



Pre-Construction Compliance Report Crowned Ridge Wind Farm Sound Study Codington and Grant Counties, SD

Submitted To:

SWCA Environmental Consultants
116 North 4th Street, Suite 200
Bismarck, North Dakota 58501
Tel: 701.258.6622
E-mail: SBaer@swca.com

Submitted By:

Jay Haley, P.E., Partner
EAPC Wind Energy
3100 DeMers Ave.
Grand Forks, ND, 58201
Tel: 701-775-3000
E-mail: jhaley@eapc.net

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Author:

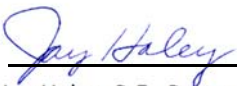

Jay Haley, P.E., Partner

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Report Update

EAPC bears no responsibility to update this report for any changes occurring subsequent to the final issuance of this report.

Revision History

Revision No.	Revision Purpose	Date	Revised By
0	Original	7/28/2019	J. Haley

Executive Summary

EAPC was hired to provide estimates of the potential sound impacts for a proposed wind turbine layout in Codington and Grant Counties of the Crowned Ridge wind farm project in northeastern South Dakota. The scope of this report includes all proposed turbines included in the Crowned Ridge project that will be permitted separately through the South Dakota Public Utilities Commission. Locations of area occupied structures and a wind turbine layout using a mixture of 142 wind turbines manufactured by General Electric (GE) were provided to EAPC by Crowned Ridge Wind, LLC. Wind turbine models and locations of 140 turbines for the adjacent Crowned Ridge II wind farm were supplied by Crowned Ridge Wind II, LLC and were included in the model. The wind turbine models and coordinates of 97 turbines for the adjacent Dakota Range I and II wind farms were also included in the model, with information gathered from permit filings. A computer model was built combining digital elevation data with the information gathered to generate sound models for the site. The resulting models were then used to perform shadow flicker calculations for the 379 turbines. Based on the calculations, site-wide realistic sound maps were produced.

The Crowned Ridge wind farm project was modeled for all counties within the turbine layout and is described in this report as one project. However, for purposes of organization and because of the differences in compliance criteria, the modeling and results of the study are presented individually for each county. The noise ordinances of Codington and Grant Counties are not the same. For Codington County the noise limit is 50 dBA at the property boundary of occupied non-participating landowners. For Grant County the noise limit is 45 dBA at a distance of 25 feet from the perimeter of non-participating occupied structures and 50 dBA at participating occupied structures.

The scope of this study also includes sound impacts that are not regulated by county ordinances including participating and non-participating occupied structures and participating parcel boundaries in Codington County. The turbine array was arranged so that the sound pressure level at all non-participating occupied structures in both counties would be 45 dBA or less and participating occupied structures in both counties would be 50 dBA or less. For all turbines, Low Noise Trailing Edge (LNTE) blades were used to reduce the sound pressure levels in order to achieve compliance with county regulations by increasing the flexibility in turbine locations to meet setback requirements.

The model is based on a number of conservative assumptions. It assumes that the wind turbines are always emitting the maximum sound pressure level with an additional 2 dBA added to the wind turbine noise emission profiles. It is also assumed that each wind turbine is always downwind of each receptor and the atmospheric conditions are most favorable for sound transmission. Also in particular for Grant County, the sound pressure level was calculated at a distance of 50 feet from the perimeter of structures instead of 25 feet. This is also a conservative assumption because the noise levels will be higher at 50 feet than 25 feet.

Crowned Ridge Codington County Turbines

Codington County's current Ordinance #68 Zoning Ordinance Section 5.22.03.12.a notes that the applicable sound limit is 50 dBA at an occupied non-participating property line, which is what has been evaluated in this report for Codington County. Codington County does not have a specific ordinance for sound pressure levels at a participating property boundary; although not required by the county, the sound pressure levels at participating property boundaries and occupied structures within 2 kilometers of a wind turbine were also evaluated. There is also no ordinance for sound pressure levels at any participating or non-participating occupied structures.

Within the Crowned Ridge Project, for Codington County, an evaluation of the sound impacts at 67 occupied land parcel boundaries (21 participating and 46 non-participating) within Codington County was performed. The 67 land parcel boundaries with existing residences were modeled using an area-type sound sensor so that the highest sound pressure level at the property line could be calculated.

In Codington County, the maximum sound pressure level at a non-participating property boundary is 49.9 dBA, therefore, the project, as modeled, is in compliance with Codington County's allowable sound pressure levels as described in Section 5.03, paragraph 12 of the Codington County Zoning Ordinance #68, which is 50 dBA. The maximum sound pressure level at a participating property boundary is 53.5 dBA.

There are 77 occupied structures (26 participating and 51 non-participating) in Codington County within 2 kilometers of a wind turbine, which were modeled using a point-type sound sensor so that the highest sound pressure level at the perimeter of the structures could be calculated. In Codington County, the maximum sound pressure level at the perimeter of a non-participating occupied structure was 44.8 dBA. The maximum sound pressure level at a participating occupied structure was 47.8 dBA.

Therefore, the project as modeled, is in compliance with Codington County's allowable sound pressure levels as described in the current Codington County Ordinance.

Crowned Ridge Grant County Turbines

Grant County's current Ordinance 2016-01C, Section 1211.04, paragraph 14 of the current Grant County Zoning Ordinance sets the limit at 45 dBA at a distance of 25 feet from the perimeter of non-participating occupied structures and 50 dBA for participating occupied structures.

For Grant County, an evaluation of the noise impacts at 60 (34 participating and 26 non-participating) occupied structures within 2 kilometers within Grant County was performed. The 60 occupied structures were modeled using a point-type sound sensor so that the highest sound pressure level 25 feet from the perimeter of the structures could be calculated. In Grant County, the maximum sound pressure level 25 feet from the perimeter of a non-

participating occupied structure is 43 dBA, and 45.3 dBA for a participating occupied structure.

Based upon the results presented above, the project as modeled, is in compliance with Grant County's allowable sound pressure levels as described in the current Grant County Ordinance.

