058.00	4,965,862.00	570.0	4:12	4:12	3,907
CR2-C46-NP	Non-P	660,435.00	4,965,627.00	582.0	12:08	12:08	2,569
CR2-C47-NP	Non-P	662,200.00	4,975,837.00	594.5	9:41	7:58	2,821
CR2-C48-NP	Non-P	662,370.00	4,965,588.00	590.3	19:13	19:13	2,172
CR2-C49-NP	Non-P	660,907.00	4,964,846.00	582.0	6:36	6:36	3,271
CR2-C50-P	Participant	661,252.00	4,976,035.00	597.0	19:23	4:15	1,696
CR2-C51-NP	Non-P	662,977.00	4,964,794.00	584.0	4:41	4:41	3,934
CR2-C52-NP	Non-P	662,688.00	4,964,792.00	585.9	14:32	14:32	3,054
CR2-C53-NP	Non-P	662,401.00	4,964,782.00	582.0	0:00	0:00	2,257
CR2-C54-NP	Non-P	662,636.00	4,976,079.00	597.0	12:36	12:36	2,287
CR2-C55-NP	Non-P	660,765.00	4,964,777.00	582.0	4:36	4:36	3,655
CR2-C56-NP	Non-P	660,759.00	4,964,737.00	582.0	4:54	4:54	3,786
CR2-C57-P	Participant	666,667.00	4,976,162.00	613.8	5:03	5:03	2,362
CR2-C58-NP	Non-P	660,764.00	4,964,686.00	582.0	5:51	5:51	3,904
CR2-C59-P	Participant	664,952.00	4,976,698.00	601.9	4:30	4:30	1,654
CR2-C60-P	Participant	662,287.00	4,976,800.00	594.0	13:54	13:54	3,793
CR2-C61-NP	Non-P	660,630.00	4,976,840.00	582.5	12:08	12:08	1,667
CR2-C62-NP	Non-P	666,992.00	4,977,048.00	615.0	16:54	16:54	1,860
CR2-C63-P	Participant	665,528.00	4,977,285.00	612.0	14:41	14:41	2,185
CR2-C64-NP	Non-P	660,901.00	4,964,220.00	582.0	0:00	0:00	4,429
CR2-C65-NP	Non-P	665,217.00	4,977,746.00	609.0	7:16	7:16	2,139
CR1-C66-NP	Non-P	659,718.00	4,985,032.00	606.0	0:00	0:00	5,800
CR2-C66-NP	Non-P	662,396.00	4,963,954.00	582.0	0:00	0:00	4,429
CR1-C67-NP	Non-P	659,789.00	4,985,057.00	606.0	0:00	0:00	5,791
CR2-C67-NP	Non-P	660,379.00	4,978,592.00	556.1	0:00	0:00	5,033
CR1-C68-P	Participant	662,652.00	4,987,606.00	609.0	6:44	6:44	2,146
CR2-C68-NP	Non-P	662,517.00	4,963,408.00	579.0	0:00	0:00	6,237

* Not included in original submittal

Table C-1: Crowned Ridge II 300 MW Shadow Flicker Tabular Results Sorted by Receptor ID
Realistic case shadow results at occupied structures
Results using GE 2.3-116-90 m HH, GE 2.1-116-80 m HH WTG's
UTM NAD83 Zone 14
Codington County
continued

Receptor ID	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)	7/9/19 App. J Real Case Results	Distance to Nearest Turbine (ft)
CR1-C69-P	Participant	662,685.00	4,987,619.00	609.0	6:05	6:05	2,185
CR2-C69-NP	Non-P	661,701.00	4,978,792.00	564.0	0:00	0:00	5,171
CR2-C70-P	Participant	665,521.00	4,970,518.00	588.9	13:57	13:57	2,215
CR1-C70-NP	Non-P	665,135.00	4,988,293.00	595.9	12:01	12:01	3,540
CR2-C71-NP	Non-P	665,411.00	4,970,503.00	586.1	10:14	10:14	2,529
CR1-C71-NP	Non-P	665,137.00	4,988,378.00	595.6	7:23	7:23	3,448
CR1-C72-NP	Non-P	665,158.00	4,988,170.00	594.6	7:39	7:39	3,776
CR2-C72-NP	Non-P	663,856.00	4,970,488.00	597.0	0:00	0:00	6,135
CR1-C73-NP	Non-P	663,066.00	4,982,530.00	591.0	6:57	6:57	3,704
CR1-C74-NP	Non-P	662,869.00	4,983,122.00	595.7	2:34	2:34	2,480
CR2-C74-NP	Non-P	660,687.00	4,969,931.00	586.5	0:00	0:00	6,732
CR2-C75-NP	Non-P	664,866.00	4,969,808.00	583.7	5:05	5:05	4,396
CR1-C75-NP	Non-P	663,010.00	4,982,658.00	588.0	4:25	4:25	3,730
CR1-C76-NP	Non-P	662,981.00	4,982,580.00	588.3	5:26	5:26	3,901
CR2-C76-NP	Non-P	664,747.00	4,969,738.00	584.8	3:53	3:53	4,560
CR1-C77-P	Participant	661,915.00	4,983,367.00	591.0	12:12	12:12	1,654
CR2-C77-NP	Non-P	663,865.00	4,969,694.00	597.0	1:28	1:28	4,406
CR2-C78-P	Participant	665,273.00	4,983,933.00	609.0	25:17	25:17	1,919
CR1-C78-P	Participant	660,190.00	4,983,788.00	602.3	6:43	6:43	2,835
CR1-C79-NP	Non-P	660,452.00	4,983,750.00	595.9	22:38	22:37	2,037
CR2-C79-NP	Non-P	666,869.00	4,984,663.00	587.9	0:00	0:00	2,703
CR1-C80-NP	Non-P	659,351.00	4,983,174.00	604.4	0:40	0:40	5,308
CR2-C80-NP	Non-P	664,705.00	4,972,092.00	597.3	0:00	0:00	7,684
CR1-C81-NP	Non-P	660,062.00	4,983,083.00	597.0	6:15	6:15	3,094
CR1-C84-NP	Non-P	659,607.00	4,982,216.00	594.0	0:00	0:00	5,856
CR1-C85-NP	Non-P	659,706.00	4,981,419.00	588.0	1:22	1:22	4,819
CR1-C86-P	Participant	662,086.00	4,982,135.00	585.0	16:51	16:51	2,306
CR2-C86-NP	Non-P	662,880.00	4,971,302.00	603.0	0:00	0:00	7,208
CR1-C87-NP	Non-P	662,628.00	4,982,425.00	585.4	4:09	4:09	4,258
CR2-C87-NP	Non-P	662,841.00	4,971,294.00	603.0	0:00	0:00	7,165
CR1-C88-NP	Non-P	660,156.00	4,980,595.00	570.9	0:00	0:00	4,045
CR1-C89-P	Participant	662,062.00	4,982,029.00	584.3	21:39	21:39	2,165
CR2-C89-NP	Non-P	662,244.00	4,971,076.00	603.0	0:00	0:00	6,489
CR2-C90-NP	Non-P	664,088.41	4,970,672.24	594.0	0:00	0:00	6,863
CR2-C91-NP	Non-P	663,938.00	4,970,546.00	597.0	0:00	0:00	6,457
CR2-C92-NP	Non-P	663,855.00	4,970,535.00	597.0	0:00	0:00	6,247
CR2-C93-NP	Non-P	659,203.00	4,973,158.00	584.9	0:00	0:00	7,792
CR2-C94-NP	Non-P	659,202.00	4,973,052.00	583.9	0:00	0:00	8,133

* Not included in original submittal

Table C-1: Crowned Ridge II 300 MW Shadow Flicker Tabular Results Sorted by Receptor ID
Realistic case shadow results at occupied structures
Results using GE 2.3-116-90 m HH, GE 2.1-116-80 m HH WTG's
UTM NAD83 Zone 14
Codington County
continued

Receptor ID	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)	7/9/19 App. J Real Case Results	Distance to Nearest Turbine (ft)
CR2-C95-NP	Non-P	659,248.00	4,974,054.00	567.0	0:00	0:00	4,898
CR2-C96-NP	Non-P	659,316.00	4,974,063.00	570.6	0:00	0:00	4,813
CR2-C97-NP	Non-P	660,093.00	4,976,001.00	583.8	29:21	21:51	1,814
CR2-C98-NP	Non-P	660,155.00	4,976,007.00	582.8	32:23	23:19	1,749
CR2-C99-P	Participant	660,584.00	4,972,570.00	591.0	0:00	0:00	7,165
CR2-C100-NP	Non-P	660,592.00	4,972,602.00	591.0	0:00	0:00	7,057
CR2-C101-NP	Non-P	660,732.00	4,972,807.00	591.0	0:00	0:00	6,266
CR2-C102-NP	Non-P	662,025.00	4,976,085.00	594.1	8:29	6:09	3,609
CR2-C103-NP	Non-P	662,046.00	4,976,067.00	594.8	8:17	6:06	3,547
CR2-C104-NP	Non-P	662,109.00	4,972,735.00	604.0	0:00	0:00	6,608
CR2-C105-NP	Non-P	662,122.00	4,976,029.00	595.3	7:46	5:58	3,425
CR2-C106-NP	Non-P	662,165.00	4,972,711.00	604.7	0:00	0:00	6,749
CR2-C107-NP	Non-P	662,265.00	4,978,194.00	577.7	4:21	4:21	4,564
CR2-C109-NP	Non-P	662,699.00	4,972,874.00	606.0	0:00	0:00	7,169
CR2-C112-NP	Non-P	665,928.00	4,972,630.00	603.0	0:00	0:00	6,575
CR2-C115-NP	Non-P	663,555.00	4,980,564.00	575.2	8:18	8:18	2,520
CR2-C116-NP	Non-P	664,640.00	4,976,142.00	591.1	4:50	4:50	3,533
CR2-C117-NP	Non-P	664,742.00	4,976,142.00	594.2	4:53	4:53	3,481
CR2-C118-NP	Non-P	665,014.00	4,974,639.00	600.0	1:57	1:57	4,947
CR2-C119-NP	Non-P	665,052.00	4,974,682.00	600.0	2:06	2:06	4,760
CR2-C123-P	Participant	666,146.00	4,966,653.00	579.4	2:13	2:13	5,216
CR2-C126-P	Participant	666,389.00	4,966,670.00	585.0	1:40	1:40	4,455
CR2-C128-P	Participant	666,636.00	4,966,649.00	589.0	3:00	3:00	3,671
CR2-C129-P	Participant	666,716.00	4,966,751.00	591.0	3:31	3:31	3,356
CR2-C130-P	Participant	666,727.00	4,966,695.00	591.0	3:42	3:42	3,350
CR2-C131-NP	Non-P	666,732.00	4,984,987.00	591.0	10:06	10:06	2,287
CR2-C132-NP	Non-P	666,857.00	4,985,021.00	588.2	1:47	1:47	1,883
CR2-C133-P	Participant	666,992.00	4,967,681.00	571.2	13:37	13:37	2,500
CR2-C134-NP	Non-P	667,097.00	4,973,011.00	613.0	3:42	3:42	3,363
CR2-C135-NP	Non-P	667,172.00	4,966,196.00	595.2	0:00	0:00	2,884
CR2-C136-NP	Non-P	667,209.00	4,966,166.00	595.4	0:00	0:00	2,887
CR2-C137-NP	Non-P	658,951.00	4,979,194.00	568.2	0:00	0:00	6,555
CR2-C142-NP	Non-P	656,697.00	4,977,269.00	566.9	0:00	0:00	8,432
CR2-C143-NP	Non-P	657,016.00	4,977,505.00	553.6	0:00	0:00	7,444
CR2-C151-NP	Non-P	663,934.00	4,964,475.00	556.1	0:00	0:00	6,929
CR2-C154-P	Participant	660,684.34	4,967,166.18	588.0	30:00	30:01	2,041
CR2-C155-NP	Non-P	657,554.06	4,975,128.16	554.6	0:00	*	7,034

* Not included in original submittal

Table C-1: Crowned Ridge II 300 MW Shadow Flicker Tabular Results Sorted by Receptor ID

Realistic case shadow results at occupied structures

Results using GE 2.3-116-90 m HH, GE 2.1-116-80 m HH WTG's

UTM NAD83 Zone 14

Deuel County

continued

Receptor ID	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)	7/9/19 App. J Real Case Results	Distance to Nearest Turbine (ft)
CR2-D3-NP	Non-P	672,390.00	4,963,482.00	612.0	6:47	6:47	2,037
CR2-D5-NP	Non-P	668,781.00	4,964,897.00	603.0	15:51	2:14	1,923
CR2-D6-P	Participant	668,762.00	4,967,671.00	591.0	17:17	17:16	2,844
CR2-D9-NP	Non-P	668,597.00	4,971,999.00	611.5	0:00	0:00	4,921
CR2-D11-NP	Non-P	669,646.00	4,974,534.00	604.4	21:54	5:51	1,919
CR2-D12-NP	Non-P	668,558.00	4,969,840.00	604.7	18:07	18:07	2,051
CR2-D14-NP	Non-P	670,351.11	4,973,543.31	606.0	13:33	14:04	2,041
CR2-D15-NP	Non-P	674,387.00	4,968,515.00	588.0	24:01	24:00	2,297
CR2-D16-P	Participant	671,626.00	4,966,693.00	601.7	5:21	5:21	2,018
CR2-D17-NP	Non-P	672,023.00	4,969,597.00	597.0	13:45	13:44	3,343
CR2-D18-NP	Non-P	671,540.00	4,976,154.00	582.0	22:04	22:04	2,201
CR2-D19-NP	Non-P	668,870.00	4,964,178.00	606.0	13:59	13:59	2,034
CR2-D20-NP	Non-P	675,261.00	4,968,400.00	579.0	3:00	3:00	2,313
CR2-D21-NP	Non-P	669,517.00	4,978,053.00	596.1	28:59	28:59	1,985
CR2-D22-NP	Non-P	668,798.00	4,963,767.00	603.1	14:21	14:20	2,142
CR2-D23-NP	Non-P	669,671.00	4,980,468.00	573.0	0:00	0:00	4,380
CR2-D30-NP	Non-P	669,549.00	4,974,233.00	611.9	17:10	6:03	2,044
CR2-D36-NP	Non-P	669,812.00	4,966,746.00	591.0	2:59	2:59	2,854
CR2-D37-NP	Non-P	674,048.00	4,974,071.00	573.0	0:00	0:00	6,542
CR2-D38-P	Participant	667,108.00	4,982,083.00	597.0	9:01	9:01	1,693
CR2-D39-P	Participant	668,443.00	4,974,627.00	614.4	18:50	18:50	1,706
CR2-D41-NP	Non-P	670,437.00	4,966,409.00	597.0	2:06	2:06	3,340
CR2-D44-NP	Non-P	670,434.00	4,965,956.00	593.8	24:03	20:58	2,149
CR2-D45-NP	Non-P	668,018.00	4,976,064.00	611.5	0:55	0:55	4,393
CR2-D46-NP	Non-P	669,797.00	4,966,804.00	591.0	1:23	1:23	2,972
CR2-D48-NP	Non-P	668,923.00	4,972,998.00	609.0	0:00	0:00	2,680
CR2-D49-P	Participant	672,024.00	4,974,135.00	583.2	8:42	8:42	3,537
CR2-D50-P	Participant	672,015.00	4,967,209.00	602.8	24:58	24:57	1,965
CR2-D51-NP	Non-P	675,005.00	4,970,131.00	577.8	8:27	8:27	2,717
CR2-D52-NP	Non-P	667,172.00	4,971,776.00	606.0	0:00	0:00	4,583
CR2-D53-P	Participant	670,392.00	4,975,925.00	592.8	27:37	27:36	1,801
CR2-D54-NP	Non-P	672,012.00	4,966,477.00	600.0	5:15	5:15	2,500
CR2-D56-P	Participant	667,119.00	4,977,925.00	612.0	8:10	8:47	2,110
CR2-D62-NP	Non-P	669,355.00	4,974,624.00	609.0	10:56	5:02	2,913
CR2-D63-NP	Non-P	670,546.00	4,961,419.00	615.0	0:00	0:00	4,065
CR2-D64-P	Participant	669,417.00	4,978,434.00	588.0	14:03	14:01	2,425
CR2-D65-NP	Non-P	670,422.00	4,966,654.00	597.0	5:26	5:26	3,583
CR2-D71-NP	Non-P	669,402.00	4,979,216.00	588.0	18:30	18:11	1,975

*** Not included in original submittal**

Table C-1: Crowned Ridge II 300 MW Shadow Flicker Tabular Results Sorted by Receptor ID
Realistic case shadow results at occupied structures
Results using GE 2.3-116-90 m HH, GE 2.1-116-80 m HH WTG's
UTM NAD83 Zone 14
Deuel County
continued

Receptor ID	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)	7/9/19 App. J Real Case Results	Distance to Nearest Turbine (ft)
CR2-D72-NP	Non-P	671,925.00	4,970,149.00	603.0	0:00	0:00	4,495
CR2-D73-NP	Non-P	672,072.00	4,971,556.00	600.0	0:00	0:00	4,035
CR2-D74-NP	Non-P	668,130.00	4,976,068.00	609.2	0:00	0:00	4,505
CR2-D75-NP	Non-P	669,473.00	4,981,625.00	570.0	0:00	0:00	6,355
CR2-D77-NP	Non-P	672,044.00	4,966,468.00	600.0	5:58	5:58	2,444
CR2-D79-NP	Non-P	672,172.00	4,974,737.00	585.0	2:16	2:16	1,955
CR2-D82-NP	Non-P	669,855.00	4,970,718.00	603.0	0:00	0:00	5,935
CR2-D83-NP	Non-P	675,891.00	4,966,810.00	579.0	12:25	12:25	1,929
CR2-D84-NP	Non-P	667,159.00	4,972,169.00	598.2	0:00	0:00	5,535
CR2-D85-NP	Non-P	669,593.00	4,976,302.00	603.0	4:36	4:36	1,949
CR2-D86-NP	Non-P	673,842.00	4,966,875.00	597.0	12:07	12:06	1,985
CR2-D90-NP	Non-P	670,516.00	4,962,327.00	612.0	7:36	7:36	3,360
CR2-D91-NP	Non-P	667,546.00	4,976,173.00	618.0	2:59	2:59	4,203
CR2-D92-NP	Non-P	671,159.00	4,971,610.00	597.2	0:00	0:00	3,881
CR2-D95-NP	Non-P	671,994.00	4,971,562.00	600.0	0:00	0:00	3,930
CR2-D96-NP	Non-P	672,899.00	4,971,469.00	594.0	0:00	0:00	5,827
CR2-D97-NP	Non-P	667,164.00	4,972,232.00	600.0	0:00	0:00	5,371
CR2-D98-P	Participant	669,757.00	4,972,426.00	606.0	0:00	0:00	5,381
CR2-D99-NP	Non-P	668,148.00	4,976,230.00	608.8	0:00	0:00	4,331
CR2-D100-NP	Non-P	668,589.00	4,972,064.00	609.9	0:00	0:00	4,708
CR2-D101-NP	Non-P	672,538.00	4,961,910.00	612.8	5:29	5:29	2,677
CR2-D103-NP	Non-P	670,588.00	4,961,119.00	615.0	0:00	0:00	4,606
CR2-D104-NP	Non-P	670,443.00	4,961,600.00	613.8	5:06	5:06	4,058
CR2-D105-NP	Non-P	670,348.00	4,963,826.00	611.7	17:56	17:56	2,821
CR2-D106-NP	Non-P	667,315.00	4,965,297.00	594.0	0:00	0:00	5,351
CR2-D107-NP	Non-P	670,405.00	4,966,321.00	597.0	6:22	2:27	3,143
CR2-D108-NP	Non-P	670,354.00	4,965,949.00	594.0	25:37	23:04	2,198
CR2-D109-NP	Non-P	676,885.00	4,965,806.00	576.0	4:51	4:51	4,432
CR2-D110-NP	Non-P	670,260.25	4,967,728.02	597.0	3:14	3:14	2,211
CR2-D111-P	Participant	671,876.00	4,969,006.00	600.0	29:32	29:32	2,178
CR2-D112-NP	Non-P	667,666.00	4,971,554.00	604.6	0:00	0:00	3,553
CR2-D113-NP	Non-P	667,774.00	4,971,544.00	606.9	0:00	0:00	3,537
CR2-D115-P	Participant	670,974.00	4,969,938.00	606.0	2:04	2:04	3,245
CR2-D116-NP	Non-P	673,491.00	4,972,398.00	577.8	0:00	0:00	6,220
CR2-D119-P	Participant	673,378.00	4,965,126.00	602.6	16:30	16:30	1,932
CR2-D120-NP	Non-P	673,401.00	4,964,165.00	609.0	2:19	2:19	3,110
CR2-D121-NP	Non-P	674,461.00	4,966,734.00	594.0	12:06	12:06	2,316
CR2-D122-P	Participant	673,601.00	4,967,341.00	594.0	18:17	18:17	1,886