1. INTRODUCTION

EAPC was hired to conduct sound studies for the regional development of the Crowned Ridge wind farm project located in Codington and Grant Counties in northeastern South Dakota. The layout consists of 129 GE 2.3 MW wind turbines with a hub height of 90 meters (including 18 alternate turbine locations) and 13 GE 2.3 MW wind turbines with a hub height of 80 meters for a total of 142 wind turbines. The array includes the six remaining Hessler turbines (CR1-16, CR1-19, CR1-23, CR1-60, CR1-67, and CR1-68) to ensure compliance in the event any of the Hessler turbines, which are now alternates, are constructed consistent with Condition No. 27. Also, to ensure compliance under all construction of turbine scenarios, CR1-49, also a Hessler turbine, has been permanently dropped. The locations of the proposed wind turbines were supplied by Crowned Ridge Wind, LLC.

From the database of existing residences and coordinates supplied by Crowned Ridge Wind, LLC, 77 occupied structures (26 participating and 51 non-participating) in Codington County and 60 occupied structures (34 participating and 26 non-participating) in Grant County were found to be within 2 kilometers of a wind turbine and were included in the sound models. Additionally, 67 occupied land parcels (21 participating and 46 non-participating) were found to be within 2 kilometers of a wind turbine in Codington County, in line with the Codington County ordinance (see below). At a distance of 2 kilometers from a turbine base, the sound pressure level will be less than 35 dBA (considerably less than ordinance limits) so there is no need to include land parcels or structures beyond that distance. Land parcels were not modeled for Grant County as they are not a part of the Grant County ordinance.

The area of interest for this study is located in Codington and Grant Counties near the town of Watertown in northeastern South Dakota. The surrounding terrain has a change in elevation across the project site ranging from 475 to 621 meters (1,558 to 2,037 feet) at the wind turbine base. The region's vegetation is comprised primarily of prairie grass and agricultural land. The project overview map can be found in Appendix A.

2. BACKGROUND AND COUNTY REGULATIONS

To determine if the layout provided would be compliant for the Crowned Ridge Project and in line with each county's regulations, detailed sound scenarios were analyzed using a computer model. The scenarios assumed that the wind turbines were operating at a wind speed that resulted in the loudest sound being emitted, which is conservative because the turbines would not actually be operating at maximum sound output levels at all times.

Codington County's current Ordinance #68 Zoning Ordinance Section 5.22.03, paragraph 12.a) prescribes sound limits for wind turbine projects as follows:

"12.a) Noise level generated by wind energy system shall not exceed 50 dBA, average A-weighted sound pressure including constructive interference level effects at the property

line of existing off-site non participating residences, businesses, and buildings owned and/or maintained by a governmental entity.”

Therefore, Codington County’s only applicable sound limit is 50 dBA at an occupied non-participating property line, which is what has been evaluated in this report for Codington County. Although not required by the county, the sound pressure levels at participating property boundaries and participating and non-participating occupied structures (i.e., residences, business, and buildings) within 2 kilometers of a wind turbine were also evaluated.

Grant County’s current Ordinance 2016-01C, Section 1211.04, paragraph 14 prescribes sound limits for wind turbine projects as follows:

“14.) Noise. Noise level shall not exceed 45 dBA, average A-weighted Sound pressure including constructive interference effects measured twenty-five (25) feet from the perimeter of existing off-site non-participating residences, businesses, buildings owned and/or maintained by a governmental entity.”

“Noise level shall not exceed 50 dBA, average A-weighted Sound pressure including constructive interference effects measured twenty-five (25) feet from the perimeter of participating residences, businesses, and buildings owned and/or maintained by a governmental entity.”

Therefore, Grant County’s current applicable sound limit is 45 dBA for all non-participating, and 50 dBA for all participating, existing off-site residences, businesses, and buildings owned and/or maintained by a governmental entity. For purposes of this report, these residences, businesses, and buildings will hereafter be referred to as occupied structures.

3. STUDY METHODOLOGY

This sound analysis was performed utilizing windPRO¹, which has the ability to calculate detailed sound maps across an entire area of interest or at site-specific locations using sound sensitive receptors.

The analysis used the ISO 9613-2 “Attenuation of sound during propagation outdoors, Part 2” sound calculation model with “General” ground attenuation and an attenuation factor of 0.5, which represents typical mixed vegetation (i.e., prairie grass, weeds, brush) and crop cover. Realistic sound pressure levels were calculated at 1.5 m AGL at the participating and non-participating existing occupied structures and occupied parcel boundaries (Codington County only). The term “realistic” in this case, means that some amount of ground attenuation is accounted for.

¹ windPRO is the world’s leading software tool for designing wind farms, including sound analysis.

The inputs and assumptions for the windPRO sound calculation include the following:

- Turbine Coordinates
- Turbine Specifications
- Turbine Sound Emission Data
- Sound Receptor Coordinates
- Participation Status
- USGS Digital Elevation Model (DEM) (height contour data)
- Uncertainty Factor
- Meteorological Conditions
- Ground Attenuation

Turbine Coordinates: The location of a wind turbine in relation to a sound receptor is one of the most important factors in determining sound impacts. Sound pressure levels drop as they travel farther from the source of emission. The attenuation comes from atmospheric absorption as well as from absorption by the ground cover between the turbine and the receptor. The sound pressure waves can also be reflected by hard or smooth surfaces such as ice or water. Sound is also absorbed by trees and reflected by structures such as buildings or walls, although these effects (trees and buildings) are ignored in the model.

Turbine Specifications: GE Wind turbine specifications from the manufacturer were supplied to EAPC by Crowned Ridge Wind, LLC. Wind turbine specifications included in the model were the power curves, blade types (standard and low noise), hub heights and operational rotational speed of the rotor. For all turbines, Low Noise Trailing Edge (LNTE) blades were used to reduce the sound pressure levels in order to achieve compliance with county regulations by increasing the flexibility in turbine locations to meet setback requirements. The turbine specifications for the Dakota Range I and II projects were supplied by Vestas.

Turbine Sound Emission Data: Sound emission data including 1/3rd octave data supplied by the manufacture is used assuming the loudest sound pressure levels are being emitted at the hub height of the turbine. A safety margin of 2 dBA was added to the wind turbine noise emission profiles for the analysis in order to produce more conservative results, meaning that the model will predict higher sound pressure levels.

According to the GE sound documentation provided to EAPC by Crowned Ridge Wind, LLC, the loudest normal operating sound pressure level emitted from the GE 2.3-116, the loudest normal operating sound pressure level emitted is 107.5 dBA at 10 m/s and higher at hub height. Since the value is reported at hub height, it is the same value for both 80 meter and 90 meter hub-height turbines.

For the turbines used in the Dakota Range projects, the loudest normal operating sound pressure level emitted from the Vestas V136-4.2 is 105.9 dBA at 9 m/s and higher.

The specifications for the GE and Vestas wind turbine models used in this study are included in Table 1 below. The table of Crowned Ridge wind turbine coordinates is included in Appendix B.

Table 1: Wind turbine specifications.

Crowned Ridge, Crowned Ridge II and Dakota Range I & II wind energy projects wind turbine specifications							
Manufacturer	Model	Hub Height (m)	Rotor Dia. (m)	Cut-In Wind Speed (m/s)	Cut-Out Wind Speed (m/s)	Max. Sound Press. Level (dBA)	Max. Sound Press. Level LNTE (dBA)
General Electric	GE 2.3	80	116	3	22	107.5	106
General Electric	GE 2.3	90	116	3	22	107.5	106
Vestas	V136-4.2	82	136	3	20	106.5	103.9

Sound Receptor Coordinates: As with the wind turbine coordinates, the elevation, and distance of a sound receptor in relation to the wind turbines are the main factors in determining the sound impacts. EAPC was provided with coordinates for all existing residences, and occupied structures found to be located within 2 kilometer of the 142 proposed wind turbine locations by Crowned Ridge.

In Grant County, where the point of compliance is 25 feet from the perimeter of the structure, a ring of receptors was modeled 50 feet from the perimeter in order to capture sound levels that would conservatively represent the sound pressure levels 25 feet away from the perimeter.

Receptor Participation Status: A database indicating the participation status of the land parcels and the structures within the wind farm boundary were supplied to EAPC by Crowned Ridge Wind, LLC.

USGS Digital Elevation Model (DEM) (height contour data): For this study, 3-meter resolution USGS National Elevation Database (NED) DEM's were used to construct 10-foot interval height contour lines for the windPRO sound model. The height contour information is important to the sound calculation since it allows the model to place the wind turbines and the sound receptors at the correct elevations.

Uncertainty Factor: No uncertainty factor was provided by the wind turbine manufacturer. In this situation, it is common practice based on experience and studies to add 2 dBA to the sound pressure levels of each wind turbine. For this analysis, the 2 dBA were added to all wind turbine noise emission profiles.

Meteorological Conditions: A temperature of 10° C (50° F) and a relative humidity of 70% were assumed for the analysis. These conditions represent an atmospheric “worst case” scenario where sound waves will travel farther with less atmospheric absorption. This will lead to more conservative (higher predicted sound levels) results.

All wind turbines are assumed to be operating simultaneously at maximum sound output levels. All turbines are assumed to be downwind of all receptors, which is another conservative (higher predicted sound pressure levels) assumption.

Ground Attenuation: A ground attenuation factor of 0.5 was assumed for this analysis. It represents “mixed ground” consisting of half hard and half soft (porous) ground cover, which is slightly conservative and will result in higher predicted sound levels since the ground cover includes native prairie and agricultural crop land.

No other sources of sound attenuation such as trees, air turbulence or wind shadow effects were assumed in the analysis.

Wind Turbines from Adjacent Projects: The Crowned Ridge II project and the Dakota Range I and II projects are adjacent to the Crowned Ridge project. Because sound impacts are cumulative, there will be impacts from these other projects that will be additive to the impacts from the Crowned Ridge project. The Crowned Ridge II wind turbine array and the Dakota Range I and II turbine arrays were included in the model to capture the full sound impacts on the receptors.

4. RESULTS OF ANALYSIS

Although modeled as one project, the noise ordinances of the two counties are not the same. For Codington County, the noise limit is 50 dBA at the property boundary of occupied non-participating landowners. Codington County does not have a specific ordinance for sound pressure levels at a participating property boundary; although not required by the county, the sound pressure levels at participating property boundaries and occupied structures within 2 kilometers of a wind turbine were also evaluated. There is also no ordinance for sound pressure levels at any participating or non-participating occupied structures. For Grant County, the noise limit is 45 dBA at a distance of 25 feet from the perimeter of non-participating occupied structures and 50 dBA at participating occupied structures. Because of the differences in compliance criteria, the results of the study are presented individually for each county.

Crowned Ridge Codington County Turbines

For the Crowned Ridge Codington County Turbines, the sound study indicates that the highest sound pressure level at a non-participating property boundary is 49.9 dBA. Therefore, the project would be in compliance with Codington County’s allowable sound pressure levels as described in Section 5.22.03 paragraph 12 of Ordinance #68. Table 2 shows the distribution of sound pressure levels for the project. The maximum sound pressure level at a participating property boundary is 53.5 dBA; however, as there is no

county ordinance for participating property boundaries. This information is provided for transparency.

Table 2: Codington County property boundary realistic sound distribution

Realistic Sound (dBA)	Non-Participating Property Boundary	Participating Property Boundary
0 to 25	0	0
25 to 30	0	0
30 to 35	0	0
35 to 40	11	0
40 to 45	12	4
45 to 50	23	7
50+	0	10

Crowned Ridge Grant County Turbines

For Grant County, the sound study indicates that the highest sound pressure level at a distance of 25 feet from the perimeter of a non-participating occupied structure is 43 dBA. The highest sound pressure level at a distance of 25 feet from the perimeter of a participating occupied structure is 45.3 dBA. Therefore the project would be in compliance with Grant County's allowable sound pressure levels as described in Section 1211.04, paragraph 14 of the current Grant County Zoning Ordinance 2016-01C. Table 3 shows the distribution of sound pressure levels for the project.

Table 3: Grant County occupied structure realistic sound distribution

Realistic Sound (dBA)	Non-Participating Occupied Structures	Participating Occupied Structures
0 to 25	0	0
25 to 30	2	0
30 to 35	4	0
35 to 40	10	14
40 to 45	10	17
45 to 50	0	3
+50	0	0

Crowned Ridge Project Summary

The summary results for the Crowned Ridge Project are shown in table 4 below. The full table of results from the sound study can be found in Appendix C. Table C-1 lists the results sorted by receptor number and Table C-2 lists the results sorted by sound impacts (dBA) from highest to lowest. Table C-3 lists the results with 6 of the turbines recommended by Hessler removed. Table C-4 lists the results with the Grant County ordinance applied 25 feet from the perimeter of all occupied structures in both Grant and Codington Counties. All of the tabular results include the cumulative impacts from Crowned Ridge and Crowned Ridge II windfarms. The maps showing the sound impact iso-lines for the Crowned Ridge wind farm are in Appendix D.