* Not included in original submittal

continued

[illegible]

* Not included in original submittal

Table C-1: Crowned Ridge II 300 MW Shadow Flicker Tabular Results Sorted by Receptor ID
Realistic case shadow results at occupied structures
Results using GE 2.3-116-90 m HH, GE 2.1-116-80 m HH WTG's
UTM NAD83 Zone 14
Grant County
continued

[illegible]

* Not included in original submittal

Table C-2: Crowned Ridge II 300 MW Shadow Flicker Tabular Results Sorted by Real Case Shadow Flicker Hours/Year
Realistic case shadow results at occupied structures
Results using GE 2.3-116-90 m HH, GE 2.1-116-80 m HH WTG's
UTM NAD83 Zone 14
Codington County

Receptor ID	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)	7/9/19 App. J Real Case Results	Distance to Nearest Turbine (ft)
CR1-C10-P	Participant	663,510.00	4,985,195.00	609.0	38:20	38:22	1,634
CR2-C98-NP	Non-P	660,155.00	4,976,007.00	582.8	32:23	23:19	1,749
CR2-C154-P	Participant	660,684.34	4,967,166.18	588.0	30:00	30:00	2,041
CR2-C97-NP	Non-P	660,093.00	4,976,001.00	583.8	29:21	21:51	1,814
CR2-C38-NP	Non-P	660,874.00	4,966,929.00	585.5	25:57	25:57	1,906
CR2-C78-P	Participant	665,273.00	4,983,933.00	609.0	25:17	25:17	1,919
CR1-C79-NP	Non-P	660,452.00	4,983,750.00	595.9	22:38	22:37	2,037
CR1-C89-P	Participant	662,062.00	4,982,029.00	584.3	21:39	21:39	2,165
CR2-C50-P	Participant	661,252.00	4,976,035.00	597.0	19:23	4:15	1,696
CR2-C48-NP	Non-P	662,370.00	4,965,588.00	590.3	19:13	19:13	2,172
CR1-C13-NP	Non-P	663,792.00	4,985,785.00	612.0	18:58	18:16	2,589
CR1-C9-NP	Non-P	665,352.00	4,985,004.00	609.0	18:09	18:08	2,280
CR2-C27-P	Participant	662,985.00	4,968,167.00	582.0	18:06	18:06	1,726
CR2-C41-P	Participant	660,770.00	4,975,147.00	596.4	17:22	17:22	1,532
CR1-C12-NP	Non-P	662,222.00	4,985,736.00	603.0	17:08	17:08	2,201
CR2-C62-NP	Non-P	666,992.00	4,977,048.00	615.0	16:54	16:54	1,860
CR1-C86-P	Participant	662,086.00	4,982,135.00	585.0	16:51	16:51	2,306
CR2-C63-P	Participant	665,528.00	4,977,285.00	612.0	14:41	14:41	2,185
CR1-C20-P	Participant	663,054.00	4,987,455.00	606.0	14:38	14:38	2,336
CR2-C52-NP	Non-P	662,688.00	4,964,792.00	585.9	14:32	14:32	3,054
CR2-C34-P	Participant	663,934.00	4,966,991.00	570.1	14:11	14:11	2,133
CR2-C70-P	Participant	665,521.00	4,970,518.00	588.9	13:57	13:57	2,215
CR2-C60-P	Participant	662,287.00	4,976,800.00	594.0	13:54	13:54	3,793
CR2-C133-P	Participant	666,992.00	4,967,681.00	571.2	13:37	13:37	2,500
CR2-C54-NP	Non-P	662,636.00	4,976,079.00	597.0	12:36	12:36	2,287
CR2-C42-NP	Non-P	664,887.00	4,975,388.00	597.0	12:14	12:14	3,566
CR1-C77-P	Participant	661,915.00	4,983,367.00	591.0	12:12	12:12	1,654
CR2-C46-NP	Non-P	660,435.00	4,965,627.00	582.0	12:08	12:08	2,569
CR2-C61-NP	Non-P	660,630.00	4,976,840.00	582.5	12:08	12:08	1,667
CR1-C70-NP	Non-P	665,135.00	4,988,293.00	595.9	12:01	12:01	3,540
CR1-C12-1-NP	Non-P	662,199.00	4,986,047.00	606.0	10:34	10:34	2,818
CR1-C11-P	Participant	664,111.00	4,985,679.00	609.0	10:27	10:27	1,860
CR2-C71-NP	Non-P	665,411.00	4,970,503.00	586.1	10:14	10:14	2,529
CR2-C131-NP	Non-P	666,732.00	4,984,987.00	591.0	10:06	10:06	2,287
CR2-C47-NP	Non-P	662,200.00	4,975,837.00	594.5	9:41	7:58	2,821
CR2-C37-NP	Non-P	663,037.00	4,974,496.00	606.0	9:34	9:34	3,537
CR2-C102-NP	Non-P	662,025.00	4,976,085.00	594.1	8:29	6:09	3,609
CR2-C36-NP	Non-P	660,475.00	4,974,426.00	578.6	8:20	8:20	2,992
CR2-C115-NP	Non-P	663,555.00	4,980,564.00	575.2	8:18	8:18	2,520

* Not included in original submittal

Table C-2: Crowned Ridge II 300 MW Shadow Flicker Tabular Results Sorted by Real Case Shadow Flicker Hours/Year
Realistic case shadow results at occupied structures
Results using GE 2.3-116-90 m HH, GE 2.1-116-80 m HH WTG's
UTM NAD83 Zone 14
Coddington County
continued

Receptor ID	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)	7/9/19 App. J Real Case Results	Distance to Nearest Turbine (ft)
CR2-C103-NP	Non-P	662,046.00	4,976,067.00	594.8	8:17	6:06	3,547
CR2-C105-NP	Non-P	662,122.00	4,976,029.00	595.3	7:46	5:58	3,425
CR1-C24-NP	Non-P	660,176.00	4,983,887.00	601.1	7:45	7:45	3,038
CR1-C72-NP	Non-P	665,158.00	4,988,170.00	594.6	7:39	7:39	3,776
CR2-C16-NP	Non-P	665,418.00	4,966,866.00	567.0	7:30	7:29	2,756
CR1-C71-NP	Non-P	665,137.00	4,988,378.00	595.6	7:23	7:23	3,448
CR2-C65-NP	Non-P	665,217.00	4,977,746.00	609.0	7:16	7:16	2,139
CR1-C73-NP	Non-P	663,066.00	4,982,530.00	591.0	6:57	6:57	3,704
CR1-C29-NP	Non-P	666,572.00	4,988,867.00	575.9	6:54	*	2,457
CR1-C68-P	Participant	662,652.00	4,987,606.00	609.0	6:44	6:44	2,146
CR1-C25-P	Participant	660,189.79	4,983,788.29	602.3	6:43	6:43	2,838
CR1-C78-P	Participant	660,190.00	4,983,788.00	602.3	6:43	6:43	2,835
CR2-C49-NP	Non-P	660,907.00	4,964,846.00	582.0	6:36	6:36	3,271
CR1-C16-NP	Non-P	661,960.00	4,986,288.00	606.0	6:17	6:17	2,648
CR1-C81-NP	Non-P	660,062.00	4,983,083.00	597.0	6:15	6:15	3,094
CR2-C26-P	Participant	664,733.00	4,968,915.00	591.0	6:09	6:09	1,959
CR1-C69-P	Participant	662,685.00	4,987,619.00	609.0	6:05	6:05	2,185
CR1-C18-P	Participant	663,651.00	4,987,157.00	610.4	5:58	5:58	3,409
CR2-C58-NP	Non-P	660,764.00	4,964,686.00	582.0	5:51	5:51	3,904
CR1-C76-NP	Non-P	662,981.00	4,982,580.00	588.3	5:26	5:26	3,901
CR2-C75-NP	Non-P	664,866.00	4,969,808.00	583.7	5:05	5:05	4,396
CR2-C57-P	Participant	666,667.00	4,976,162.00	613.8	5:03	5:03	2,362
CR2-C56-NP	Non-P	660,759.00	4,964,737.00	582.0	4:54	4:54	3,786
CR2-C117-NP	Non-P	664,742.00	4,976,142.00	594.2	4:53	4:53	3,481
CR2-C116-NP	Non-P	664,640.00	4,976,142.00	591.1	4:50	4:50	3,533
CR2-C51-NP	Non-P	662,977.00	4,964,794.00	584.0	4:41	4:41	3,934
CR2-C55-NP	Non-P	660,765.00	4,964,777.00	582.0	4:36	4:36	3,655
CR2-C59-P	Participant	664,952.00	4,976,698.00	601.9	4:30	4:30	1,654
CR1-C75-NP	Non-P	663,010.00	4,982,658.00	588.0	4:25	4:25	3,730
CR2-C107-NP	Non-P	662,265.00	4,978,194.00	577.7	4:21	4:21	4,564
CR2-C45-P	Participant	664,058.00	4,965,862.00	570.0	4:12	4:12	3,907
CR1-C87-NP	Non-P	662,628.00	4,982,425.00	585.4	4:09	4:09	4,258
CR2-C76-NP	Non-P	664,747.00	4,969,738.00	584.8	3:53	3:53	4,560
CR2-C1-NP	Non-P	662,198.00	4,980,622.00	591.0	3:51	3:51	1,909
CR2-C130-P	Participant	666,727.00	4,966,695.00	591.0	3:42	3:42	3,350
CR2-C134-NP	Non-P	667,097.00	4,973,011.00	613.0	3:42	3:42	3,363
CR2-C129-P	Participant	666,716.00	4,966,751.00	591.0	3:31	3:31	3,356
CR2-C24-NP	Non-P	661,541.00	4,969,653.00	600.0	3:21	3:21	3,809

* Not included in original submittal

Table C-2: Crowned Ridge II 300 MW Shadow Flicker Tabular Results Sorted by Real Case Shadow Flicker Hours/Year
Realistic case shadow results at occupied structures
Results using GE 2.3-116-90 m HH, GE 2.1-116-80 m HH WTG's
UTM NAD83 Zone 14
Codington County
continued

Receptor ID	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)	7/9/19 App. J Real Case Results	Distance to Nearest Turbine (ft)
CR2-C128-P	Participant	666,636.00	4,966,649.00	589.0	3:00	3:00	3,671
CR1-C28-NP	Non-P	665,429.00	4,988,598.00	590.9	2:43	2:43	2,831
CR1-C74-NP	Non-P	662,869.00	4,983,122.00	595.7	2:34	2:34	2,480
CR2-C33-P	Participant	663,878.00	4,967,612.00	576.1	2:28	2:28	2,999
CR2-C39-NP	Non-P	664,089.00	4,966,486.00	566.2	2:27	2:27	2,178
CR1-C15-NP	Non-P	663,291.00	4,986,026.00	615.0	2:16	2:20	2,175
CR2-C123-P	Participant	666,146.00	4,966,653.00	579.4	2:13	2:13	5,216
CR2-C119-NP	Non-P	665,052.00	4,974,682.00	600.0	2:06	2:06	4,760
CR2-C118-NP	Non-P	665,014.00	4,974,639.00	600.0	1:57	1:57	4,947
CR2-C132-NP	Non-P	666,857.00	4,985,021.00	588.2	1:47	1:47	1,883
CR2-C43-NP	Non-P	664,382.00	4,975,544.00	597.0	1:42	1:42	4,232
CR2-C126-P	Participant	666,389.00	4,966,670.00	585.0	1:40	1:40	4,455
CR2-C40-NP	Non-P	659,189.00	4,974,765.00	578.3	1:38	1:38	2,841
CR2-C77-NP	Non-P	663,865.00	4,969,694.00	597.0	1:28	1:28	4,406
CR1-C85-NP	Non-P	659,706.00	4,981,419.00	588.0	1:22	1:22	4,819
CR2-C2-NP	Non-P	662,238.00	4,980,604.00	590.9	1:03	1:03	1,880
CR1-C22-P	Participant	660,755.00	4,984,082.00	594.0	1:01	1:01	2,375
CR1-C21-P	Participant	660,756.00	4,984,086.00	594.0	1:00	1:00	2,388
CR2-C23-NP	Non-P	664,069.00	4,969,661.00	594.0	0:58	0:58	4,439
CR2-C44-NP	Non-P	659,145.00	4,966,062.00	561.4	0:43	0:43	4,183
CR1-C80-NP	Non-P	659,351.00	4,983,174.00	604.4	0:40	0:40	5,308
CR2-C3-NP	Non-P	664,345.00	4,964,571.00	556.0	0:00	0:00	7,497
CR1-C4-NP	Non-P	659,744.00	4,984,749.00	606.0	0:00	0:00	5,981
CR1-C5-NP	Non-P	659,958.00	4,984,794.00	604.8	0:00	0:00	5,659
CR1-C7-NP	Non-P	660,893.00	4,984,861.00	593.2	0:00	0:00	3,022
CR2-C7-NP	Non-P	665,694.00	4,966,179.00	570.0	0:00	0:00	4,409
CR1-C8-P	Participant	660,532.00	4,984,445.00	599.4	0:00	0:00	3,740
CR2-C10-NP	Non-P	665,189.00	4,966,505.00	570.0	0:00	0:00	2,438
CR2-C22-NP	Non-P	661,202.00	4,972,711.00	597.0	0:00	0:00	6,247
CR1-C23-P	Participant	660,619.00	4,984,078.00	595.8	0:00	0:00	2,523
CR2-C28-P	Participant	659,208.00	4,968,159.00	572.8	0:00	0:00	5,630
CR2-C29-NP	Non-P	661,223.00	4,968,144.00	595.2	0:00	0:00	4,639
CR2-C30-NP	Non-P	659,100.00	4,968,023.00	568.6	0:00	0:00	5,502
CR1-C31-NP	Non-P	665,939.00	4,988,950.00	585.4	0:00	0:00	2,126
CR2-C31-P	Participant	663,117.00	4,972,923.00	606.0	0:00	0:00	7,579
CR2-C32-P	Participant	659,469.00	4,967,984.00	575.2	0:00	0:00	4,678
CR2-C35-NP	Non-P	658,964.00	4,974,334.00	566.8	0:00	0:00	4,432
CR2-C53-NP	Non-P	662,401.00	4,964,782.00	582.0	0:00	0:00	2,257

* Not included in original submittal

Table C-2: Crowned Ridge II 300 MW Shadow Flicker Tabular Results Sorted by Real Case Shadow Flicker Hours/Year
Realistic case shadow results at occupied structures
Results using GE 2.3-116-90 m HH, GE 2.1-116-80 m HH WTG's
UTM NAD83 Zone 14
Codington County
continued

Receptor ID	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)	7/9/19 App. J Real Case Results	Distance to Nearest Turbine (ft)
CR2-C64-NP	Non-P	660,901.00	4,964,220.00	582.0	0:00	0:00	4,429
CR1-C66-NP	Non-P	659,718.00	4,985,032.00	606.0	0:00	0:00	5,800
CR2-C66-NP	Non-P	662,396.00	4,963,954.00	582.0	0:00	0:00	4,429
CR1-C67-NP	Non-P	659,789.00	4,985,057.00	606.0	0:00	0:00	5,791
CR2-C67-NP	Non-P	660,379.00	4,978,592.00	556.1	0:00	0:00	5,033
CR2-C68-NP	Non-P	662,517.00	4,963,408.00	579.0	0:00	0:00	6,237
CR2-C69-NP	Non-P	661,701.00	4,978,792.00	564.0	0:00	0:00	5,171
CR2-C72-NP	Non-P	663,856.00	4,970,488.00	597.0	0:00	0:00	6,135
CR2-C74-NP	Non-P	660,687.00	4,969,931.00	586.5	0:00	0:00	6,732
CR2-C79-NP	Non-P	666,869.00	4,984,663.00	587.9	0:00	0:00	2,703
CR2-C80-NP	Non-P	664,705.00	4,972,092.00	597.3	0:00	0:00	7,684
CR1-C84-NP	Non-P	659,607.00	4,982,216.00	594.0	0:00	0:00	5,856
CR2-C86-NP	Non-P	662,880.00	4,971,302.00	603.0	0:00	0:00	7,208
CR2-C87-NP	Non-P	662,841.00	4,971,294.00	603.0	0:00	0:00	7,165
CR1-C88-NP	Non-P	660,156.00	4,980,595.00	570.9	0:00	0:00	4,045
CR2-C89-NP	Non-P	662,244.00	4,971,076.00	603.0	0:00	0:00	6,489
CR2-C90-NP	Non-P	664,088.41	4,970,672.24	594.0	0:00	0:00	6,863
CR2-C91-NP	Non-P	663,938.00	4,970,546.00	597.0	0:00	0:00	6,457
CR2-C92-NP	Non-P	663,855.00	4,970,535.00	597.0	0:00	0:00	6,247
CR2-C93-NP	Non-P	659,203.00	4,973,158.00	584.9	0:00	0:00	7,792
CR2-C94-NP	Non-P	659,202.00	4,973,052.00	583.9	0:00	0:00	8,133
CR2-C95-NP	Non-P	659,248.00	4,974,054.00	567.0	0:00	0:00	4,898
CR2-C96-NP	Non-P	659,316.00	4,974,063.00	570.6	0:00	0:00	4,813
CR2-C99-P	Participant	660,584.00	4,972,570.00	591.0	0:00	0:00	7,165
CR2-C100-NP	Non-P	660,592.00	4,972,602.00	591.0	0:00	0:00	7,057
CR2-C101-NP	Non-P	660,732.00	4,972,807.00	591.0	0:00	0:00	6,266
CR2-C104-NP	Non-P	662,109.00	4,972,735.00	604.0	0:00	0:00	6,608
CR2-C106-NP	Non-P	662,165.00	4,972,711.00	604.7	0:00	0:00	6,749
CR2-C109-NP	Non-P	662,699.00	4,972,874.00	606.0	0:00	0:00	7,169
CR2-C112-NP	Non-P	665,928.00	4,972,630.00	603.0	0:00	0:00	6,575
CR2-C135-NP	Non-P	667,172.00	4,966,196.00	595.2	0:00	0:00	2,884
CR2-C136-NP	Non-P	667,209.00	4,966,166.00	595.4	0:00	0:00	2,887
CR2-C137-NP	Non-P	658,951.00	4,979,194.00	568.2	0:00	0:00	6,555
CR2-C142-NP	Non-P	656,697.00	4,977,269.00	566.9	0:00	0:00	8,432
CR2-C143-NP	Non-P	657,016.00	4,977,505.00	553.6	0:00	0:00	7,444
CR2-C151-NP	Non-P	663,934.00	4,964,475.00	556.1	0:00	0:00	6,929
CR2-C155-NP	Non-P	657,554.06	4,975,128.16	554.6	0:00	*	7,034

* Not included in original submittal

Table C-2: Crowned Ridge II 300 MW Shadow Flicker Tabular Results Sorted by Real Case Shadow Flicker Hours/Year
Realistic case shadow results at occupied structures
Results using GE 2.3-116-90 m HH, GE 2.1-116-80 m HH WTG's
UTM NAD83 Zone 14
Deuel County
continued