Table 4: Summary of sound pressure level predictions.

County	Feature	Noise Limit (dBA)	Maximum Predicted (dBA)
Codington	Participating Occupied Structures	N/A	47.8
	Non-Participating Occupied Structures	N/A	44.8
	Participating Occupied Parcel Boundary Lines	N/A	53.5
	Non-participating Occupied Parcel Boundary Lines	50	49.9
Grant	Participating Occupied Structures	50	45.3
	Non-Participating Occupied Structures	45	43

5. CONCLUSIONS

The conservative results of this sound study indicate that the Crowned Ridge Project is in compliance with both Codington and Grant County ordinances.

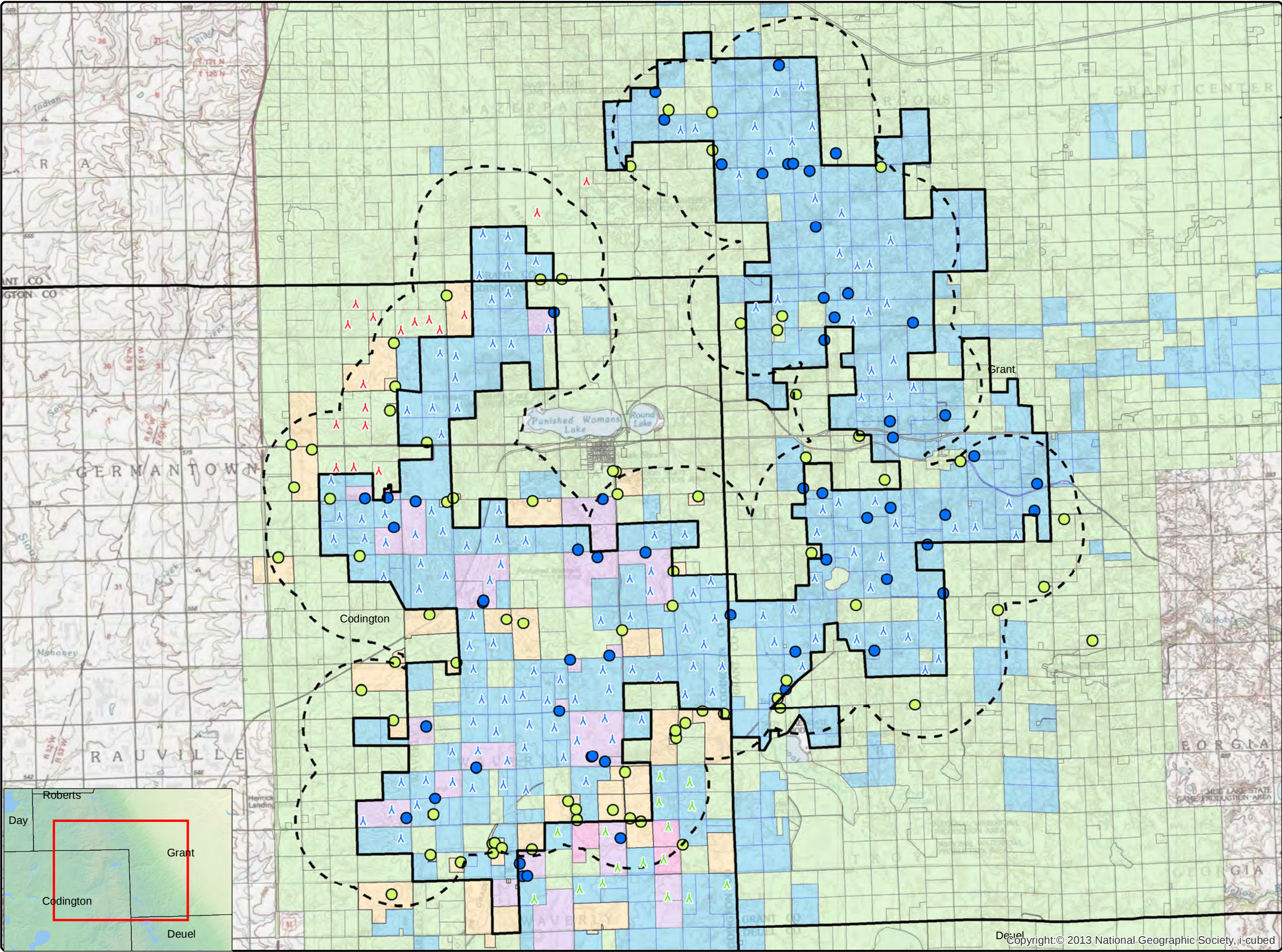
For Codington County, of the 67 property boundaries modeled, the highest sound pressure level at a non-participating property boundary is 49.9 dBA and none measured more than 50 dBA. Therefore the Crowned Ridge wind farms would be in compliance with Codington County Ordinance #68.

For Grant County, the sound study indicates that the highest sound pressure level 25 feet from the perimeter of a non-participating occupied structure is 43 dBA. The highest sound pressure level 25 feet from the perimeter of a participating occupied structure is 45.3 dBA. Therefore the project would be in compliance with the current Grant County Ordinance 2016-01C.

The results of this study are inherently conservative due to the fact that the turbines were modeled as though they were always operating at maximum sound emission levels and in all cases, an additional 2 dBA was added to the sound level being emitted by the turbine

during the modeling stage and not to the results of the sound modeling. The turbines were also modeled as though they were always downwind of each receptor, and atmospheric conditions were modeled to be most favorable for sound transmission. In addition, the receptors in Grant County were modeled 50 feet from the perimeter of the structures where the ordinance specifies 25 feet. Noise levels will be higher farther away from the perimeter.

APPENDIX A: CROWNED RIDGE WIND ENERGY PROJECT SITE OVERVIEW MAP



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Crowned Ridge 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 occupied land parcels within 2 km of a wind turbine.

Location: Watertown, SD
Project #: 20174430

Issue Dates

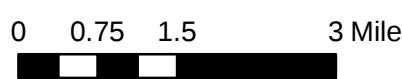
#	Description	Date
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Drawn By: AS Checked By: JH

Legend

- Crowned Ridge Turbines
- Crowned Ridge II Turbines
- Dakota Range Turbines
- 2 km Turbine Buffer
- County Lines
- CR1 Project Boundary
- Non Participants
- Participants
- Non-Part. Occupied Codington Parcels
- Participating Occupied Codington Parcels
- Non-Participating Parcels
- Participating Parcels
- Pending Parcels

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APPENDIX B: WIND TURBINE COORDINATES

Crowned Ridge Wind Farm - Updated 7/27/19
GE 2.3-116-90 m HH, GE 2.3-116-80 m HH WTG's
UTM NAD83 Zone 14

WTG	Turbine Type	Easting (m)	Northing (m)	Base Elev. AMSL (m)	Sound Profile
CRI-1	GE2.3 116RD 90HH r2.madE	659,443	5,003,083	610.2	LNTE
CRI-2	GE2.3 116RD 90HH r2.madE	660,185	5,003,010	598.1	LNTE
CRI-3	GE2.3 116RD 90HH r2.madE	661,008	5,002,288	584.1	LNTE
CRI-4	GE2.3 116RD 90HH r2.madE	660,173	5,002,120	602.5	LNTE
CRI-5	GE2.3 116RD 90HH r2.madE	659,337	5,001,862	609.9	LNTE
CRI-6	GE2.3 116RD 90HH r2.madE	660,193	5,001,329	610.5	LNTE
CRI-7	GE2.3 116RD 90HH r2.madE	659,705	5,001,146	618.0	LNTE
CRI-8	GE2.3 116RD 90HH r2.madE	661,380	5,000,282	588.3	LNTE
CRI-9	GE2.3 116RD 90HH r2.madE	659,731	4,999,855	613.4	LNTE
CRI-10	GE2.3 116RD 90HH r2.madE	660,280	4,999,837	615.0	LNTE
CRI-11	GE2.3 116RD 90HH r2.madE	658,170	4,999,546	610.9	LNTE
CRI-12	GE2.3 116RD 90HH r2.madE	658,644	4,999,460	615.0	LNTE
CRI-13	GE2.3 116RD 90HH r2.madE	658,622	4,998,843	613.3	LNTE
CRI-14	GE2.3 116RD 90HH r2.madE	657,947	4,997,935	618.3	LNTE
CRI-15	GE2.3 116RD 90HH r2.madE	658,688	4,997,924	618.0	LNTE
CRI-16	GE2.3 116RD 90HH r2.madE	657,203	4,997,856	611.9	LNTE
CRI-18	GE2.3 116RD 90HH r2.madE	658,217	4,997,154	618.0	LNTE
CRI-19	GE2.3 116RD 90HH r2.madE	654,954	4,995,804	601.1	LNTE
CRI-20	GE2.3 116RD 90HH r2.madE	659,920	4,994,924	594.0	LNTE
CRI-21	GE2.3 116RD 90HH r2.madE	657,925	4,994,896	617.1	LNTE
CRI-22	GE2.3 116RD 90HH r2.madE	656,543	4,994,796	616.5	LNTE
CRI-23	GE2.3 116RD 90HH r2.madE	655,208	4,994,717	594.7	LNTE
CRI-24	GE2.3 116RD 90HH r2.madE	655,852	4,994,652	609.0	LNTE
CRI-25	GE2.3 116RD 90HH r2.madE	658,251	4,994,286	605.5	LNTE
CRI-26	GE2.3 116RD 90HH r2.madE	665,405	4,994,191	578.5	LNTE
CRI-27	GE2.3 116RD 90HH r2.madE	657,442	4,994,187	621.0	LNTE
CRI-28	GE2.3 116RD 90HH r2.madE	664,517	4,994,168	579.0	LNTE
CRI-29	GE2.3 116RD 90HH r2.madE	655,940	4,994,069	606.9	LNTE
CRI-30	GE2.3 116RD 90HH r2.madE	659,871	4,994,052	593.7	LNTE
CRI-31	GE2.3 116RD 90HH r2.madE	655,030	4,994,051	603.0	LNTE
CRI-32	GE2.3 116RD 90HH r2.madE	660,704	4,993,998	606.0	LNTE
CRI-33	GE2.3 116RD 90HH r2.madE	656,566	4,993,941	618.0	LNTE
CRI-34	GE2.3 116RD 90HH r2.madE	658,966	4,993,856	599.7	LNTE
CRI-35	GE2.3 116RD 90HH r2.madE	657,602	4,993,347	607.4	LNTE
CRI-36	GE2.3 116RD 90HH r2.madE	659,966	4,993,319	594.0	LNTE
CRI-37	GE2.3 116RD 90HH r2.madE	664,419	4,993,110	587.3	LNTE
CRI-38	GE2.3 116RD 90HH r2.madE	658,338	4,992,981	600.5	LNTE
CRI-39	GE2.3 116RD 90HH r2.madE	656,507	4,992,958	609.0	LNTE
CRI-41	GE2.3 116RD 90HH r2.madE	663,782	4,992,883	597.7	LNTE
CRI-43	GE2.3 116RD 90HH r2.madE	666,181	4,992,815	577.9	LNTE
CRI-44	GE2.3 116RD 90HH r2.madE	665,665	4,992,460	576.0	LNTE

Crowned Ridge Wind Farm - Updated 7/27/19
GE 2.3-116-90 m HH, GE 2.3-116-80 m HH WTG's
UTM NAD83 Zone 14
continued