Receptor ID	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)	7/9/19 App. J Real Case Results	Distance to Nearest Turbine (ft)
CR2-D111-P	Participant	671,876.00	4,969,006.00	600.0	29:32	29:32	2,178
CR2-D21-NP	Non-P	669,517.00	4,978,053.00	596.1	28:59	28:59	1,985
CR2-D53-P	Participant	670,392.00	4,975,925.00	592.8	27:37	27:37	1,801
CR2-D108-NP	Non-P	670,354.00	4,965,949.00	594.0	25:37	23:04	2,198
CR2-D131-P	Participant	669,471.00	4,977,139.00	597.5	25:29	25:29	2,087
CR2-D50-P	Participant	672,015.00	4,967,209.00	602.8	24:58	24:57	1,965
CR2-D44-NP	Non-P	670,434.00	4,965,956.00	593.8	24:03	20:58	2,149
CR2-D15-NP	Non-P	674,387.00	4,968,515.00	588.0	24:01	24:00	2,297
CR2-D18-NP	Non-P	671,540.00	4,976,154.00	582.0	22:04	22:04	2,201
CR2-D11-NP	Non-P	669,646.00	4,974,534.00	604.4	21:54	5:51	1,919
CR2-D123-P	Participant	673,527.00	4,967,015.00	596.7	19:44	19:44	2,441
CR2-D39-P	Participant	668,443.00	4,974,627.00	614.4	18:50	18:50	1,706
CR2-D71-NP	Non-P	669,402.00	4,979,216.00	588.0	18:30	18:12	1,975
CR2-D122-P	Participant	673,601.00	4,967,341.00	594.0	18:17	18:17	1,886
CR2-D12-NP	Non-P	668,558.00	4,969,840.00	604.7	18:07	18:07	2,051
CR2-D105-NP	Non-P	670,348.00	4,963,826.00	611.7	17:56	17:56	2,821
CR2-D6-P	Participant	668,762.00	4,967,671.00	591.0	17:17	17:17	2,844
CR2-D30-NP	Non-P	669,549.00	4,974,233.00	611.9	17:10	6:03	2,044
CR2-D132-NP	Non-P	669,497.00	4,974,128.00	609.0	16:49	6:45	2,264
CR2-D119-P	Participant	673,378.00	4,965,126.00	602.6	16:30	16:30	1,932
CR2-D128-NP	Non-P	668,625.00	4,967,652.00	588.0	15:58	15:58	2,779
CR2-D5-NP	Non-P	668,781.00	4,964,897.00	603.0	15:51	2:14	1,923
CR2-D124-P	Participant	671,911.00	4,967,745.00	603.0	15:47	15:47	2,493
CR2-D22-NP	Non-P	668,798.00	4,963,767.00	603.1	14:21	14:21	2,142
CR2-D64-P	Participant	669,417.00	4,978,434.00	588.0	14:03	14:01	2,425
CR2-D19-NP	Non-P	668,870.00	4,964,178.00	606.0	13:59	13:59	2,034
CR2-D17-NP	Non-P	672,023.00	4,969,597.00	597.0	13:45	13:45	3,343
CR2-D14-NP	Non-P	670,351.11	4,973,543.31	606.0	13:33	14:04	2,041
CR2-D221-NP	Non-P	670,351.11	4,973,543.31	606.0	13:33	14:04	2,041
CR2-D130-NP	Non-P	672,080.49	4,973,212.28	591.0	13:27	15:12	2,260
CR2-D222-NP	Non-P	672,080.49	4,973,212.28	591.0	13:27	15:12	2,264
CR2-D125-NP	Non-P	670,404.00	4,966,786.00	597.0	13:11	13:11	3,422
CR2-D212-P	Participant	667,211.00	4,969,816.00	608.3	12:55	12:55	1,686
CR2-D83-NP	Non-P	675,891.00	4,966,810.00	579.0	12:25	12:25	1,929
CR2-D86-NP	Non-P	673,842.00	4,966,875.00	597.0	12:07	12:07	1,985
CR2-D121-NP	Non-P	674,461.00	4,966,734.00	594.0	12:06	12:06	2,316
CR2-D176-P	Participant	673,641.00	4,962,583.00	609.0	12:02	12:02	3,304
CR2-D127-NP	Non-P	668,841.00	4,969,858.00	603.0	11:40	11:40	2,894

* Not included in original submittal

Table C-2: Crowned Ridge II 300 MW Shadow Flicker Tabular Results Sorted by Real Case Shadow Flicker Hours/Year
Realistic case shadow results at occupied structures
Results using GE 2.3-116-90 m HH, GE 2.1-116-80 m HH WTG's
UTM NAD83 Zone 14
Deuel County
continued

Receptor ID	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)	7/9/19 App. J Real Case Results	Distance to Nearest Turbine (ft)
CR2-D62-NP	Non-P	669,355.00	4,974,624.00	609.0	10:56	5:02	2,913
CR2-D38-P	Participant	667,108.00	4,982,083.00	597.0	9:01	9:01	1,693
CR2-D49-P	Participant	672,024.00	4,974,135.00	583.2	8:42	8:42	3,537
CR2-D51-NP	Non-P	675,005.00	4,970,131.00	577.8	8:27	8:27	2,717
CR2-D56-P	Participant	667,119.00	4,977,925.00	612.0	8:10	8:47	2,110
CR2-D90-NP	Non-P	670,516.00	4,962,327.00	612.0	7:36	7:36	3,360
CR2-D3-NP	Non-P	672,390.00	4,963,482.00	612.0	6:47	6:47	2,037
CR2-D208-P	Participant	676,741.00	4,964,971.00	579.0	6:43	6:43	3,205
CR2-D107-NP	Non-P	670,405.00	4,966,321.00	597.0	6:22	2:27	3,143
CR2-D77-NP	Non-P	672,044.00	4,966,468.00	600.0	5:58	5:58	2,444
CR2-D101-NP	Non-P	672,538.00	4,961,910.00	612.8	5:29	5:29	2,677
CR2-D65-NP	Non-P	670,422.00	4,966,654.00	597.0	5:26	5:26	3,583
CR2-D16-P	Participant	671,626.00	4,966,693.00	601.7	5:21	5:21	2,018
CR2-D54-NP	Non-P	672,012.00	4,966,477.00	600.0	5:15	5:15	2,500
CR2-D104-NP	Non-P	670,443.00	4,961,600.00	613.8	5:06	5:06	4,058
CR2-D109-NP	Non-P	676,885.00	4,965,806.00	576.0	4:51	4:51	4,432
CR2-D85-NP	Non-P	669,593.00	4,976,302.00	603.0	4:36	4:36	1,949
CR2-D129-NP	Non-P	669,645.00	4,973,005.00	606.0	4:30	4:30	4,511
CR2-D110-NP	Non-P	670,260.25	4,967,728.02	597.0	3:14	3:14	2,211
CR2-D220-NP	Non-P	670,260.25	4,967,728.02	597.0	3:14	3:14	2,211
CR2-D126-NP	Non-P	670,227.27	4,967,454.62	593.3	3:04	3:04	2,749
CR2-D223-NP	Non-P	670,227.27	4,967,454.62	593.3	3:04	3:04	2,749
CR2-D20-NP	Non-P	675,261.00	4,968,400.00	579.0	3:00	3:00	2,313
CR2-D36-NP	Non-P	669,812.00	4,966,746.00	591.0	2:59	2:59	2,854
CR2-D91-NP	Non-P	667,546.00	4,976,173.00	618.0	2:59	2:59	4,203
CR2-D120-NP	Non-P	673,401.00	4,964,165.00	609.0	2:19	2:19	3,110
CR2-D79-NP	Non-P	672,172.00	4,974,737.00	585.0	2:16	2:16	1,955
CR2-D41-NP	Non-P	670,437.00	4,966,409.00	597.0	2:06	2:06	3,340
CR2-D115-P	Participant	670,974.00	4,969,938.00	606.0	2:04	2:04	3,245
CR2-D224-NP	Non-P	669,886.93	4,966,846.04	590.6	1:40	*	3,261
CR2-D46-NP	Non-P	669,797.00	4,966,804.00	591.0	1:23	1:23	2,972
CR2-D45-NP	Non-P	668,018.00	4,976,064.00	611.5	0:55	0:55	4,393
CR2-D9-NP	Non-P	668,597.00	4,971,999.00	611.5	0:00	0:00	4,921
CR2-D23-NP	Non-P	669,671.00	4,980,468.00	573.0	0:00	0:00	4,380
CR2-D37-NP	Non-P	674,048.00	4,974,071.00	573.0	0:00	0:00	6,542
CR2-D48-NP	Non-P	668,923.00	4,972,998.00	609.0	0:00	0:00	2,680
CR2-D52-NP	Non-P	667,172.00	4,971,776.00	606.0	0:00	0:00	4,583
CR2-D63-NP	Non-P	670,546.00	4,961,419.00	615.0	0:00	0:00	4,065

* Not included in original submittal

Table C-2: Crowned Ridge II 300 MW Shadow Flicker Tabular Results Sorted by Real Case Shadow Flicker Hours/Year
Realistic case shadow results at occupied structures
Results using GE 2.3-116-90 m HH, GE 2.1-116-80 m HH WTG's
UTM NAD83 Zone 14
Deuel County
continued

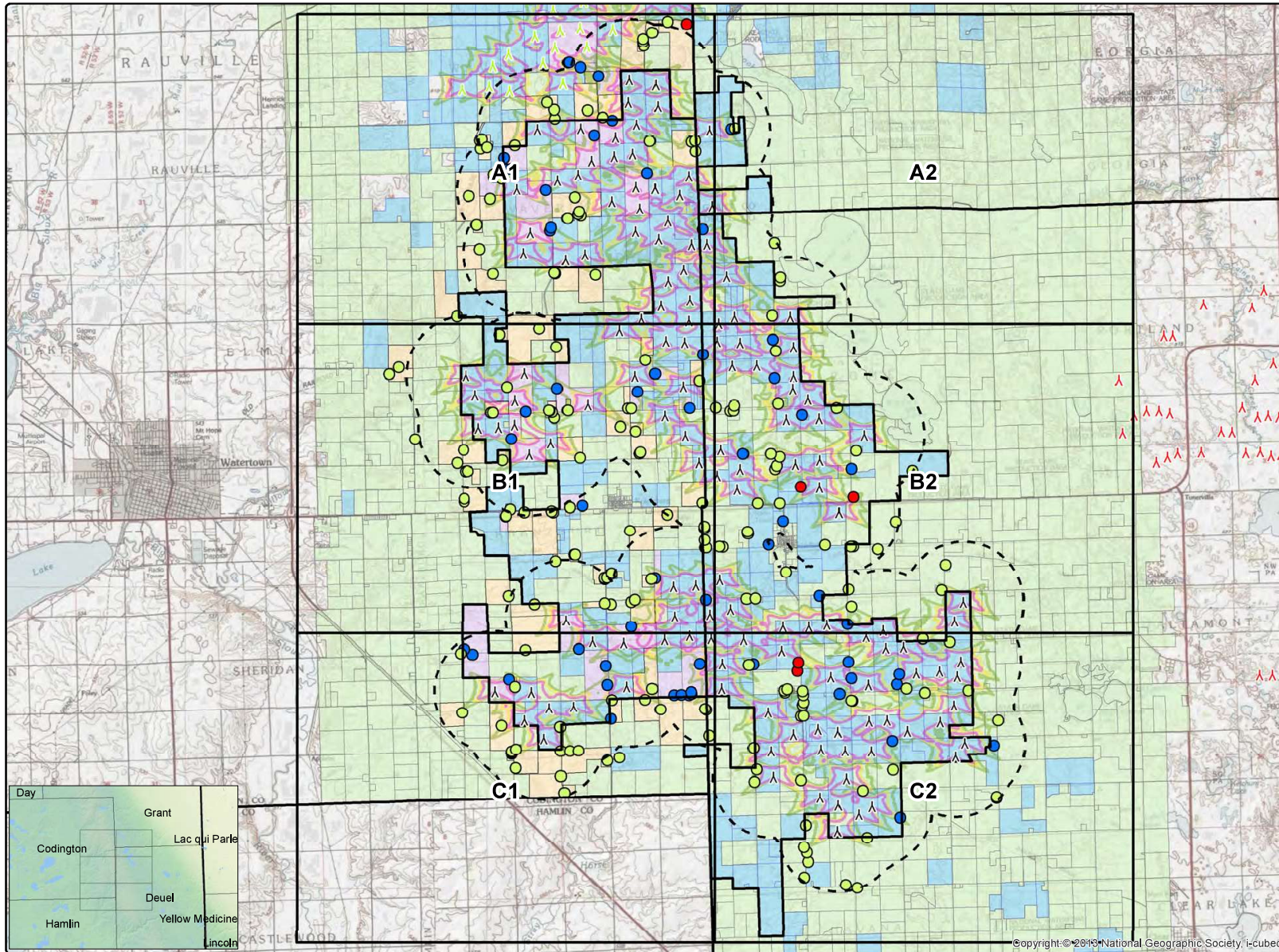
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* Not included in original submittal

Table C-2: Crowned Ridge II 300 MW Shadow Flicker Tabular Results Sorted by Real Case Shadow Flicker Hours/Year
Realistic case shadow results at occupied structures
Results using GE 2.3-116-90 m HH, GE 2.1-116-80 m HH WTG's
UTM NAD83 Zone 14
Grant County
continued

[illegible]

* Not included in original submittal



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Crowned Ridge II Wind Farm 300 MW Shadow Overview Map

Client

SWCA Environmental Consultants

Project Description

Wind turbine layout with occupied structures within 2 km.

Predicted shadow flicker levels at existing residences.

Location: Watertown, SD

Project #: 20174431

Issue Dates

1	Original	2019.10.24
#	Description	Date

Drawn By: AS

Checked By: JH

Legend

- ▲ Crowned Ridge II Turbines
- ▲ Crowned Ridge Turbines
- ▲ Deuel Harvest Turbines
- 2 km Turbine Buffer
- County Lines
- CR II Project Boundary
- CR2 Intervenor
- Non-Participants Shadow
- Participants Shadow
- Shadow Flicker (hr/yr)**
 - 10
 - 15
 - 20
 - 25
 - 30
- Non-Participating Codrington Parcels
- Participating Codrington Parcels
- Non-Participating Parcels
- Participating Parcels

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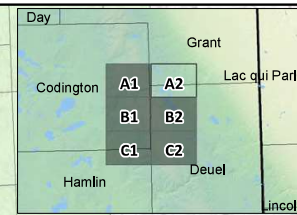
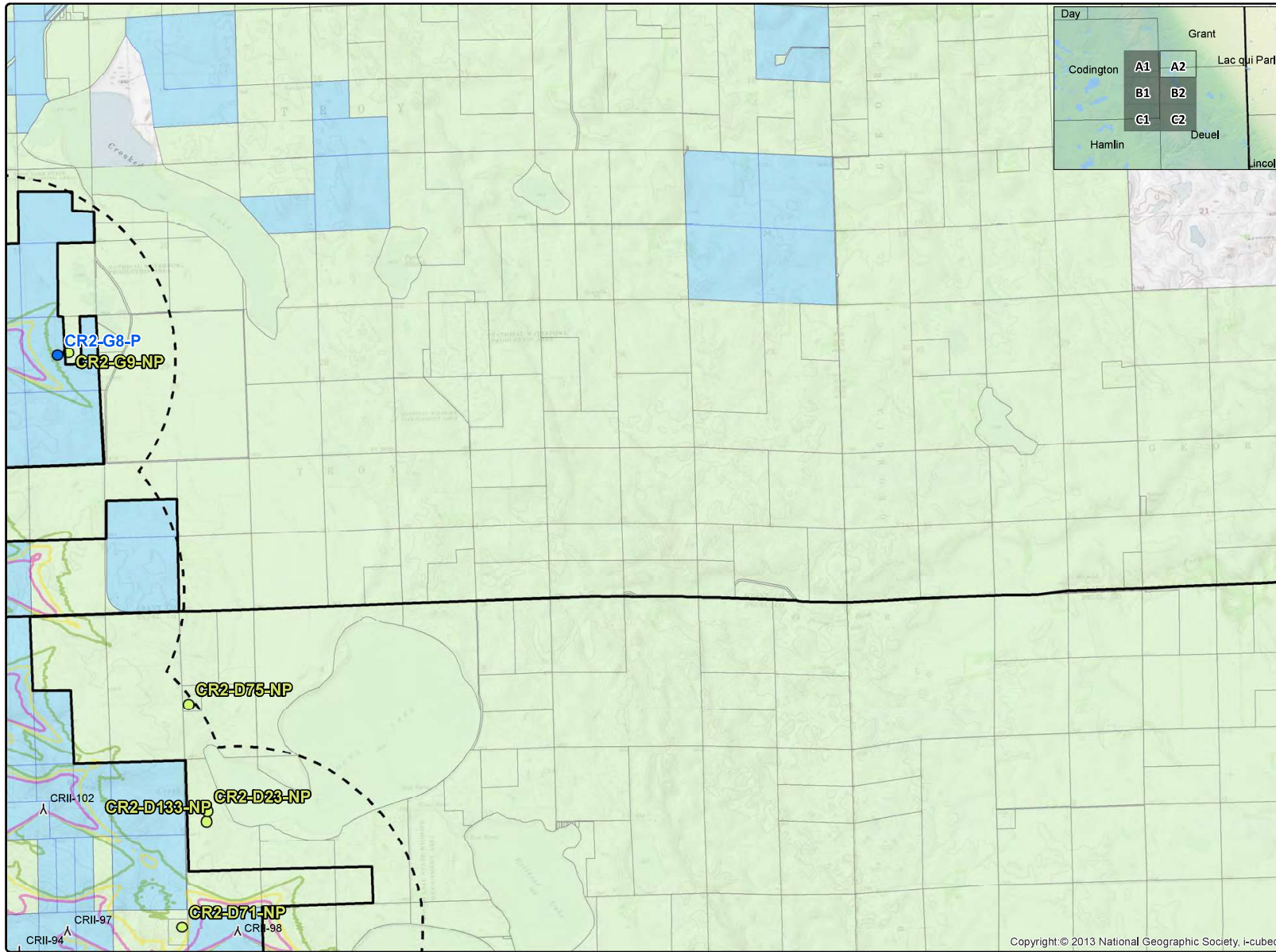


0 0.75 1.5 3 Mile



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003509





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**Crowned Ridge II Wind Farm
300 MW
Shadow Flicker Iso-Lines**

Client
SWCA Environmental Consultants

Project Description
Wind turbine layout with occupied structures within 2 km.

Predicted shadow flicker levels at existing residences.

Location: Watertown, SD
Project #: 20174431

Issue Dates

1	Original	2019.10.24
#	Description	Date

Drawn By: AS **Checked By:** JH

Legend

- ▲ Crowned Ridge II Turbines
- ▲ Crowned Ridge Turbines
- ▲ Deuel Harvest Turbines
- 2 km Turbine Buffer
- County Lines
- CR II Project Boundary
- CR2 Intervenor
- Non-Participants Shadow
- Participants Shadow

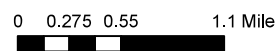
Shadow Flicker (hr/yr)

- 10
- 15
- 20
- 25
- 30

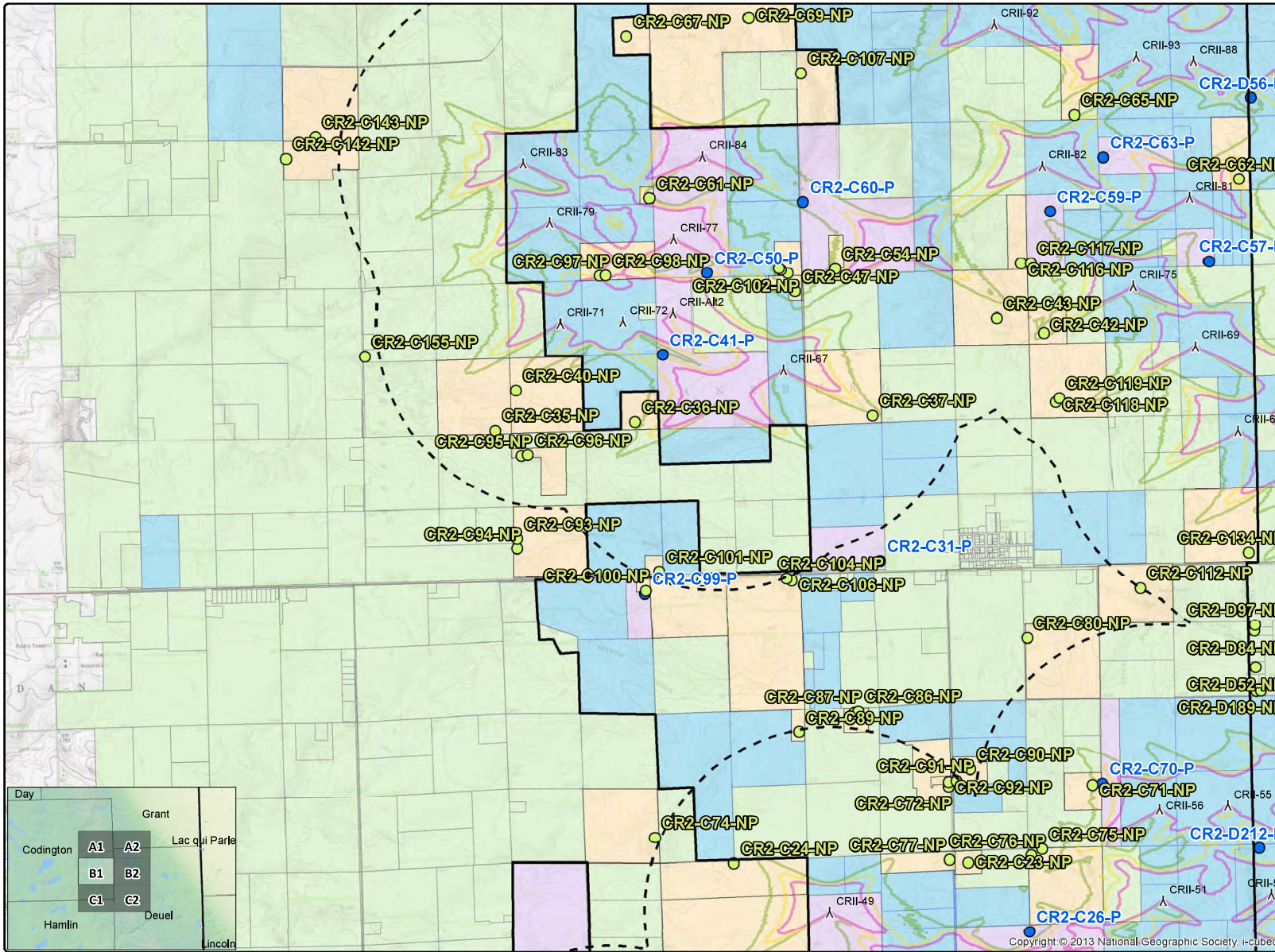
- Non-Participating Codrington_Parcel
- Participating Codrington_Parcel
- Non-Participating Parcel
- Participating Parcel

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Crowned Ridge II Wind Farm 300 MW Shadow Flicker Iso-Lines

Client
SWCA Environmental Consultants

Project Description
Wind turbine layout with occupied structures within 2 km.