WTG	Turbine Type	Easting (m)	Northing (m)	Base Elev. AMSL (m)	Sound Profile
CRI-46	GE2.3 116RD 90HH r2.madE	664,387	4,992,505	591.0	LNTE
CRI-48	GE2.3 116RD 90HH r2.madE	663,794	4,991,782	587.1	LNTE
CRI-50	GE2.3 116RD 90HH r2.madE	662,930	4,991,655	612.0	LNTE
CRI-51	GE2.3 116RD 90HH r2.madE	666,299	4,991,723	575.3	LNTE
CRI-52	GE2.3 116RD 90HH r2.madE	665,426	4,991,398	575.6	LNTE
CRI-53	GE2.3 116RD 90HH r2.madE	659,750	4,990,981	598.7	LNTE
CRI-54	GE2.3 116RD 90HH r2.madE	665,979	4,990,946	573.7	LNTE
CRI-55	GE2.3 116RD 90HH r2.madE	659,045	4,990,899	597.1	LNTE
CRI-58	GE2.3 116RD 90HH r2.madE	665,663	4,990,303	585.0	LNTE
CRI-59	GE2.3 116RD 90HH r2.madE	666,523	4,990,291	573.0	LNTE
CRI-60	GE2.3 116RD 90HH r2.madE	659,155	4,990,208	594.0	LNTE
CRI-61	GE2.3 116RD 90HH r2.madE	662,982	4,990,178	612.0	LNTE
CRI-62	GE2.3 116RD 90HH r2.madE	660,954	4,990,155	600.7	LNTE
CRI-63	GE2.3 116RD 90HH r2.madE	664,627	4,989,977	588.6	LNTE
CRI-64	GE2.3 116RD 90HH r2.madE	663,858	4,990,188	604.3	LNTE
CRI-65	GE2.3 116RD 90HH r2.madE	661,732	4,989,898	609.0	LNTE
CRI-66	GE2.3 116RD 90HH r2.madE	663,165	4,989,613	614.7	LNTE
CRI-67	GE2.3 116RD 90HH r2.madE	666,226	4,989,531	574.8	LNTE
CRI-68	GE2.3 116RD 90HH r2.madE	665,420	4,989,461	585.0	LNTE
CRI-69	GE2.3 116RD 80HH r2.madE	660,621	4,989,453	605.6	LNTE
CRI-70	GE2.3 116RD 90HH r2.madE	662,171	4,989,319	611.0	LNTE
CRI-71	GE2.3 116RD 80HH r2.madE	659,405	4,989,320	607.3	LNTE
CRI-72	GE2.3 116RD 80HH r2.madE	660,087	4,989,309	606.0	LNTE
CRI-73	GE2.3 116RD 90HH r2.madE	661,344	4,989,297	609.8	LNTE
CRI-74	GE2.3 116RD 90HH r2.madE	663,041	4,988,744	615.0	LNTE
CRI-75	GE2.3 116RD 90HH r2.madE	664,137	4,988,702	609.0	LNTE
CRI-76	GE2.3 116RD 90HH r2.madE	662,399	4,988,667	615.0	LNTE
CRI-77	GE2.3 116RD 80HH r2.madE	659,158	4,988,642	612.0	LNTE
CRI-78	GE2.3 116RD 80HH r2.madE	660,811	4,988,558	604.1	LNTE
CRI-80	GE2.3 116RD 90HH r2.madE	661,552	4,988,481	608.8	LNTE
CRI-81	GE2.3 116RD 90HH r2.madE	659,825	4,988,365	606.8	LNTE
CRI-82	GE2.3 116RD 90HH r2.madE	663,271	4,988,133	613.0	LNTE
CRI-83	GE2.3 116RD 90HH r2.madE	662,227	4,988,103	606.6	LNTE
CRI-84	GE2.3 116RD 80HH r2.madE	660,677	4,987,880	600.6	LNTE
CRI-85	GE2.3 116RD 90HH r2.madE	659,295	4,987,798	612.0	LNTE
CRI-86	GE2.3 116RD 90HH r2.madE	658,534	4,987,759	613.1	LNTE
CRI-87	GE2.3 116RD 90HH r2.madE	661,830	4,987,596	609.0	LNTE
CRI-88	GE2.3 116RD 90HH r2.madE	660,157	4,987,492	603.0	LNTE
CRI-89	GE2.3 116RD 80HH r2.madE	657,758	4,986,926	614.9	LNTE
CRI-90	GE2.3 116RD 80HH r2.madE	658,545	4,986,881	612.0	LNTE
CRI-91	GE2.3 116RD 80HH r2.madE	657,023	4,986,868	612.0	LNTE

Crowned Ridge Wind Farm - Updated 7/27/19
 GE 2.3-116-90 m HH, GE 2.3-116-80 m HH WTG's
 UTM NAD83 Zone 14
continued

WTG	Turbine Type	Easting (m)	Northing (m)	Base Elev. AMSL (m)	Sound Profile
CRI-92	GE2.3 116RD 80HH r2.madE	660,039	4,986,804	607.2	LNTE
CRI-93	GE2.3 116RD 80HH r2.madE	659,133	4,986,700	607.9	LNTE
CRI-94	GE2.3 116RD 80HH r2.madE	660,716	4,986,660	600.6	LNTE
CRI-95	GE2.3 116RD 90HH r2.madE	657,488	4,986,184	612.0	LNTE
CRI-96	GE2.3 116RD 90HH r2.madE	656,744	4,986,037	609.0	LNTE
CRI-97	GE2.3 116RD 80HH r2.madE	655,899	4,985,715	592.7	LNTE
CRI-98	GE2.3 116RD 90HH r2.madE	657,015	4,985,192	608.9	LNTE
CRI-99	GE2.3 116RD 90HH r2.madE	672,521	4,990,188	556.7	LNTE
CRI-100	GE2.3 116RD 90HH r2.madE	668,885	4,990,286	585.0	LNTE
CRI-101	GE2.3 116RD 90HH r2.madE	672,921	4,990,513	544.6	LNTE
CRI-102	GE2.3 116RD 90HH r2.madE	668,059	4,991,023	581.0	LNTE
CRI-103	GE2.3 116RD 90HH r2.madE	669,279	4,991,115	582.0	LNTE
CRI-104	GE2.3 116RD 90HH r2.madE	672,009	4,991,151	555.0	LNTE
CRI-105	GE2.3 116RD 90HH r2.madE	670,488	4,991,091	571.6	LNTE
CRI-106	GE2.3 116RD 90HH r2.madE	671,278	4,991,335	566.2	LNTE
CRI-107	GE2.3 116RD 90HH r2.madE	667,723	4,991,800	582.0	LNTE
CRI-108	GE2.3 116RD 90HH r2.madE	672,917	4,991,775	541.2	LNTE
CRI-109	GE2.3 116RD 90HH r2.madE	670,897	4,992,616	557.4	LNTE
CRI-111	GE2.3 116RD 90HH r2.madE	671,220	4,993,526	550.6	LNTE
CRI-112	GE2.3 116RD 90HH r2.madE	670,419	4,993,665	561.0	LNTE
CRI-113	GE2.3 116RD 90HH r2.madE	675,201	4,994,165	497.6	LNTE
CRI-114	GE2.3 116RD 90HH r2.madE	669,318	4,994,256	561.0	LNTE
CRI-115	GE2.3 116RD 90HH r2.madE	673,402	4,994,374	516.4	LNTE
CRI-116	GE2.3 116RD 90HH r2.madE	671,642	4,994,527	531.4	LNTE
CRI-117	GE2.3 116RD 90HH r2.madE	669,488	4,994,930	544.8	LNTE
CRI-118	GE2.3 116RD 90HH r2.madE	669,961	4,995,134	540.4	LNTE
CRI-119	GE2.3 116RD 90HH r2.madE	674,992	4,995,107	492.0	LNTE
CRI-120	GE2.3 116RD 90HH r2.madE	671,034	4,995,179	536.2	LNTE
CRI-121	GE2.3 116RD 90HH r2.madE	670,629	4,998,259	531.0	LNTE
CRI-122	GE2.3 116RD 90HH r2.madE	671,475	4,998,261	517.4	LNTE
CRI-123	GE2.3 116RD 90HH r2.madE	672,180	4,998,561	505.0	LNTE
CRI-124	GE2.3 116RD 90HH r2.madE	670,926	4,999,036	522.8	LNTE
CRI-125	GE2.3 116RD 90HH r2.madE	671,580	4,999,340	509.8	LNTE
CRI-126	GE2.3 116RD 90HH r2.madE	670,382	5,000,519	516.0	LNTE
CRI-127	GE2.3 116RD 90HH r2.madE	670,845	5,000,795	507.4	LNTE
CRI-128	GE2.3 116RD 90HH r2.madE	671,388	5,001,034	498.2	LNTE
CRI-129	GE2.3 116RD 90HH r2.madE	667,516	5,000,900	553.6	LNTE
CRI-130	GE2.3 116RD 90HH r2.madE	668,158	5,001,149	546.0	LNTE
CRI-131	GE2.3 116RD 90HH r2.madE	670,512	5,002,137	504.0	LNTE
CRI-132	GE2.3 116RD 90HH r2.madE	670,875	5,002,186	499.9	LNTE
CRI-133	GE2.3 116RD 90HH r2.madE	669,990	5,002,521	502.7	LNTE

Crowned Ridge Wind Farm - Updated 7/27/19
GE 2.3-116-90 m HH, GE 2.3-116-80 m HH WTG's
UTM NAD83 Zone 14
continued

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APPENDIX C: TABLE OF SOUND RESULTS

Table C-1: Crowned Ridge Sound Level Tabular Results Sorted by Receptor ID - Updated 7/27/19**Realistic case sound results at land parcel boundaries and occupied structures****Results using GE 2.3-116-90 m HH, GE 2.3-116-80 m HH WTG's****UTM NAD83 Zone 14****Codington County**

Receptor ID	Participation Status	Type	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Sound (dB(A))	Distance to Nearest Turbine (ft)
CR1-C1-NP	Non-P	Boundary	657,276	4,983,921	590.3	36.4	4,258
CR1-C2-NP	Non-P	Boundary	658,435	4,984,609	601.8	37.5	5,036
CR1-C3-NP	Non-P	Boundary	657,812	4,984,785	603.4	39.3	2,936
CR1-C4-NP	Non-P	Boundary	659,890	4,985,620	605.2	40.4	3,914
CR1-C6-P	Participant	Boundary	663,383	4,994,502	591.0	38.3	3,878
CR1-C7-NP	Non-P	Boundary	661,266	4,985,387	591.0	46.5	1,253
CR1-C8-P	Participant	Boundary	661,277	4,984,852	597.0	43.0	2,139
CR1-C9-NP	Non-P	Boundary	665,264	4,985,116	609.0	45.3	1,814
CR1-C10-P	Participant	Boundary	662,871	4,985,402	601.7	52.1	614
CR1-C11-NP	Non-P	Boundary	664,482	4,984,923	608.8	47.4	1,509
CR1-C12-NP	Non-P	Boundary	662,067	4,985,677	605.1	45.1	1,670
CR1-C13-NP	Non-P	Boundary	664,428	4,986,270	615.0	49.9	728
CR1-C14-NP	Non-P	Boundary	657,803	4,986,003	609.0	46.1	1,191
CR1-C15-NP	Non-P	Boundary	663,047	4,985,700	612.9	48.7	968
CR1-C16-NP	Non-P	Boundary	661,642	4,985,677	597.0	48.7	948
CR1-C17-P	Participant	Boundary	658,819	4,986,842	611.4	49.7	909
CR1-C18-NP	Non-P	Boundary	664,396	4,987,007	609.4	49.1	948
CR1-C19-P	Participant	Boundary	660,393	4,987,529	608.4	50.1	784
CR1-C20-P	Participant	Boundary	662,024	4,987,612	604.2	51.0	640
CR1-C26-P	Participant	Boundary	658,015	4,987,993	606.7	43.4	1,867
CR1-C27-NP	Non-P	Boundary	657,234	4,988,151	587.2	39.5	4,265
CR1-C28-NP	Non-P	Boundary	665,432	4,989,009	583.9	44.7	1,483
CR1-C29-NP	Non-P	Boundary	666,496	4,989,001	574.3	42.5	1,952
CR1-C30-P	Participant	Boundary	661,978	4,989,318	612.8	51.3	633
CR1-C31-NP	Non-P	Boundary	665,639	4,989,013	584.7	44.3	1,637
CR1-C32-NP	Non-P	Boundary	657,160	4,990,373	573.2	37.5	6,421
CR1-C33-NP	Non-P	Boundary	657,126	4,990,843	567.0	37.8	5,856
CR1-C34-NP	Non-P	Boundary	658,763	4,990,247	589.4	45.8	1,293
CR1-C35-P	Participant	Boundary	661,955	4,990,153	606.1	47.1	1,112
CR1-C36-P	Participant	Boundary	663,116	4,990,548	610.7	46.1	1,293
CR1-C37-NP	Non-P	Boundary	663,829	4,990,572	594.0	46.1	1,263
CR1-C38-NP	Non-P	Boundary	660,955	4,990,468	591.2	47.3	1,027
CR1-C39-NP	Non-P	Boundary	659,741	4,991,242	583.3	48.5	856
CR1-C40-NP	Non-P	Boundary	658,706	4,991,231	579.8	44.8	1,555
CR1-C41-NP	Non-P	Boundary	664,797	4,992,137	578.8	44.5	1,808
CR1-C42-P	Participant	Boundary	659,828	4,992,807	580.1	51.1	604
CR1-C44-NP	Non-P	Boundary	665,447	4,992,972	578.1	44.3	1,824
CR1-C45-NP	Non-P	Boundary	653,821	4,993,552	573.0	36.6	4,291
CR1-C46-NP	Non-P	Boundary	655,903	4,993,577	609.0	45.1	1,621