Predicted shadow flicker levels at existing residences.

Location: Watertown, SD
Project #: 20174431

Issue Dates

1	Original	2019.10.24
#	Description	Date

Drawn By: AS Checked By: JH

Legend

- ▲ Crowned Ridge II Turbines
- ▲ Crowned Ridge Turbines
- ▲ Deuel Harvest Turbines
- 2 km Turbine Buffer
- County Lines
- CR II Project Boundary
- CR2 Intervenor
- Non-Participants Shadow
- Participants Shadow

Shadow Flicker (hr/yr)

- 10
- 15
- 20
- 25
- 30

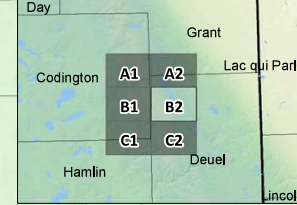
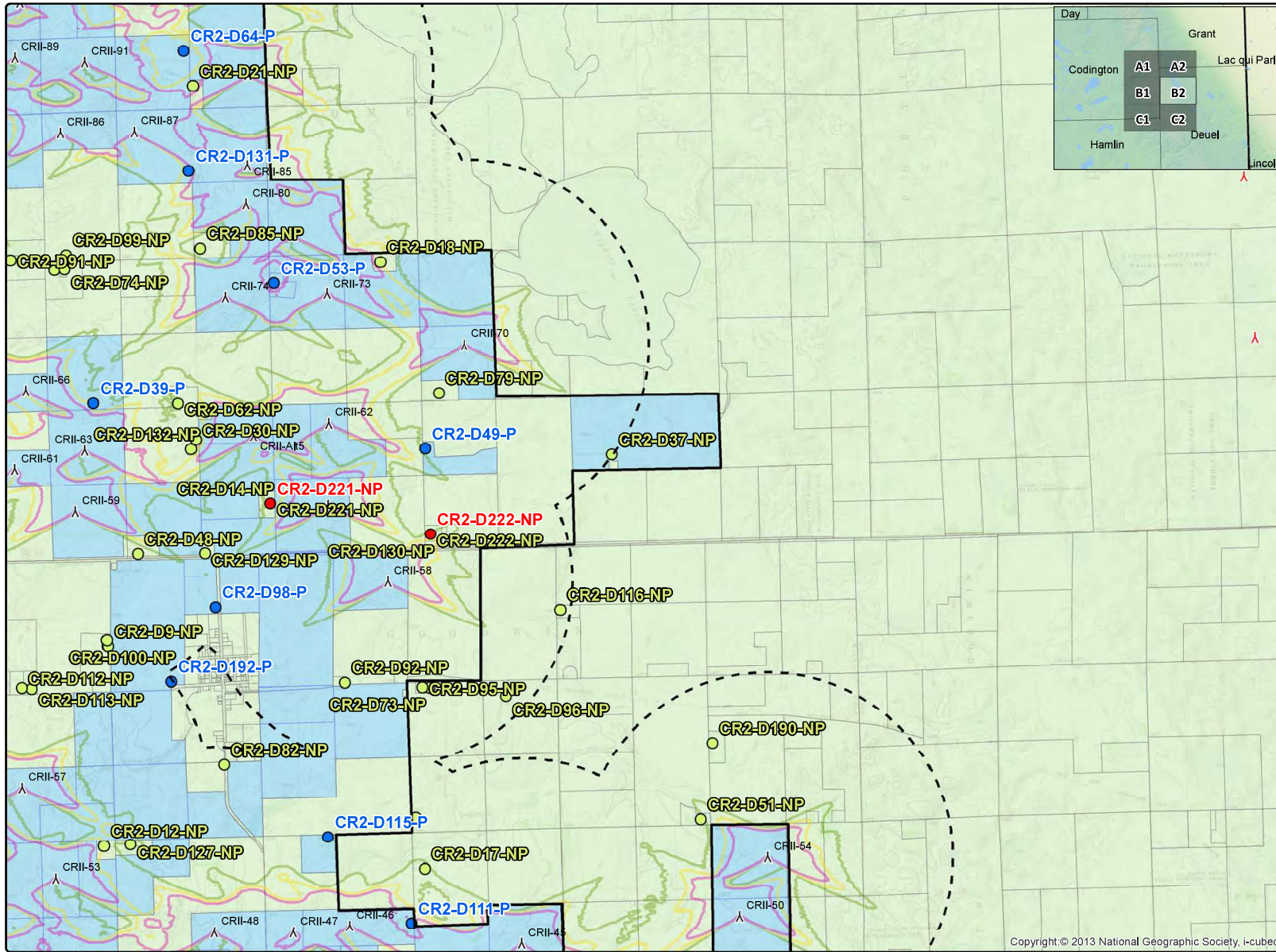
Non-Participating Codrington Parcels
 Participating Codrington Parcels
 Non-Participating Parcels
 Participating Parcels

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0 0.275 0.55 1.1 Mile

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003512



Crowned Ridge II Wind Farm 300 MW Shadow Flicker Iso-Lines

Client
SWCA Environmental Consultants

Project Description
Wind turbine layout with occupied structures within 2 km.

Predicted shadow flicker levels at existing residences.

Location: Watertown, SD
Project #: 20174431

Issue Dates

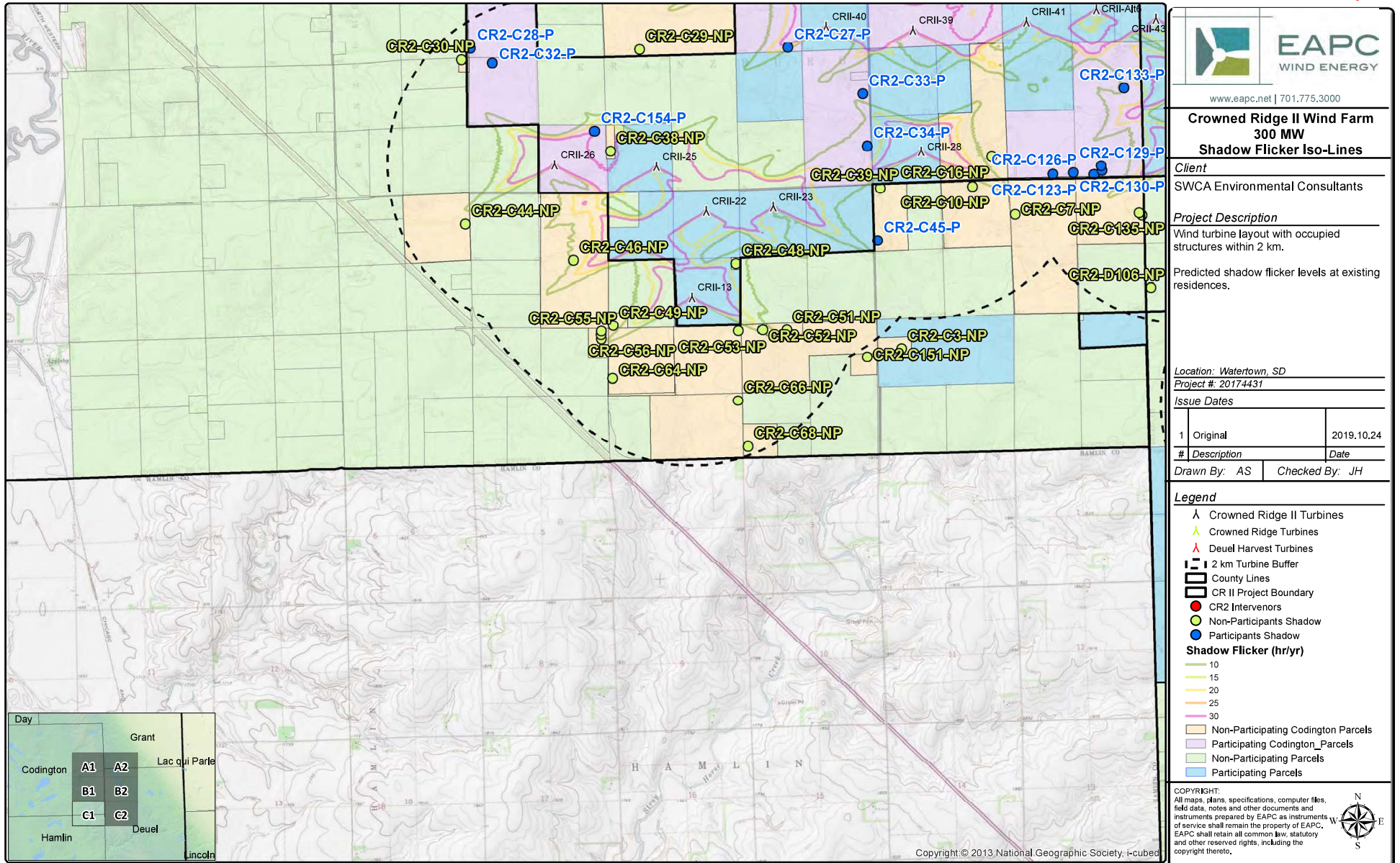
1	Original	2019.10.24
#	Description	Date
Drawn By:	AS	Checked By: JH

- Legend**
- ▲ Crowned Ridge II Turbines
 - ▲ Crowned Ridge Turbines
 - ▲ Deuel Harvest Turbines
 - 2 km Turbine Buffer
 - County Lines
 - CR II Project Boundary
 - CR2 Intervenor
 - Non-Participants Shadow
 - Participants Shadow
 - Shadow Flicker (hr/yr)**
 - 10
 - 15
 - 20
 - 25
 - 30
 - Non-Participating Codington Parcels
 - Participating Codington Parcels
 - Non-Participating Parcels
 - Participating Parcels

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0 0.275 0.55 1.1 Mile

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0 0.275 0.55 1.1 Mile

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003514

**Crowned Ridge II Wind Farm
300 MW
Shadow Flicker Iso-Lines**

<i>Client</i>
SWCA Environmental Consultants

Project Description

Wind turbine layout with occupied structures within 2 km.

Predicted shadow flicker levels at existing residences.

Location: Watertown, SD

Project #: 20174431

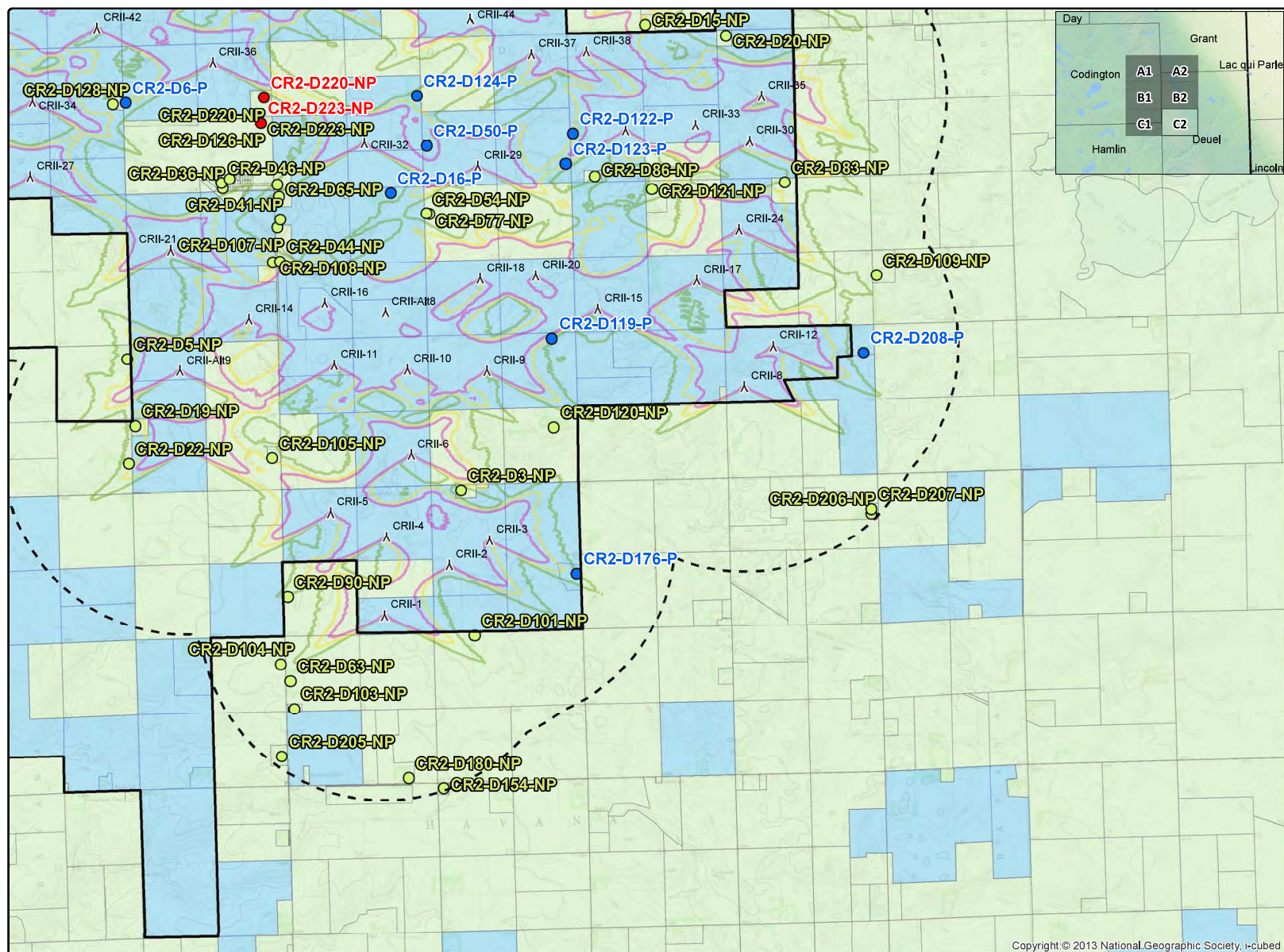
Issue Dates

1	Original	2019.10.24
#	Description	Date
Drawn By: AS		Checked By: JH

Legend

-  Crowned Ridge II Turbines
 -  Crowned Ridge Turbines
 -  Deuel Harvest Turbines
 -  2 km Turbine Buffer
 -  County Lines
 -  CR II Project Boundary
 -  CR2 Intervenor
 -  Non-Participants Shadow
 -  Participants Shadow
- Shadow Flicker (hr/yr)**
-  10
 -  15
 -  20
 -  25
 -  30
-  Non-Participating Codington Parcels
 -  Participating Codington_Parcels
 -  Non-Participating Parcels
 -  Participating Parcels

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Table C-1: Crowned Ridge II 200 MW Shadow Flicker Tabular Results Sorted by Receptor ID

Realistic case shadow results at occupied structures

Results using GE 2.3-116-90 m HH, GE 2.1-116-80 m HH WTG's

UTM NAD83 Zone 14

Codington County

Receptor ID	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)	7/9/19 App. J Report Real Case Results	Distance to Nearest Turbine (ft)
CR2-C1-NP	Non-P	662,198.00	4,980,622.00	591.0	3:51	3:51	1,909
CR2-C2-NP	Non-P	662,238.00	4,980,604.00	590.9	1:03	1:03	1,880
CR2-C3-NP	Non-P	664,345.00	4,964,571.00	556.0	0:00	0:00	7,497
CR1-C4-NP	Non-P	659,744.00	4,984,749.00	606.0	0:00	0:00	5,981
CR1-C5-NP	Non-P	659,958.00	4,984,794.00	604.8	0:00	0:00	5,659
CR1-C7-NP	Non-P	660,893.00	4,984,861.00	593.2	0:00	0:00	3,022
CR2-C7-NP	Non-P	665,694.00	4,966,179.00	570.0	0:00	0:00	4,409
CR1-C8-P	Participant	660,532.00	4,984,445.00	599.4	0:00	0:00	3,740
CR1-C9-NP	Non-P	665,352.00	4,985,004.00	609.0	18:08	18:08	2,280
CR1-C10-P	Participant	663,510.00	4,985,195.00	609.0	12:25	38:22	2,346
CR2-C10-NP	Non-P	665,189.00	4,966,505.00	570.0	0:00	0:00	2,438
CR1-C11-P	Participant	664,111.00	4,985,679.00	609.0	7:36	10:27	1,860
CR1-C12-1-NP	Non-P	662,199.00	4,986,047.00	606.0	1:28	10:34	2,818
CR1-C12-NP	Non-P	662,222.00	4,985,736.00	603.0	10:53	17:08	2,201
CR1-C13-NP	Non-P	663,792.00	4,985,785.00	612.0	12:30	18:16	2,589
CR1-C15-NP	Non-P	663,291.00	4,986,026.00	615.0	2:16	2:20	3,907
CR1-C16-NP	Non-P	661,960.00	4,986,288.00	606.0	2:19	6:17	2,648
CR2-C16-NP	Non-P	665,418.00	4,966,866.00	567.0	7:30	7:29	2,756
CR1-C18-P	Participant	663,651.00	4,987,157.00	610.4	5:58	5:58	3,409
CR1-C20-P	Participant	663,054.00	4,987,455.00	606.0	14:38	14:38	2,336
CR1-C21-P	Participant	660,756.00	4,984,086.00	594.0	1:00	1:00	2,388
CR1-C22-P	Participant	660,755.00	4,984,082.00	594.0	1:01	1:01	2,375
CR2-C22-NP	Non-P	661,202.00	4,972,711.00	597.0	0:00	0:00	6,247
CR1-C23-P	Participant	660,619.00	4,984,078.00	595.8	0:00	0:00	2,523
CR2-C23-NP	Non-P	664,069.00	4,969,661.00	594.0	0:58	0:58	4,439
CR1-C24-NP	Non-P	660,176.00	4,983,887.00	601.1	7:45	7:45	3,038
CR2-C24-NP	Non-P	661,541.00	4,969,653.00	600.0	3:21	3:21	3,809
CR1-C25-P	Participant	660,189.79	4,983,788.29	602.3	6:43	6:43	2,838
CR2-C26-P	Participant	664,733.00	4,968,915.00	591.0	6:09	6:09	1,959
CR2-C27-P	Participant	662,985.00	4,968,167.00	582.0	18:06	18:06	1,726
CR1-C28-NP	Non-P	665,429.00	4,988,598.00	590.9	2:43	2:43	2,831
CR2-C28-P	Participant	659,208.00	4,968,159.00	572.8	0:00	0:00	5,630
CR1-C29-NP	Non-P	666,572.00	4,988,867.00	575.9	6:54	*	2,457
CR2-C29-NP	Non-P	661,223.00	4,968,144.00	595.2	0:00	0:00	4,639
CR2-C30-NP	Non-P	659,100.00	4,968,023.00	568.6	0:00	0:00	5,502
CR1-C31-NP	Non-P	665,939.00	4,988,950.00	585.4	0:00	0:00	2,126
CR2-C31-P	Participant	663,117.00	4,972,923.00	606.0	0:00	0:00	7,579
CR2-C32-P	Participant	659,469.00	4,967,984.00	575.2	0:00	0:00	4,678
CR2-C33-P	Participant	663,878.00	4,967,612.00	576.1	2:28	2:28	2,999

* Not included in original submittal

Table C-1: Crowned Ridge II 200 MW Shadow Flicker Tabular Results Sorted by Receptor ID
Realistic case shadow results at occupied structures
Results using GE 2.3-116-90 m HH, GE 2.1-116-80 m HH WTG's
UTM NAD83 Zone 14
Codington County
continued

Receptor ID	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)	7/9/19 App. J Report Real Case Results	Distance to Nearest Turbine (ft)
CR2-C34-P	Participant	663,934.00	4,966,991.00	570.1	14:11	14:11	2,133
CR2-C35-NP	Non-P	658,964.00	4,974,334.00	566.8	0:00	0:00	4,432
CR2-C36-NP	Non-P	660,475.00	4,974,426.00	578.6	8:20	8:20	2,992
CR2-C37-NP	Non-P	663,037.00	4,974,496.00	606.0	9:34	9:34	3,537
CR2-C38-NP	Non-P	660,874.00	4,966,929.00	585.5	25:57	25:57	1,906
CR2-C39-NP	Non-P	664,089.00	4,966,486.00	566.2	2:27	2:27	2,178
CR2-C40-NP	Non-P	659,189.00	4,974,765.00	578.3	1:38	1:38	2,841
CR2-C41-P	Participant	660,770.00	4,975,147.00	596.4	17:22	17:22	1,532
CR2-C42-NP	Non-P	664,887.00	4,975,388.00	597.0	12:14	12:14	3,566
CR2-C43-NP	Non-P	664,382.00	4,975,544.00	597.0	1:42	1:42	4,232
CR2-C44-NP	Non-P	659,145.00	4,966,062.00	561.4	0:43	0:43	4,183
CR2-C45-P	Participant	664,058.00	4,965,862.00	570.0	4:12	4:12	3,907
CR2-C46-NP	Non-P	660,435.00	4,965,627.00	582.0	12:08	12:08	2,569
CR2-C47-NP	Non-P	662,200.00	4,975,837.00	594.5	9:41	7:58	2,821
CR2-C48-NP	Non-P	662,370.00	4,965,588.00	590.3	19:13	19:13	2,172
CR2-C49-NP	Non-P	660,907.00	4,964,846.00	582.0	6:36	6:36	3,271
CR2-C50-P	Participant	661,252.00	4,976,035.00	597.0	19:23	4:15	1,696
CR2-C51-NP	Non-P	662,977.00	4,964,794.00	584.0	4:41	4:41	3,934
CR2-C52-NP	Non-P	662,688.00	4,964,792.00	585.9	14:32	14:32	3,054
CR2-C53-NP	Non-P	662,401.00	4,964,782.00	582.0	0:00	0:00	2,257
CR2-C54-NP	Non-P	662,636.00	4,976,079.00	597.0	12:36	12:36	2,287
CR2-C55-NP	Non-P	660,765.00	4,964,777.00	582.0	4:36	4:36	3,655
CR2-C56-NP	Non-P	660,759.00	4,964,737.00	582.0	4:54	4:54	3,786
CR2-C57-P	Participant	666,667.00	4,976,162.00	613.8	5:03	5:03	2,362
CR2-C58-NP	Non-P	660,764.00	4,964,686.00	582.0	5:51	5:51	3,904
CR2-C59-P	Participant	664,952.00	4,976,698.00	601.9	4:30	4:30	1,654
CR2-C60-P	Participant	662,287.00	4,976,800.00	594.0	13:54	13:54	3,793
CR2-C61-NP	Non-P	660,630.00	4,976,840.00	582.5	12:08	12:08	1,667
CR2-C62-NP	Non-P	666,992.00	4,977,048.00	615.0	16:54	16:54	1,860
CR2-C63-P	Participant	665,528.00	4,977,285.00	612.0	14:41	14:41	2,185
CR2-C64-NP	Non-P	660,901.00	4,964,220.00	582.0	0:00	0:00	4,429
CR2-C65-NP	Non-P	665,217.00	4,977,746.00	609.0	7:16	7:16	2,139
CR1-C66-NP	Non-P	659,718.00	4,985,032.00	606.0	0:00	0:00	5,800
CR2-C66-NP	Non-P	662,396.00	4,963,954.00	582.0	0:00	0:00	4,429
CR1-C67-NP	Non-P	659,789.00	4,985,057.00	606.0	0:00	0:00	5,791
CR2-C67-NP	Non-P	660,379.00	4,978,592.00	556.1	0:00	0:00	5,033
CR1-C68-P	Participant	662,652.00	4,987,606.00	609.0	6:44	6:44	2,146
CR2-C68-NP	Non-P	662,517.00	4,963,408.00	579.0	0:00	0:00	6,237

* Not included in original submittal

Table C-1: Crowned Ridge II 200 MW Shadow Flicker Tabular Results Sorted by Receptor ID
Realistic case shadow results at occupied structures
Results using GE 2.3-116-90 m HH, GE 2.1-116-80 m HH WTG's
UTM NAD83 Zone 14
Codington County
continued

Receptor ID	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)	7/9/19 App. J Report Real Case Results	Distance to Nearest Turbine (ft)
CR1-C69-P	Participant	662,685.00	4,987,619.00	609.0	6:05	6:05	2,185
CR2-C69-NP	Non-P	661,701.00	4,978,792.00	564.0	0:00	0:00	5,171
CR1-C70-NP	Non-P	665,135.00	4,988,293.00	595.9	12:01	12:01	3,540
CR2-C70-P	Participant	665,521.00	4,970,518.00	588.9	11:52	13:57	2,215
CR1-C71-NP	Non-P	665,137.00	4,988,378.00	595.6	7:23	7:23	3,448
CR2-C71-NP	Non-P	665,411.00	4,970,503.00	586.1	8:28	10:14	2,529
CR1-C72-NP	Non-P	665,158.00	4,988,170.00	594.6	7:39	7:39	3,776
CR2-C72-NP	Non-P	663,856.00	4,970,488.00	597.0	0:00	0:00	6,135
CR1-C73-NP	Non-P	663,066.00	4,982,530.00	591.0	6:57	6:57	3,704
CR1-C74-NP	Non-P	662,869.00	4,983,122.00	595.7	2:34	2:34	2,480
CR2-C74-NP	Non-P	660,687.00	4,969,931.00	586.5	0:00	0:00	6,732
CR1-C75-NP	Non-P	663,010.00	4,982,658.00	588.0	4:25	4:25	3,730
CR2-C75-NP	Non-P	664,866.00	4,969,808.00	583.7	5:05	5:05	4,396
CR1-C76-NP	Non-P	662,981.00	4,982,580.00	588.3	5:26	5:26	3,901
CR2-C76-NP	Non-P	664,747.00	4,969,738.00	584.8	3:53	3:53	4,560
CR1-C77-P	Participant	661,915.00	4,983,367.00	591.0	12:12	12:12	1,654
CR2-C77-NP	Non-P	663,865.00	4,969,694.00	597.0	1:28	1:28	4,406
CR1-C78-P	Participant	660,190.00	4,983,788.00	602.3	6:43	6:43	2,835
CR2-C78-P	Participant	665,273.00	4,983,933.00	609.0	25:17	25:17	1,919
CR1-C79-NP	Non-P	660,452.00	4,983,750.00	595.9	22:38	22:37	2,037
CR2-C79-NP	Non-P	666,869.00	4,984,663.00	587.9	0:00	0:00	2,703
CR1-C80-NP	Non-P	659,351.00	4,983,174.00	604.4	0:40	0:40	5,308
CR2-C80-NP	Non-P	664,705.00	4,972,092.00	597.3	0:00	0:00	7,684
CR1-C81-NP	Non-P	660,062.00	4,983,083.00	597.0	6:15	6:15	3,094
CR1-C84-NP	Non-P	659,607.00	4,982,216.00	594.0	0:00	0:00	5,856
CR1-C85-NP	Non-P	659,706.00	4,981,419.00	588.0	1:22	1:22	4,819
CR1-C86-P	Participant	662,086.00	4,982,135.00	585.0	16:51	16:51	2,306
CR2-C86-NP	Non-P	662,880.00	4,971,302.00	603.0	0:00	0:00	7,208
CR1-C87-NP	Non-P	662,628.00	4,982,425.00	585.4	4:09	4:09	4,258
CR2-C87-NP	Non-P	662,841.00	4,971,294.00	603.0	0:00	0:00	7,165
CR1-C88-NP	Non-P	660,156.00	4,980,595.00	570.9	0:00	0:00	4,045
CR1-C89-P	Participant	662,062.00	4,982,029.00	584.3	21:39	21:39	2,165
CR2-C89-NP	Non-P	662,244.00	4,971,076.00	603.0	0:00	0:00	6,489
CR2-C90-NP	Non-P	664,088.41	4,970,672.24	594.0	0:00	0:00	6,863
CR2-C91-NP	Non-P	663,938.00	4,970,546.00	597.0	0:00	0:00	6,457
CR2-C92-NP	Non-P	663,855.00	4,970,535.00	597.0	0:00	0:00	6,247
CR2-C93-NP	Non-P	659,203.00	4,973,158.00	584.9	0:00	0:00	7,792
CR2-C94-NP	Non-P	659,202.00	4,973,052.00	583.9	0:00	0:00	8,133

* Not included in original submittal

Table C-1: Crowned Ridge II 200 MW Shadow Flicker Tabular Results Sorted by Receptor ID
Realistic case shadow results at occupied structures
Results using GE 2.3-116-90 m HH, GE 2.1-116-80 m HH WTG's
UTM NAD83 Zone 14
Codington County
continued

Receptor ID	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)	7/9/19 App. J Report Real Case Results	Distance to Nearest Turbine (ft)
CR2-C95-NP	Non-P	659,248.00	4,974,054.00	567.0	0:00	0:00	4,898
CR2-C96-NP	Non-P	659,316.00	4,974,063.00	570.6	0:00	0:00	4,813
CR2-C97-NP	Non-P	660,093.00	4,976,001.00	583.8	29:21	21:51	1,814
CR2-C98-NP	Non-P	660,155.00	4,976,007.00	582.8	32:23	23:19	1,749
CR2-C99-P	Participant	660,584.00	4,972,570.00	591.0	0:00	0:00	7,165
CR2-C100-NP	Non-P	660,592.00	4,972,602.00	591.0	0:00	0:00	7,057
CR2-C101-NP	Non-P	660,732.00	4,972,807.00	591.0	0:00	0:00	6,266
CR2-C102-NP	Non-P	662,025.00	4,976,085.00	594.1	8:29	6:09	3,609
CR2-C103-NP	Non-P	662,046.00	4,976,067.00	594.8	8:17	6:06	3,547
CR2-C104-NP	Non-P	662,109.00	4,972,735.00	604.0	0:00	0:00	6,608
CR2-C105-NP	Non-P	662,122.00	4,976,029.00	595.3	7:46	5:58	3,425
CR2-C106-NP	Non-P	662,165.00	4,972,711.00	604.7	0:00	0:00	6,749
CR2-C107-NP	Non-P	662,265.00	4,978,194.00	577.7	4:21	4:21	4,564
CR2-C109-NP	Non-P	662,699.00	4,972,874.00	606.0	0:00	0:00	7,169
CR2-C112-NP	Non-P	665,928.00	4,972,630.00	603.0	0:00	0:00	6,575
CR2-C115-NP	Non-P	663,555.00	4,980,564.00	575.2	8:18	8:18	2,520
CR2-C116-NP	Non-P	664,640.00	4,976,142.00	591.1	4:50	4:50	3,533
CR2-C117-NP	Non-P	664,742.00	4,976,142.00	594.2	4:53	4:53	3,481
CR2-C118-NP	Non-P	665,014.00	4,974,639.00	600.0	1:57	1:57	4,947
CR2-C119-NP	Non-P	665,052.00	4,974,682.00	600.0	2:06	2:06	4,760
CR2-C123-P	Participant	666,146.00	4,966,653.00	579.4	2:13	2:13	5,216
CR2-C126-P	Participant	666,389.00	4,966,670.00	585.0	1:40	1:40	4,455
CR2-C128-P	Participant	666,636.00	4,966,649.00	589.0	3:00	3:00	3,671
CR2-C129-P	Participant	666,716.00	4,966,751.00	591.0	3:31	3:31	3,356
CR2-C130-P	Participant	666,727.00	4,966,695.00	591.0	3:42	3:42	3,350
CR2-C131-NP	Non-P	666,732.00	4,984,987.00	591.0	10:06	10:06	2,287
CR2-C132-NP	Non-P	666,857.00	4,985,021.00	588.2	1:47	1:47	1,883
CR2-C133-P	Participant	666,992.00	4,967,681.00	571.2	5:14	13:37	3,002
CR2-C134-NP	Non-P	667,097.00	4,973,011.00	613.0	3:42	3:42	3,363
CR2-C135-NP	Non-P	667,172.00	4,966,196.00	595.2	0:00	0:00	2,884
CR2-C136-NP	Non-P	667,209.00	4,966,166.00	595.4	0:00	0:00	2,887
CR2-C137-NP	Non-P	658,951.00	4,979,194.00	568.2	0:00	0:00	6,555
CR2-C142-NP	Non-P	656,697.00	4,977,269.00	566.9	0:00	0:00	8,432
CR2-C143-NP	Non-P	657,016.00	4,977,505.00	553.6	0:00	0:00	7,444
CR2-C151-NP	Non-P	663,934.00	4,964,475.00	556.1	0:00	0:00	6,929
CR2-C154-P	Participant	660,684.34	4,967,166.18	588.0	30:00	30:00	2,041
CR2-C155-NP	Non-P	657,554.06	4,975,128.16	554.6	0:00	*	7,034

* Not included in original submittal

Table C-1: Crowned Ridge II 200 MW Shadow Flicker Tabular Results Sorted by Receptor ID

Realistic case shadow results at occupied structures

Results using GE 2.3-116-90 m HH, GE 2.1-116-80 m HH WTG's

UTM NAD83 Zone 14

Deuel County

continued

Receptor ID	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)	7/9/19 App. J Report Real Case Results	Distance to Nearest Turbine (ft)
CR2-D3-NP	Non-P	672,390.00	4,963,482.00	612.0	0:00	6:47	18,746
CR2-D5-NP	Non-P	668,781.00	4,964,897.00	603.0	0:00	2:14	7,342
CR2-D6-P	Participant	668,762.00	4,967,671.00	591.0	3:35	17:17	2,844
CR2-D9-NP	Non-P	668,597.00	4,971,999.00	611.5	0:00	0:00	4,921
CR2-D11-NP	Non-P	669,646.00	4,974,534.00	604.4	21:54	5:51	1,919
CR2-D12-NP	Non-P	668,558.00	4,969,840.00	604.7	18:07	18:07	2,051
CR2-D14-NP	Non-P	670,351.11	4,973,543.31	606.0	11:51	14:04	2,041
CR2-D15-NP	Non-P	674,387.00	4,968,515.00	588.0	0:00	24:00	12,474
CR2-D16-P	Participant	671,626.00	4,966,693.00	601.7	0:00	5:21	8,005
CR2-D17-NP	Non-P	672,023.00	4,969,597.00	597.0	1:06	13:45	5,167
CR2-D18-NP	Non-P	671,540.00	4,976,154.00	582.0	22:04	22:04	2,201
CR2-D19-NP	Non-P	668,870.00	4,964,178.00	606.0	0:00	13:59	9,600
CR2-D20-NP	Non-P	675,261.00	4,968,400.00	579.0	0:00	3:00	15,364
CR2-D21-NP	Non-P	669,517.00	4,978,053.00	596.1	28:59	28:59	1,985
CR2-D22-NP	Non-P	668,798.00	4,963,767.00	603.1	0:00	14:21	10,777
CR2-D23-NP	Non-P	669,671.00	4,980,468.00	573.0	0:00	0:00	4,380
CR2-D30-NP	Non-P	669,549.00	4,974,233.00	611.9	17:10	6:03	2,044
CR2-D36-NP	Non-P	669,812.00	4,966,746.00	591.0	0:00	2:59	6,837
CR2-D37-NP	Non-P	674,048.00	4,974,071.00	573.0	0:00	0:00	6,542
CR2-D38-P	Participant	667,108.00	4,982,083.00	597.0	5:20	9:01	1,693
CR2-D39-P	Participant	668,443.00	4,974,627.00	614.4	18:50	18:50	1,706
CR2-D41-NP	Non-P	670,437.00	4,966,409.00	597.0	0:00	2:06	8,225
CR2-D44-NP	Non-P	670,434.00	4,965,956.00	593.8	0:00	20:58	9,363
CR2-D45-NP	Non-P	668,018.00	4,976,064.00	611.5	0:55	0:55	4,393
CR2-D46-NP	Non-P	669,797.00	4,966,804.00	591.0	0:00	1:23	6,778
CR2-D48-NP	Non-P	668,923.00	4,972,998.00	609.0	0:00	0:00	2,680
CR2-D49-P	Participant	672,024.00	4,974,135.00	583.2	8:42	8:42	3,537
CR2-D50-P	Participant	672,015.00	4,967,209.00	602.8	0:00	24:57	7,247
CR2-D51-NP	Non-P	675,005.00	4,970,131.00	577.8	0:00	8:27	14,977
CR2-D52-NP	Non-P	667,172.00	4,971,776.00	606.0	0:00	0:00	4,583
CR2-D53-P	Participant	670,392.00	4,975,925.00	592.8	27:37	27:37	1,801
CR2-D54-NP	Non-P	672,012.00	4,966,477.00	600.0	0:00	5:15	9,219
CR2-D56-P	Participant	667,119.00	4,977,925.00	612.0	5:18	8:47	2,110
CR2-D62-NP	Non-P	669,355.00	4,974,624.00	609.0	10:56	5:02	2,913
CR2-D63-NP	Non-P	670,546.00	4,961,419.00	615.0	0:00	0:00	20,138
CR2-D64-P	Participant	669,417.00	4,978,434.00	588.0	14:03	14:01	2,425
CR2-D65-NP	Non-P	670,422.00	4,966,654.00	597.0	0:00	5:26	7,424
CR2-D71-NP	Non-P	669,402.00	4,979,216.00	588.0	18:30	18:12	1,975

* Not included in original submittal

Table C-1: Crowned Ridge II 200 MW Shadow Flicker Tabular Results Sorted by Receptor ID
Realistic case shadow results at occupied structures
Results using GE 2.3-116-90 m HH, GE 2.1-116-80 m HH WTG's
UTM NAD83 Zone 14
Deuel County
continued

Receptor ID	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)	7/9/19 App. J Report Real Case Results	Distance to Nearest Turbine (ft)
CR2-D72-NP	Non-P	671,925.00	4,970,149.00	603.0	0:00	0:00	5,938
CR2-D73-NP	Non-P	672,072.00	4,971,556.00	600.0	0:00	0:00	7,405
CR2-D74-NP	Non-P	668,130.00	4,976,068.00	609.2	0:00	0:00	4,505
CR2-D75-NP	Non-P	669,473.00	4,981,625.00	570.0	0:00	0:00	7,319
CR2-D77-NP	Non-P	672,044.00	4,966,468.00	600.0	0:00	5:58	9,298
CR2-D79-NP	Non-P	672,172.00	4,974,737.00	585.0	2:16	2:16	1,955
CR2-D82-NP	Non-P	669,855.00	4,970,718.00	603.0	0:00	0:00	5,935
CR2-D83-NP	Non-P	675,891.00	4,966,810.00	579.0	0:00	12:25	18,658
CR2-D84-NP	Non-P	667,159.00	4,972,169.00	598.2	0:00	0:00	5,535
CR2-D85-NP	Non-P	669,593.00	4,976,302.00	603.0	4:36	4:36	1,949
CR2-D86-NP	Non-P	673,842.00	4,966,875.00	597.0	0:00	12:07	12,542
CR2-D90-NP	Non-P	670,516.00	4,962,327.00	612.0	0:00	7:36	17,493
CR2-D91-NP	Non-P	667,546.00	4,976,173.00	618.0	2:59	2:59	4,203
CR2-D92-NP	Non-P	671,159.00	4,971,610.00	597.2	0:00	0:00	6,319
CR2-D95-NP	Non-P	671,994.00	4,971,562.00	600.0	0:00	0:00	7,264
CR2-D96-NP	Non-P	672,899.00	4,971,469.00	594.0	0:00	0:00	9,249
CR2-D97-NP	Non-P	667,164.00	4,972,232.00	600.0	0:00	0:00	5,371
CR2-D98-P	Participant	669,757.00	4,972,426.00	606.0	0:00	0:00	5,381
CR2-D99-NP	Non-P	668,148.00	4,976,230.00	608.8	0:00	0:00	4,331
CR2-D100-NP	Non-P	668,589.00	4,972,064.00	609.9	0:00	0:00	4,708
CR2-D101-NP	Non-P	672,538.00	4,961,910.00	612.8	0:00	5:29	22,667
CR2-D103-NP	Non-P	670,588.00	4,961,119.00	615.0	0:00	0:00	21,079
CR2-D104-NP	Non-P	670,443.00	4,961,600.00	613.8	0:00	5:06	19,455
CR2-D105-NP	Non-P	670,348.00	4,963,826.00	611.7	0:00	17:56	13,179
CR2-D106-NP	Non-P	667,315.00	4,965,297.00	594.0	0:00	0:00	5,351
CR2-D107-NP	Non-P	670,405.00	4,966,321.00	597.0	0:00	2:27	8,520
CR2-D108-NP	Non-P	670,354.00	4,965,949.00	594.0	0:00	23:04	9,121
CR2-D109-NP	Non-P	676,885.00	4,965,806.00	576.0	0:00	4:51	22,979
CR2-D110-NP	Non-P	670,260.25	4,967,728.02	597.0	0:00	3:14	4,042
CR2-D111-P	Participant	671,876.00	4,969,006.00	600.0	2:01	29:32	4,180
CR2-D112-NP	Non-P	667,666.00	4,971,554.00	604.6	0:00	0:00	3,553
CR2-D113-NP	Non-P	667,774.00	4,971,544.00	606.9	0:00	0:00	3,537
CR2-D115-P	Participant	670,974.00	4,969,938.00	606.0	2:04	2:04	3,583
CR2-D116-NP	Non-P	673,491.00	4,972,398.00	577.8	0:00	0:00	9,055
CR2-D119-P	Participant	673,378.00	4,965,126.00	602.6	0:00	16:30	15,390
CR2-D120-NP	Non-P	673,401.00	4,964,165.00	609.0	0:00	2:19	18,067
CR2-D121-NP	Non-P	674,461.00	4,966,734.00	594.0	0:00	12:06	14,524
CR2-D122-P	Participant	673,601.00	4,967,341.00	594.0	0:00	18:17	11,092

* Not included in original submittal

continued

[illegible]

* Not included in original submittal

Table C-1: Crowned Ridge II 200 MW Shadow Flicker Tabular Results Sorted by Receptor ID
Realistic case shadow results at occupied structures
Results using GE 2.3-116-90 m HH, GE 2.1-116-80 m HH WTG's
UTM NAD83 Zone 14
Grant County
continued

[illegible]

* Not included in original submittal

Table C-2: Crowned Ridge II 200 MW Shadow Flicker Tabular Results Sorted by Real Case Shadow Flicker Hours/Year
Realistic case shadow results at occupied structures
Results using GE 2.3-116-90 m HH, GE 2.1-116-80 m HH WTG's
UTM NAD83 Zone 14
Codrington County

Receptor ID	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)	7/9/19 App. J Report Real Case Results	Distance to Nearest Turbine (ft)
CR2-C98-NP	Non-P	660,155.00	4,976,007.00	582.8	32:23	23:19	1,749
CR2-C154-P	Participant	660,684.34	4,967,166.18	588.0	30:00	30:00	2,041
CR2-C97-NP	Non-P	660,093.00	4,976,001.00	583.8	29:21	21:51	1,814
CR2-C38-NP	Non-P	660,874.00	4,966,929.00	585.5	25:57	25:57	1,906
CR2-C78-P	Participant	665,273.00	4,983,933.00	609.0	25:17	25:17	1,919
CR1-C79-NP	Non-P	660,452.00	4,983,750.00	595.9	22:38	22:37	2,037
CR1-C89-P	Participant	662,062.00	4,982,029.00	584.3	21:39	21:39	2,165
CR2-C50-P	Participant	661,252.00	4,976,035.00	597.0	19:23	4:15	1,696
CR2-C48-NP	Non-P	662,370.00	4,965,588.00	590.3	19:13	19:13	2,172
CR1-C9-NP	Non-P	665,352.00	4,985,004.00	609.0	18:08	18:08	2,280
CR2-C27-P	Participant	662,985.00	4,968,167.00	582.0	18:06	18:06	1,726
CR2-C41-P	Participant	660,770.00	4,975,147.00	596.4	17:22	17:22	1,532
CR2-C62-NP	Non-P	666,992.00	4,977,048.00	615.0	16:54	16:54	1,860
CR1-C86-P	Participant	662,086.00	4,982,135.00	585.0	16:51	16:51	2,306
CR2-C63-P	Participant	665,528.00	4,977,285.00	612.0	14:41	14:41	2,185
CR1-C20-P	Participant	663,054.00	4,987,455.00	606.0	14:38	14:38	2,336
CR2-C52-NP	Non-P	662,688.00	4,964,792.00	585.9	14:32	14:32	3,054
CR2-C34-P	Participant	663,934.00	4,966,991.00	570.1	14:11	14:11	2,133
CR2-C60-P	Participant	662,287.00	4,976,800.00	594.0	13:54	13:54	3,793
CR2-C54-NP	Non-P	662,636.00	4,976,079.00	597.0	12:36	12:36	2,287
CR1-C13-NP	Non-P	663,792.00	4,985,785.00	612.0	12:30	18:16	2,589
CR1-C10-P	Participant	663,510.00	4,985,195.00	609.0	12:25	38:22	2,346
CR2-C42-NP	Non-P	664,887.00	4,975,388.00	597.0	12:14	12:14	3,566
CR1-C77-P	Participant	661,915.00	4,983,367.00	591.0	12:12	12:12	1,654
CR2-C46-NP	Non-P	660,435.00	4,965,627.00	582.0	12:08	12:08	2,569
CR2-C61-NP	Non-P	660,630.00	4,976,840.00	582.5	12:08	12:08	1,667
CR1-C70-NP	Non-P	665,135.00	4,988,293.00	595.9	12:01	12:01	3,540
CR2-C70-P	Participant	665,521.00	4,970,518.00	588.9	11:52	13:57	2,215
CR1-C12-NP	Non-P	662,222.00	4,985,736.00	603.0	10:53	17:08	2,201
CR2-C131-NP	Non-P	666,732.00	4,984,987.00	591.0	10:06	10:06	2,287
CR2-C47-NP	Non-P	662,200.00	4,975,837.00	594.5	9:41	7:58	2,821
CR2-C37-NP	Non-P	663,037.00	4,974,496.00	606.0	9:34	9:34	3,537
CR2-C102-NP	Non-P	662,025.00	4,976,085.00	594.1	8:29	6:09	3,609
CR2-C71-NP	Non-P	665,411.00	4,970,503.00	586.1	8:28	10:14	2,529
CR2-C36-NP	Non-P	660,475.00	4,974,426.00	578.6	8:20	8:20	2,992
CR2-C115-NP	Non-P	663,555.00	4,980,564.00	575.2	8:18	8:18	2,520
CR2-C103-NP	Non-P	662,046.00	4,976,067.00	594.8	8:17	6:06	3,547
CR2-C105-NP	Non-P	662,122.00	4,976,029.00	595.3	7:46	5:58	3,425
CR1-C24-NP	Non-P	660,176.00	4,983,887.00	601.1	7:45	7:45	3,038

* Not included in original submittal

Table C-2: Crowned Ridge II 200 MW Shadow Flicker Tabular Results Sorted by Real Case Shadow Flicker Hours/Year
Realistic case shadow results at occupied structures
Results using GE 2.3-116-90 m HH, GE 2.1-116-80 m HH WTG's
UTM NAD83 Zone 14
Coddington County
continued

Receptor ID	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)	7/9/19 App. J Report Real Case Results	Distance to Nearest Turbine (ft)
CR1-C72-NP	Non-P	665,158.00	4,988,170.00	594.6	7:39	7:39	3,776
CR1-C11-P	Participant	664,111.00	4,985,679.00	609.0	7:36	10:27	1,860
CR2-C16-NP	Non-P	665,418.00	4,966,866.00	567.0	7:30	7:29	2,756
CR1-C71-NP	Non-P	665,137.00	4,988,378.00	595.6	7:23	7:23	3,448
CR2-C65-NP	Non-P	665,217.00	4,977,746.00	609.0	7:16	7:16	2,139
CR1-C73-NP	Non-P	663,066.00	4,982,530.00	591.0	6:57	6:57	3,704
CR1-C29-NP	Non-P	666,572.00	4,988,867.00	575.9	6:54	*	2,457
CR1-C68-P	Participant	662,652.00	4,987,606.00	609.0	6:44	6:44	2,146
CR1-C25-P	Participant	660,189.79	4,983,788.29	602.3	6:43	6:43	2,838
CR1-C78-P	Participant	660,190.00	4,983,788.00	602.3	6:43	6:43	2,835
CR2-C49-NP	Non-P	660,907.00	4,964,846.00	582.0	6:36	6:36	3,271
CR1-C81-NP	Non-P	660,062.00	4,983,083.00	597.0	6:15	6:15	3,094
CR2-C26-P	Participant	664,733.00	4,968,915.00	591.0	6:09	6:09	1,959
CR1-C69-P	Participant	662,685.00	4,987,619.00	609.0	6:05	6:05	2,185
CR1-C18-P	Participant	663,651.00	4,987,157.00	610.4	5:58	5:58	3,409
CR2-C58-NP	Non-P	660,764.00	4,964,686.00	582.0	5:51	5:51	3,904
CR1-C76-NP	Non-P	662,981.00	4,982,580.00	588.3	5:26	5:26	3,901
CR2-C133-P	Participant	666,992.00	4,967,681.00	571.2	5:14	13:37	3,002
CR2-C75-NP	Non-P	664,866.00	4,969,808.00	583.7	5:05	5:05	4,396
CR2-C57-P	Participant	666,667.00	4,976,162.00	613.8	5:03	5:03	2,362
CR2-C56-NP	Non-P	660,759.00	4,964,737.00	582.0	4:54	4:54	3,786
CR2-C117-NP	Non-P	664,742.00	4,976,142.00	594.2	4:53	4:53	3,481
CR2-C116-NP	Non-P	664,640.00	4,976,142.00	591.1	4:50	4:50	3,533
CR2-C51-NP	Non-P	662,977.00	4,964,794.00	584.0	4:41	4:41	3,934
CR2-C55-NP	Non-P	660,765.00	4,964,777.00	582.0	4:36	4:36	3,655
CR2-C59-P	Participant	664,952.00	4,976,698.00	601.9	4:30	4:30	1,654
CR1-C75-NP	Non-P	663,010.00	4,982,658.00	588.0	4:25	4:25	3,730
CR2-C107-NP	Non-P	662,265.00	4,978,194.00	577.7	4:21	4:21	4,564
CR2-C45-P	Participant	664,058.00	4,965,862.00	570.0	4:12	4:12	3,907
CR1-C87-NP	Non-P	662,628.00	4,982,425.00	585.4	4:09	4:09	4,258
CR2-C76-NP	Non-P	664,747.00	4,969,738.00	584.8	3:53	3:53	4,560
CR2-C1-NP	Non-P	662,198.00	4,980,622.00	591.0	3:51	3:51	1,909
CR2-C130-P	Participant	666,727.00	4,966,695.00	591.0	3:42	3:42	3,350
CR2-C134-NP	Non-P	667,097.00	4,973,011.00	613.0	3:42	3:42	3,363
CR2-C129-P	Participant	666,716.00	4,966,751.00	591.0	3:31	3:31	3,356
CR2-C24-NP	Non-P	661,541.00	4,969,653.00	600.0	3:21	3:21	3,809
CR2-C128-P	Participant	666,636.00	4,966,649.00	589.0	3:00	3:00	3,671
CR1-C28-NP	Non-P	665,429.00	4,988,598.00	590.9	2:43	2:43	2,831

* Not included in original submittal

Table C-2: Crowned Ridge II 200 MW Shadow Flicker Tabular Results Sorted by Real Case Shadow Flicker Hours/Year
Realistic case shadow results at occupied structures
Results using GE 2.3-116-90 m HH, GE 2.1-116-80 m HH WTG's
UTM NAD83 Zone 14
Cordington County
continued

Receptor ID	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)	7/9/19 App. J Report Real Case Results	Distance to Nearest Turbine (ft)
CR1-C74-NP	Non-P	662,869.00	4,983,122.00	595.7	2:34	2:34	2,480
CR2-C33-P	Participant	663,878.00	4,967,612.00	576.1	2:28	2:28	2,999
CR2-C39-NP	Non-P	664,089.00	4,966,486.00	566.2	2:27	2:27	2,178
CR1-C16-NP	Non-P	661,960.00	4,986,288.00	606.0	2:19	6:17	2,648
CR1-C15-NP	Non-P	663,291.00	4,986,026.00	615.0	2:16	2:20	3,907
CR2-C123-P	Participant	666,146.00	4,966,653.00	579.4	2:13	2:13	5,216
CR2-C119-NP	Non-P	665,052.00	4,974,682.00	600.0	2:06	2:06	4,760
CR2-C118-NP	Non-P	665,014.00	4,974,639.00	600.0	1:57	1:57	4,947
CR2-C132-NP	Non-P	666,857.00	4,985,021.00	588.2	1:47	1:47	1,883
CR2-C43-NP	Non-P	664,382.00	4,975,544.00	597.0	1:42	1:42	4,232
CR2-C126-P	Participant	666,389.00	4,966,670.00	585.0	1:40	1:40	4,455
CR2-C40-NP	Non-P	659,189.00	4,974,765.00	578.3	1:38	1:38	2,841
CR1-C12-1-NP	Non-P	662,199.00	4,986,047.00	606.0	1:28	10:34	2,818
CR2-C77-NP	Non-P	663,865.00	4,969,694.00	597.0	1:28	1:28	4,406
CR1-C85-NP	Non-P	659,706.00	4,981,419.00	588.0	1:22	1:22	4,819
CR2-C2-NP	Non-P	662,238.00	4,980,604.00	590.9	1:03	1:03	1,880
CR1-C22-P	Participant	660,755.00	4,984,082.00	594.0	1:01	1:01	2,375
CR1-C21-P	Participant	660,756.00	4,984,086.00	594.0	1:00	1:00	2,388
CR2-C23-NP	Non-P	664,069.00	4,969,661.00	594.0	0:58	0:58	4,439
CR2-C44-NP	Non-P	659,145.00	4,966,062.00	561.4	0:43	0:43	4,183
CR1-C80-NP	Non-P	659,351.00	4,983,174.00	604.4	0:40	0:40	5,308
CR2-C3-NP	Non-P	664,345.00	4,964,571.00	556.0	0:00	0:00	7,497
CR1-C4-NP	Non-P	659,744.00	4,984,749.00	606.0	0:00	0:00	5,981
CR1-C5-NP	Non-P	659,958.00	4,984,794.00	604.8	0:00	0:00	5,659
CR1-C7-NP	Non-P	660,893.00	4,984,861.00	593.2	0:00	0:00	3,022
CR2-C7-NP	Non-P	665,694.00	4,966,179.00	570.0	0:00	0:00	4,409
CR1-C8-P	Participant	660,532.00	4,984,445.00	599.4	0:00	0:00	3,740
CR2-C10-NP	Non-P	665,189.00	4,966,505.00	570.0	0:00	0:00	2,438
CR2-C22-NP	Non-P	661,202.00	4,972,711.00	597.0	0:00	0:00	6,247
CR1-C23-P	Participant	660,619.00	4,984,078.00	595.8	0:00	0:00	2,523
CR2-C28-P	Participant	659,208.00	4,968,159.00	572.8	0:00	0:00	5,630
CR2-C29-NP	Non-P	661,223.00	4,968,144.00	595.2	0:00	0:00	4,639
CR2-C30-NP	Non-P	659,100.00	4,968,023.00	568.6	0:00	0:00	5,502
CR1-C31-NP	Non-P	665,939.00	4,988,950.00	585.4	0:00	0:00	2,126
CR2-C31-P	Participant	663,117.00	4,972,923.00	606.0	0:00	0:00	7,579
CR2-C32-P	Participant	659,469.00	4,967,984.00	575.2	0:00	0:00	4,678
CR2-C35-NP	Non-P	658,964.00	4,974,334.00	566.8	0:00	0:00	4,432
CR2-C53-NP	Non-P	662,401.00	4,964,782.00	582.0	0:00	0:00	2,257

* Not included in original submittal

Table C-2: Crowned Ridge II 200 MW Shadow Flicker Tabular Results Sorted by Real Case Shadow Flicker Hours/Year
Realistic case shadow results at occupied structures
Results using GE 2.3-116-90 m HH, GE 2.1-116-80 m HH WTG's
UTM NAD83 Zone 14
Codington County
continued

Receptor ID	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)	7/9/19 App. J Report Real Case Results	Distance to Nearest Turbine (ft)
CR2-C64-NP	Non-P	660,901.00	4,964,220.00	582.0	0:00	0:00	4,429
CR1-C66-NP	Non-P	659,718.00	4,985,032.00	606.0	0:00	0:00	5,800
CR2-C66-NP	Non-P	662,396.00	4,963,954.00	582.0	0:00	0:00	4,429
CR1-C67-NP	Non-P	659,789.00	4,985,057.00	606.0	0:00	0:00	5,791
CR2-C67-NP	Non-P	660,379.00	4,978,592.00	556.1	0:00	0:00	5,033
CR2-C68-NP	Non-P	662,517.00	4,963,408.00	579.0	0:00	0:00	6,237
CR2-C69-NP	Non-P	661,701.00	4,978,792.00	564.0	0:00	0:00	5,171
CR2-C72-NP	Non-P	663,856.00	4,970,488.00	597.0	0:00	0:00	6,135
CR2-C74-NP	Non-P	660,687.00	4,969,931.00	586.5	0:00	0:00	6,732
CR2-C79-NP	Non-P	666,869.00	4,984,663.00	587.9	0:00	0:00	2,703
CR2-C80-NP	Non-P	664,705.00	4,972,092.00	597.3	0:00	0:00	7,684
CR1-C84-NP	Non-P	659,607.00	4,982,216.00	594.0	0:00	0:00	5,856
CR2-C86-NP	Non-P	662,880.00	4,971,302.00	603.0	0:00	0:00	7,208
CR2-C87-NP	Non-P	662,841.00	4,971,294.00	603.0	0:00	0:00	7,165
CR1-C88-NP	Non-P	660,156.00	4,980,595.00	570.9	0:00	0:00	4,045
CR2-C89-NP	Non-P	662,244.00	4,971,076.00	603.0	0:00	0:00	6,489
CR2-C90-NP	Non-P	664,088.41	4,970,672.24	594.0	0:00	0:00	6,863
CR2-C91-NP	Non-P	663,938.00	4,970,546.00	597.0	0:00	0:00	6,457
CR2-C92-NP	Non-P	663,855.00	4,970,535.00	597.0	0:00	0:00	6,247
CR2-C93-NP	Non-P	659,203.00	4,973,158.00	584.9	0:00	0:00	7,792
CR2-C94-NP	Non-P	659,202.00	4,973,052.00	583.9	0:00	0:00	8,133
CR2-C95-NP	Non-P	659,248.00	4,974,054.00	567.0	0:00	0:00	4,898
CR2-C96-NP	Non-P	659,316.00	4,974,063.00	570.6	0:00	0:00	4,813
CR2-C99-P	Participant	660,584.00	4,972,570.00	591.0	0:00	0:00	7,165
CR2-C100-NP	Non-P	660,592.00	4,972,602.00	591.0	0:00	0:00	7,057
CR2-C101-NP	Non-P	660,732.00	4,972,807.00	591.0	0:00	0:00	6,266
CR2-C104-NP	Non-P	662,109.00	4,972,735.00	604.0	0:00	0:00	6,608
CR2-C106-NP	Non-P	662,165.00	4,972,711.00	604.7	0:00	0:00	6,749
CR2-C109-NP	Non-P	662,699.00	4,972,874.00	606.0	0:00	0:00	7,169
CR2-C112-NP	Non-P	665,928.00	4,972,630.00	603.0	0:00	0:00	6,575
CR2-C135-NP	Non-P	667,172.00	4,966,196.00	595.2	0:00	0:00	2,884
CR2-C136-NP	Non-P	667,209.00	4,966,166.00	595.4	0:00	0:00	2,887
CR2-C137-NP	Non-P	658,951.00	4,979,194.00	568.2	0:00	0:00	6,555
CR2-C142-NP	Non-P	656,697.00	4,977,269.00	566.9	0:00	0:00	8,432
CR2-C143-NP	Non-P	657,016.00	4,977,505.00	553.6	0:00	0:00	7,444
CR2-C151-NP	Non-P	663,934.00	4,964,475.00	556.1	0:00	0:00	6,929
CR2-C155-NP	Non-P	657,554.06	4,975,128.16	554.6	0:00	*	7,034

* Not included in original submittal

Table C-2: Crowned Ridge II 200 MW Shadow Flicker Tabular Results Sorted by Real Case Shadow Flicker Hours/Year
Realistic case shadow results at occupied structures
Results using GE 2.3-116-90 m HH, GE 2.1-116-80 m HH WTG's
UTM NAD83 Zone 14
Deuel County
continued

Receptor ID	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)	7/9/19 App. J Report Real Case Results	Distance to Nearest Turbine (ft)
CR2-D21-NP	Non-P	669,517.00	4,978,053.00	596.1	28:59	28:59	1,985
CR2-D53-P	Participant	670,392.00	4,975,925.00	592.8	27:37	27:37	1,801
CR2-D131-P	Participant	669,471.00	4,977,139.00	597.5	25:29	25:29	2,087
CR2-D18-NP	Non-P	671,540.00	4,976,154.00	582.0	22:04	22:04	2,201
CR2-D11-NP	Non-P	669,646.00	4,974,534.00	604.4	21:54	5:51	1,919
CR2-D39-P	Participant	668,443.00	4,974,627.00	614.4	18:50	18:50	1,706
CR2-D71-NP	Non-P	669,402.00	4,979,216.00	588.0	18:30	18:12	1,975
CR2-D12-NP	Non-P	668,558.00	4,969,840.00	604.7	18:07	18:07	2,051
CR2-D30-NP	Non-P	669,549.00	4,974,233.00	611.9	17:10	6:03	2,044
CR2-D132-NP	Non-P	669,497.00	4,974,128.00	609.0	16:49	6:45	2,264
CR2-D64-P	Participant	669,417.00	4,978,434.00	588.0	14:03	14:01	2,425
CR2-D212-P	Participant	667,211.00	4,969,816.00	608.3	12:55	12:55	1,686
CR2-D14-NP	Non-P	670,351.11	4,973,543.31	606.0	11:51	14:04	2,041
CR2-D221-NP	Non-P	670,351.11	4,973,543.31	606.0	11:51	14:04	2,041
CR2-D127-NP	Non-P	668,841.00	4,969,858.00	603.0	11:40	11:40	2,894
CR2-D62-NP	Non-P	669,355.00	4,974,624.00	609.0	10:56	5:02	2,913
CR2-D49-P	Participant	672,024.00	4,974,135.00	583.2	8:42	8:42	3,537
CR2-D38-P	Participant	667,108.00	4,982,083.00	597.0	5:20	9:01	1,693
CR2-D56-P	Participant	667,119.00	4,977,925.00	612.0	5:18	8:47	2,110
CR2-D128-NP	Non-P	668,625.00	4,967,652.00	588.0	4:53	15:58	2,779
CR2-D130-NP	Non-P	672,080.49	4,973,212.28	591.0	4:38	15:12	3,776
CR2-D222-NP	Non-P	672,080.49	4,973,212.28	591.0	4:38	15:12	3,779
CR2-D85-NP	Non-P	669,593.00	4,976,302.00	603.0	4:36	4:36	1,949
CR2-D129-NP	Non-P	669,645.00	4,973,005.00	606.0	4:30	4:30	4,511
CR2-D6-P	Participant	668,762.00	4,967,671.00	591.0	3:35	17:17	2,844
CR2-D91-NP	Non-P	667,546.00	4,976,173.00	618.0	2:59	2:59	4,203
CR2-D79-NP	Non-P	672,172.00	4,974,737.00	585.0	2:16	2:16	1,955
CR2-D115-P	Participant	670,974.00	4,969,938.00	606.0	2:04	2:04	3,583
CR2-D111-P	Participant	671,876.00	4,969,006.00	600.0	2:01	29:32	4,180
CR2-D17-NP	Non-P	672,023.00	4,969,597.00	597.0	1:06	13:45	5,167
CR2-D45-NP	Non-P	668,018.00	4,976,064.00	611.5	0:55	0:55	4,393
CR2-D3-NP	Non-P	672,390.00	4,963,482.00	612.0	0:00	6:47	18,746
CR2-D5-NP	Non-P	668,781.00	4,964,897.00	603.0	0:00	2:14	7,342
CR2-D9-NP	Non-P	668,597.00	4,971,999.00	611.5	0:00	0:00	4,921
CR2-D15-NP	Non-P	674,387.00	4,968,515.00	588.0	0:00	24:00	12,474
CR2-D16-P	Participant	671,626.00	4,966,693.00	601.7	0:00	5:21	8,005
CR2-D19-NP	Non-P	668,870.00	4,964,178.00	606.0	0:00	13:59	9,600
CR2-D20-NP	Non-P	675,261.00	4,968,400.00	579.0	0:00	3:00	15,364

* Not included in original submittal

Table C-2: Crowned Ridge II 200 MW Shadow Flicker Tabular Results Sorted by Real Case Shadow Flicker Hours/Year
Realistic case shadow results at occupied structures
Results using GE 2.3-116-90 m HH, GE 2.1-116-80 m HH WTG's
UTM NAD83 Zone 14
Deuel County
continued

Receptor ID	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)	7/9/19 App. J Report Real Case Results	Distance to Nearest Turbine (ft)
CR2-D22-NP	Non-P	668,798.00	4,963,767.00	603.1	0:00	14:21	10,777
CR2-D23-NP	Non-P	669,671.00	4,980,468.00	573.0	0:00	0:00	4,380
CR2-D36-NP	Non-P	669,812.00	4,966,746.00	591.0	0:00	2:59	6,837
CR2-D37-NP	Non-P	674,048.00	4,974,071.00	573.0	0:00	0:00	6,542
CR2-D41-NP	Non-P	670,437.00	4,966,409.00	597.0	0:00	2:06	8,225
CR2-D44-NP	Non-P	670,434.00	4,965,956.00	593.8	0:00	20:58	9,363
CR2-D46-NP	Non-P	669,797.00	4,966,804.00	591.0	0:00	1:23	6,778
CR2-D48-NP	Non-P	668,923.00	4,972,998.00	609.0	0:00	0:00	2,680
CR2-D50-P	Participant	672,015.00	4,967,209.00	602.8	0:00	24:57	7,247
CR2-D51-NP	Non-P	675,005.00	4,970,131.00	577.8	0:00	8:27	14,977
CR2-D52-NP	Non-P	667,172.00	4,971,776.00	606.0	0:00	0:00	4,583
CR2-D54-NP	Non-P	672,012.00	4,966,477.00	600.0	0:00	5:15	9,219
CR2-D63-NP	Non-P	670,546.00	4,961,419.00	615.0	0:00	0:00	20,138
CR2-D65-NP	Non-P	670,422.00	4,966,654.00	597.0	0:00	5:26	7,424
CR2-D72-NP	Non-P	671,925.00	4,970,149.00	603.0	0:00	0:00	5,938
CR2-D73-NP	Non-P	672,072.00	4,971,556.00	600.0	0:00	0:00	7,405
CR2-D74-NP	Non-P	668,130.00	4,976,068.00	609.2	0:00	0:00	4,505
CR2-D75-NP	Non-P	669,473.00	4,981,625.00	570.0	0:00	0:00	7,319
CR2-D77-NP	Non-P	672,044.00	4,966,468.00	600.0	0:00	5:58	9,298
CR2-D82-NP	Non-P	669,855.00	4,970,718.00	603.0	0:00	0:00	5,935
CR2-D83-NP	Non-P	675,891.00	4,966,810.00	579.0	0:00	12:25	18,658
CR2-D84-NP	Non-P	667,159.00	4,972,169.00	598.2	0:00	0:00	5,535
CR2-D86-NP	Non-P	673,842.00	4,966,875.00	597.0	0:00	12:07	12,542
CR2-D90-NP	Non-P	670,516.00	4,962,327.00	612.0	0:00	7:36	17,493
CR2-D92-NP	Non-P	671,159.00	4,971,610.00	597.2	0:00	0:00	6,319
CR2-D95-NP	Non-P	671,994.00	4,971,562.00	600.0	0:00	0:00	7,264
CR2-D96-NP	Non-P	672,899.00	4,971,469.00	594.0	0:00	0:00	9,249
CR2-D97-NP	Non-P	667,164.00	4,972,232.00	600.0	0:00	0:00	5,371
CR2-D98-P	Participant	669,757.00	4,972,426.00	606.0	0:00	0:00	5,381
CR2-D99-NP	Non-P	668,148.00	4,976,230.00	608.8	0:00	0:00	4,331
CR2-D100-NP	Non-P	668,589.00	4,972,064.00	609.9	0:00	0:00	4,708
CR2-D101-NP	Non-P	672,538.00	4,961,910.00	612.8	0:00	5:29	22,667
CR2-D103-NP	Non-P	670,588.00	4,961,119.00	615.0	0:00	0:00	21,079
CR2-D104-NP	Non-P	670,443.00	4,961,600.00	613.8	0:00	5:06	19,455
CR2-D105-NP	Non-P	670,348.00	4,963,826.00	611.7	0:00	17:56	13,179
CR2-D106-NP	Non-P	667,315.00	4,965,297.00	594.0	0:00	0:00	5,351
CR2-D107-NP	Non-P	670,405.00	4,966,321.00	597.0	0:00	2:27	8,520
CR2-D108-NP	Non-P	670,354.00	4,965,949.00	594.0	0:00	23:04	9,121

* Not included in original submittal

Table C-2: Crowned Ridge II 200 MW Shadow Flicker Tabular Results Sorted by Real Case Shadow Flicker Hours/Year
 Realistic case shadow results at occupied structures
 Results using GE 2.3-116-90 m HH, GE 2.1-116-80 m HH WTG's
 UTM NAD83 Zone 14
 Deuel County
continued

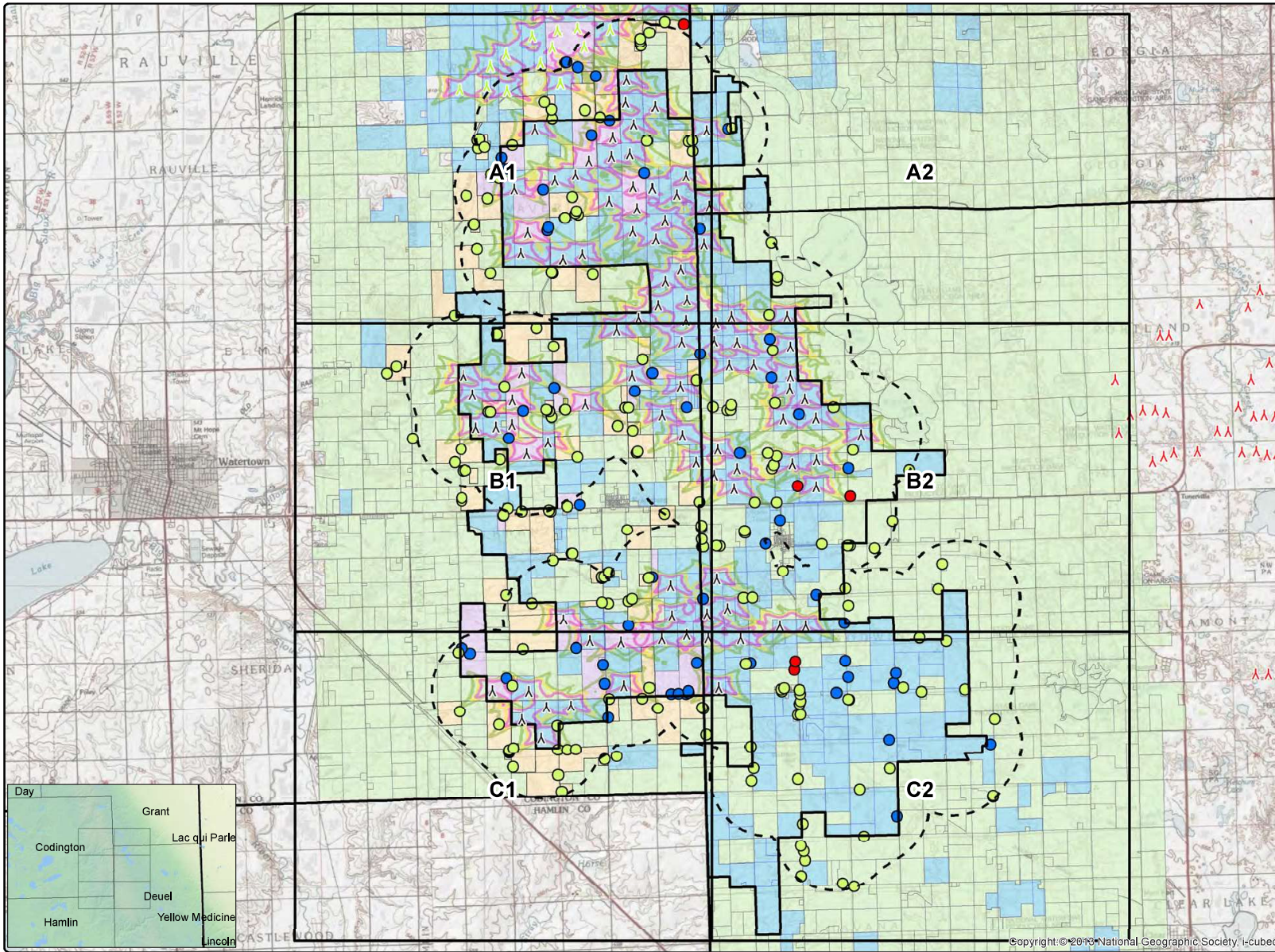
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* Not included in original submittal

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* Not included in original submittal





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Crowned Ridge II Wind Farm 200 MW Shadow Overview Map

Client
SWCA Environmental Consultants

Project Description
Wind turbine layout with occupied structures within 2 km.

Predicted shadow flicker levels at existing residences.

Location: Watertown, SD
Project #: 20174431

Issue Dates

#	Description	Date
1	Original	2019.10.24

Drawn By: AS **Checked By:** JH

Legend

- △ Crowned Ridge II Turbines
- △ Crowned Ridge Turbines
- △ Deuel Harvest Turbines
- 2 km Turbine Buffer
- County Lines
- CR II Project Boundary
- CR2 Intervenor
- Non-Participants Shadow
- Participants Shadow

Shadow Flicker (hr/yr)

- 10
- 15
- 20
- 25
- 30

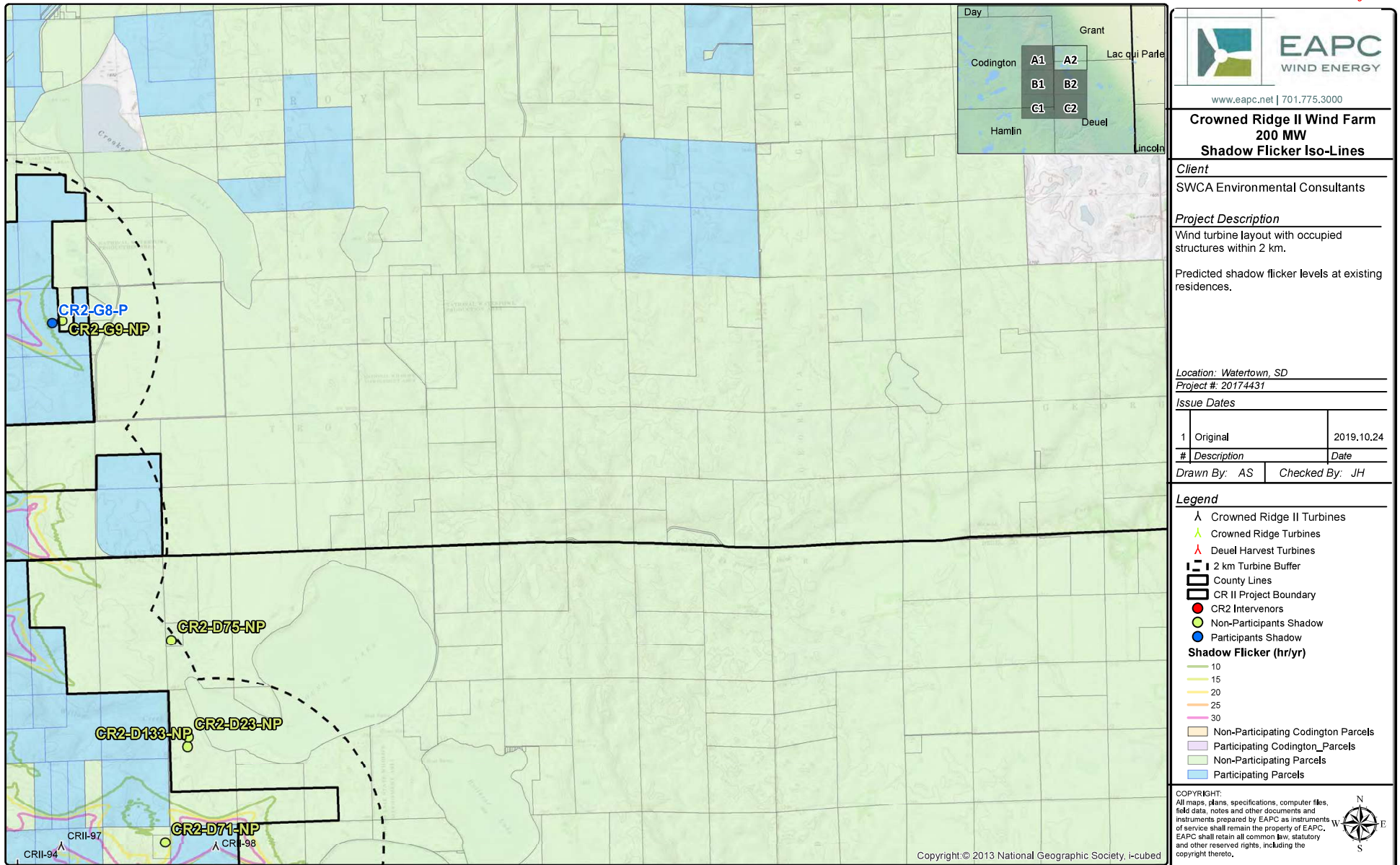
Non-Participating Codington_Parcel
Participating Codington_Parcel
Non-Participating Parcel
Participating Parcel

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0 0.75 1.5 3 Mile

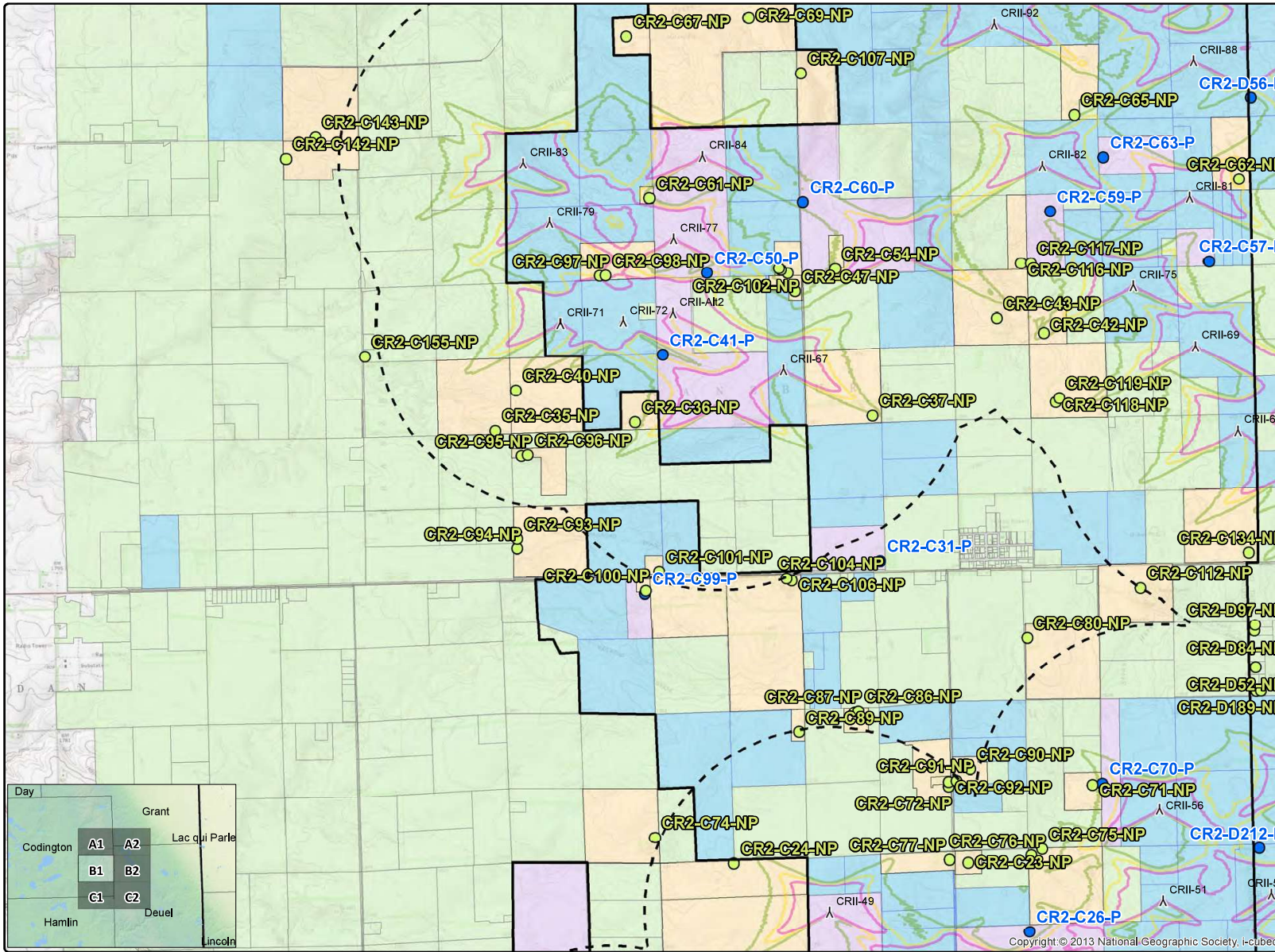
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**Crowned Ridge II Wind Farm
200 MW
Shadow Flicker Iso-Lines**

Client
SWCA Environmental Consultants

Project Description
Wind turbine layout with occupied structures within 2 km.

Predicted shadow flicker levels at existing residences.

Location: Watertown, SD
Project #: 20174431

Issue Dates

1	Original	2019.10.24
#	Description	Date

Drawn By: AS Checked By: JH

Legend

- ▲ Crowned Ridge II Turbines
- ▲ Crowned Ridge Turbines
- ▲ Deuel Harvest Turbines
- 2 km Turbine Buffer
- County Lines
- CR II Project Boundary
- CR2 Intervenor
- Non-Participants Shadow
- Participants Shadow

Shadow Flicker (hr/yr)

- 10
- 15
- 20
- 25
- 30

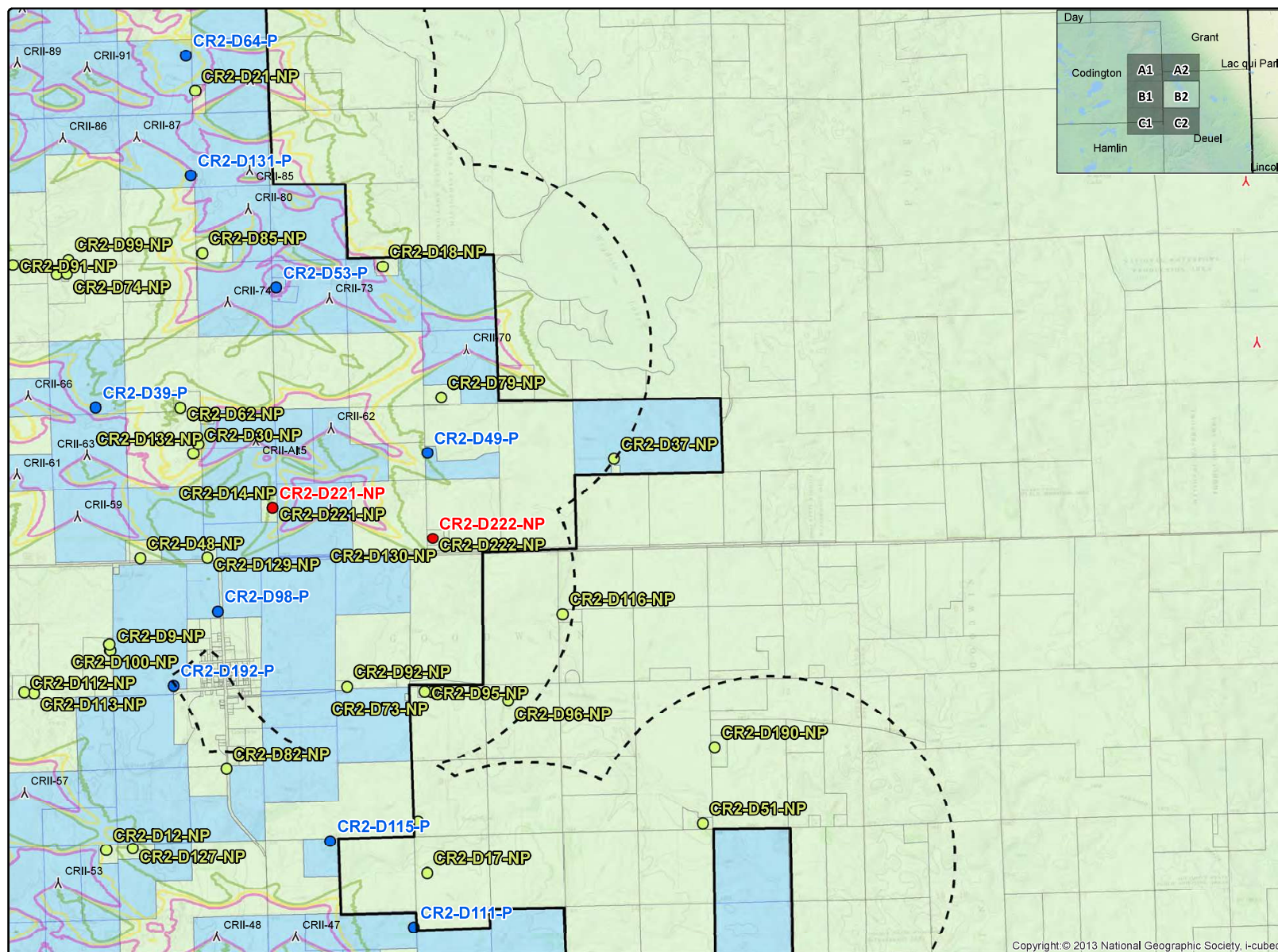
- Non-Participating Codington Parcels
- Participating Codington Parcels
- Non-Participating Parcels
- Participating Parcels

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0 0.275 0.55 1.1 Mile

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Crowned Ridge II Wind Farm 200 MW Shadow Flicker Iso-Lines

Client
SWCA Environmental Consultants

Project Description
Wind turbine layout with occupied structures within 2 km.

Predicted shadow flicker levels at existing residences.

Location: Watertown, SD
Project #: 20174431

Issue Dates

#	Description	Date
1	Original	2019.10.24

Drawn By: AS **Checked By:** JH

Legend

- ▲ Crowned Ridge II Turbines
- ▲ Crowned Ridge Turbines
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- CR II Project Boundary
- CR2 Intervenor
- Non-Participants Shadow
- Participants Shadow

Shadow Flicker (hr/yr)

- 10
- 15
- 20
- 25
- 30

Non-Participating Codington Parcels
Participating Codington Parcels
Non-Participating Parcels
Participating Parcels

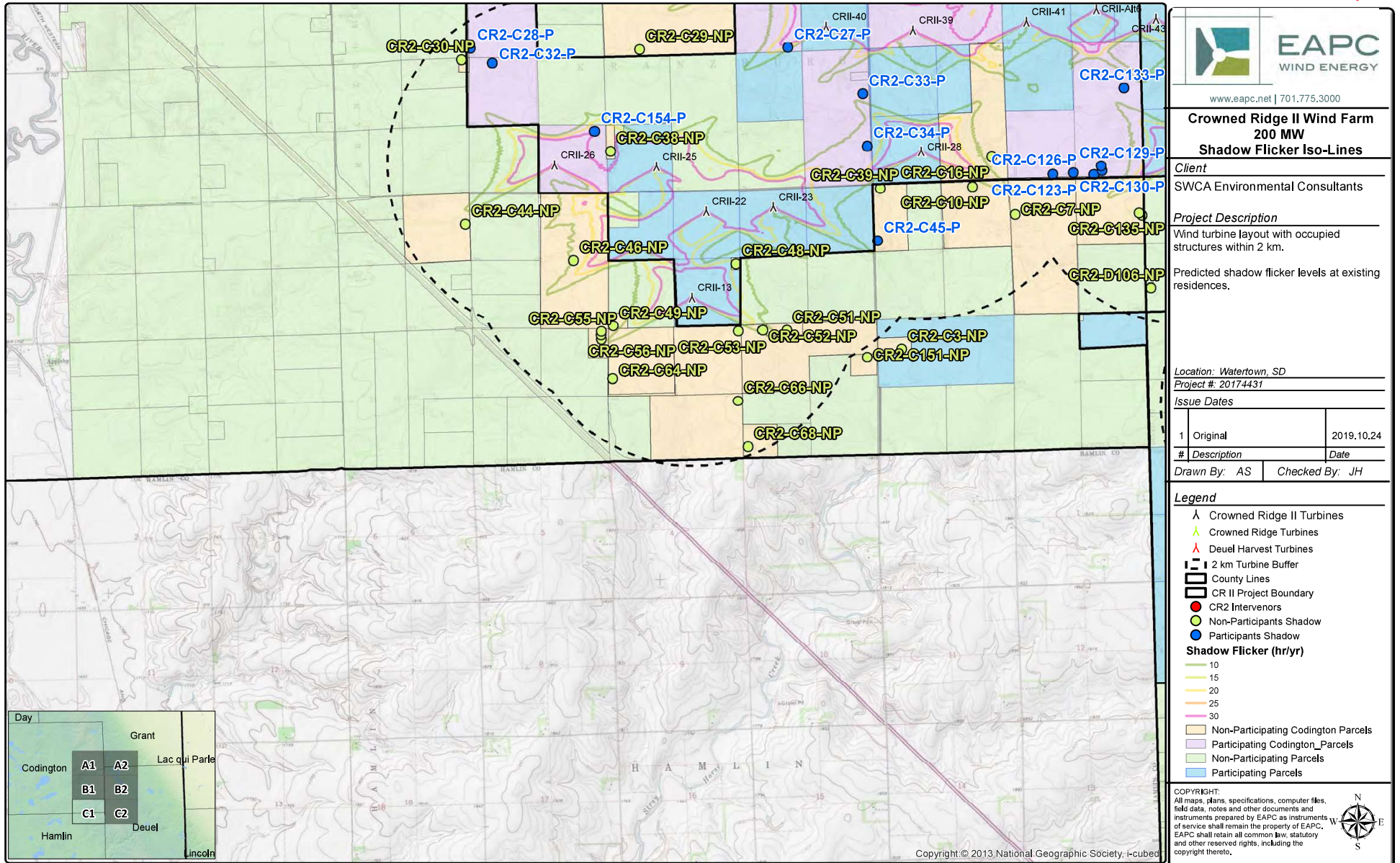
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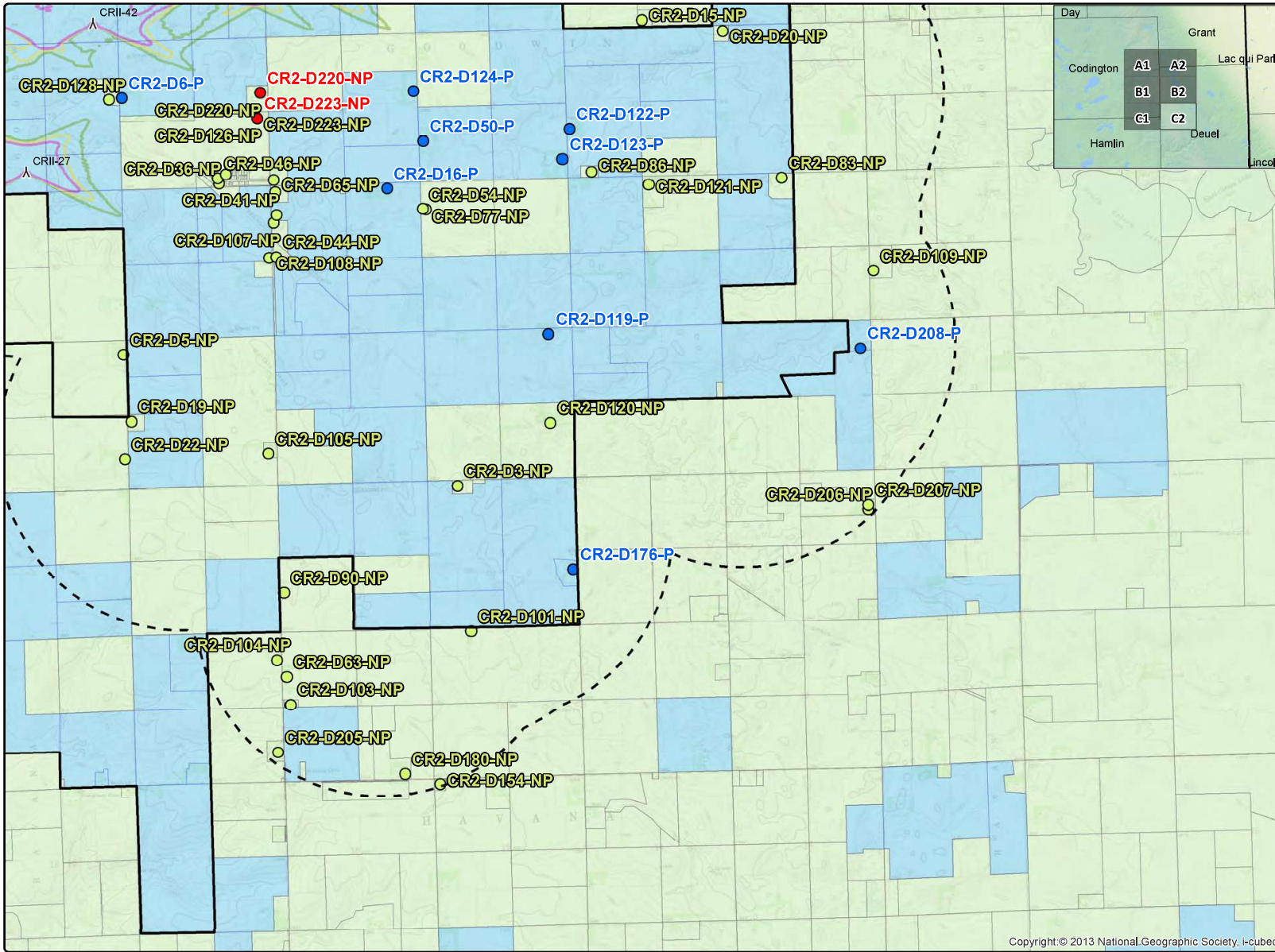
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**Crowned Ridge II Wind Farm
200 MW
Shadow Flicker Iso-Lines**

Client
SWCA Environmental Consultants

Project Description
Wind turbine layout with occupied structures within 2 km.

Predicted shadow flicker levels at existing residences.

Location: Watertown, SD
Project #: 20174431
Issue Dates

1	Original	2019.10.24
#	Description	Date

Drawn By: AS *Checked By:* JH

Legend

- ▲ Crowned Ridge II Turbines
- ▲ Crowned Ridge Turbines
- ▲ Deuel Harvest Turbines
- 2 km Turbine Buffer
- County Lines
- CR II Project Boundary
- CR2 Intervenor
- Non-Participants Shadow
- Participants Shadow

Shadow Flicker (hr/yr)

- 10
- 15
- 20
- 25
- 30

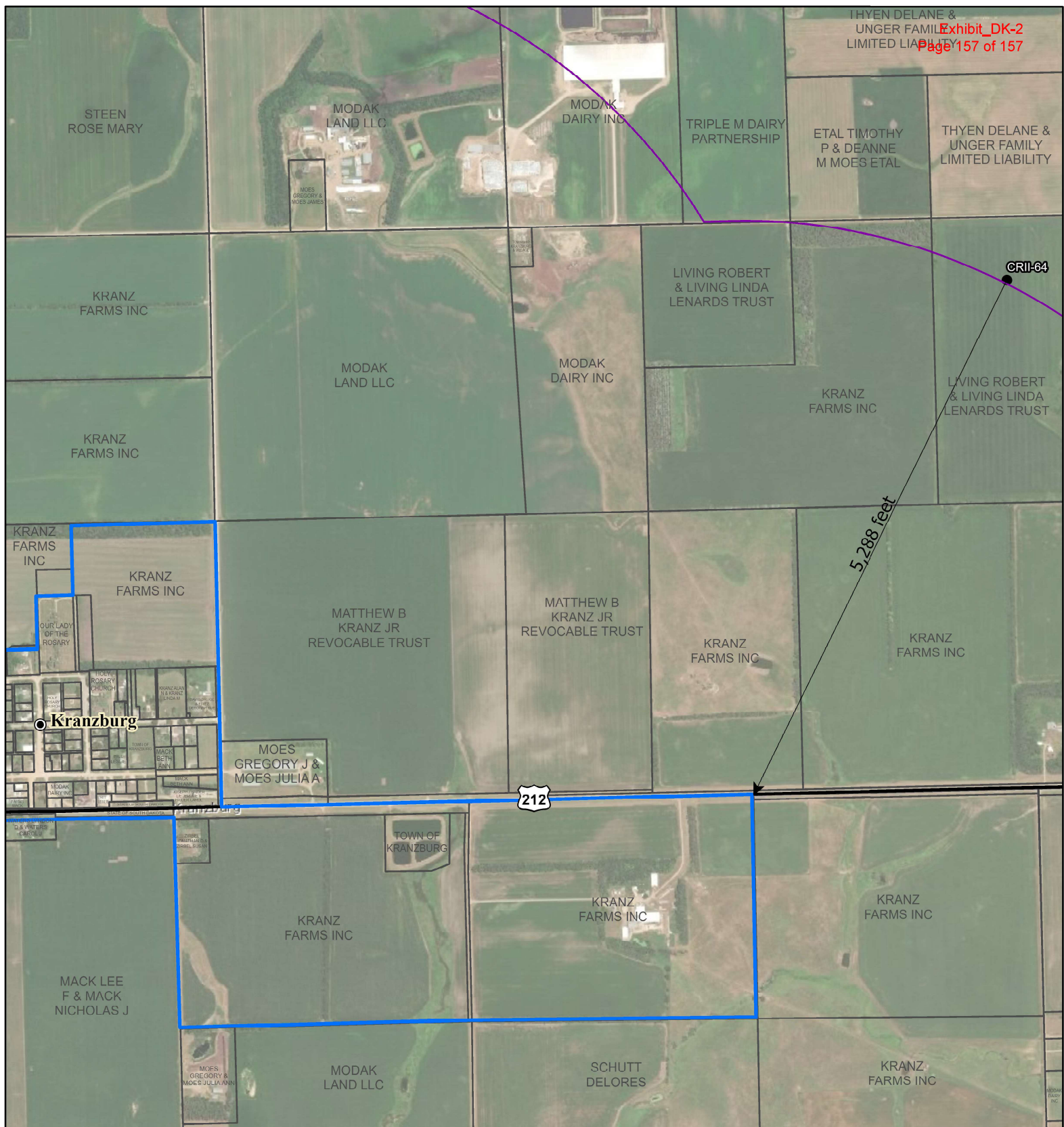
Non-Participating Codington Parcels
Participating Codington_Parcels
Non-Participating Parcels
Participating Parcels

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0 0.275 0.55 1.1 Mile

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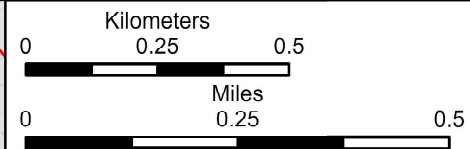
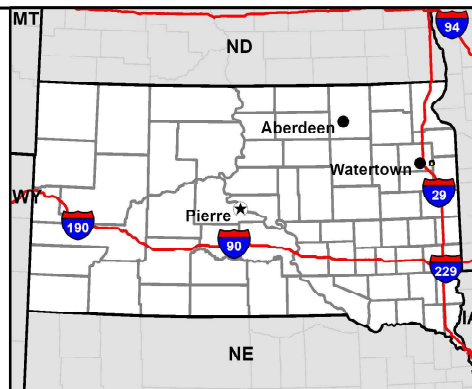
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PUC Supplemental

Crowned Ridge II Wind Farm

- Primary Turbine
- City
- Kranzburg City Limit
- 1-mile Setback
- U.S. Highway
- Parcel Boundary



Base Map: World Light Gray Canvas Base
Sources: Esri, HERE, Garmin, © OpenStreetMap contributors, and the GIS user community
Codington, Deuel, and Grant Counties, South Dakota

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Projection: NAD 1983 UTM Zone 14N