Table C-1: Crowned Ridge Sound Level Tabular Results Sorted by Receptor ID - Updated 7/27/19

Realistic case sound results at land parcel boundaries and occupied structures

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

UTM NAD83 Zone 14

Codington County

continued

Receptor ID	Participation Status	Type	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Sound (dB(A))	Distance to Nearest Turbine (ft)
CR1-C47-P	Participant	Boundary	663,454	4,992,888	612.0	46.7	1,076
CR1-C48-P	Participant	Boundary	664,262	4,992,514	586.6	53.5	413
CR1-C49-P	Participant	Boundary	662,224	4,993,664	609.0	38.3	5,105
CR1-C50-P	Participant	Boundary	656,239	4,994,042	618.0	49.6	984
CR1-C51-P	Participant	Boundary	657,753	4,994,889	620.0	51.5	564
CR1-C52-NP	Non-P	Boundary	654,986	4,995,398	603.0	45.8	1,335
CR1-C53-NP	Non-P	Boundary	664,171	4,995,340	580.5	37.2	4,009
CR1-C54-NP	Non-P	Boundary	663,495	4,995,329	582.9	36.5	5,075
CR1-C55-NP	Non-P	Boundary	660,139	4,994,937	607.0	49.4	722
CR1-C56-P	Participant	Boundary	655,385	4,995,606	603.0	45.6	1,555
CR1-C57-P	Participant	Boundary	656,526	4,995,198	616.1	45.8	1,319
CR1-C58-NP	Non-P	Boundary	657,839	4,997,040	615.0	45.4	1,293
CR1-C59-P	Participant	Boundary	661,380	5,000,092	591.5	50.2	623
CR1-C60-NP	Non-P	Boundary	656,539	4,998,453	609.3	42.6	2,162
CR1-C61-NP	Non-P	Boundary	656,926	4,997,851	612.0	47.8	909
CR1-C62-NP	Non-P	Boundary	658,155	4,994,994	614.5	48.7	820
CR1-C63-NP	Non-P	Boundary	658,543	4,995,211	606.8	42.4	2,277
CR1-C64-P	Participant	Boundary	659,129	4,991,995	576.6	49.9	679
CR1-C65-NP	Non-P	Boundary	665,516	4,995,045	578.0	39.1	2,825
CR1-C70-NP	Non-P	Boundary	664,953	4,987,981	596.1	42.2	3,225
CR1-C71-NP	Non-P	Boundary	664,683	4,987,355	600.0	48.2	1,047
CR1-C105-NP	Non-P	Boundary	658,351	5,000,265	609.0	49.8	604
CR1-C107-NP	Non-P	Boundary	655,923	4,998,435	595.6	48.5	673
CR1-C109-NP	Non-P	Boundary	654,533	4,997,357	592.6	40.9	1,909
CR1-C110-NP	Non-P	Boundary	654,553	4,996,633	588.7	41.3	2,365
CR1-C111-NP	Non-P	Boundary	654,576	4,995,809	599.1	45.5	1,240
CR1-C112-NP	Non-P	Boundary	660,152	4,984,994	604.0	39.2	5,075
CR2-C150-P	Participant	Boundary	657,308	4,986,173	600.0	51.3	591
CR1-C1-NP	Non-P	Structure	656,743	4,983,525	596.0	34.8	5,541
CR1-C2-NP	Non-P	Structure	658,791	4,984,483	602.0	37.2	6,273
CR1-C3-NP	Non-P	Structure	657,888	4,984,697	604.2	38.7	3,294
CR1-C4-NP	Non-P	Structure	659,744	4,984,749	606.0	38.4	5,981
CR1-C5-NP	Non-P	Structure	659,958	4,984,794	604.8	38.7	5,659
CR1-C6-P	Participant	Structure	662,989	4,995,228	599.8	36.3	6,102
CR1-C7-NP	Non-P	Structure	660,893	4,984,861	593.2	41.1	3,022
CR1-C8-P	Participant	Structure	660,532	4,984,445	599.4	40.0	3,740
CR1-C9-NP	Non-P	Structure	665,352	4,985,004	609.0	44.7	2,280
CR1-C10-P	Participant	Structure	663,510	4,985,195	609.0	46.0	1,634

Table C-1: Crowned Ridge Sound Level Tabular Results Sorted by Receptor ID - Updated 7/27/19**Realistic case sound results at land parcel boundaries and occupied structures****Results using GE 2.3-116-90 m HH, GE 2.3-116-80 m HH WTG's****UTM NAD83 Zone 14****Codington County****continued**

Receptor ID	Participation Status	Type	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Sound (dB(A))	Distance to Nearest Turbine (ft)
CR1-C11-NP	Non-P	Structure	664,111	4,985,679	609.0	44.0	2,615
CR1-C12-NP	Non-P	Structure	662,222	4,985,736	603.0	44.0	2,201
CR1-C12-1-NP	Non-P	Structure	662,199	4,986,047	606.0	43.2	2,818
CR1-C13-NP	Non-P	Structure	663,792	4,985,785	612.0	43.5	2,713
CR1-C14-NP	Non-P	Structure	657,982	4,985,894	609.0	43.4	1,880
CR1-C15-NP	Non-P	Structure	663,291	4,986,026	615.0	43.7	2,175
CR1-C16-NP	Non-P	Structure	661,960	4,986,288	606.0	43.0	2,648
CR1-C17-P	Participant	Structure	658,031	4,986,373	609.1	45.1	1,886
CR1-C18-NP	Non-P	Structure	663,651	4,987,157	610.4	42.6	3,409
CR1-C19-P	Participant	Structure	659,243	4,987,276	611.6	46.3	1,722
CR1-C20-P	Participant	Structure	663,054	4,987,455	606.0	44.0	2,336
CR1-C21-P	Participant	Structure	660,756	4,984,086	594.0	41.9	2,388
CR1-C22-P	Participant	Structure	660,755	4,984,082	594.0	41.9	2,375
CR1-C23-P	Participant	Structure	660,619	4,984,078	595.8	41.4	2,523
CR1-C26-P	Participant	Structure	657,767	4,988,493	597.0	40.3	3,484
CR1-C27-NP	Non-P	Structure	656,876	4,988,683	583.0	37.5	5,974
CR1-C28-NP	Non-P	Structure	665,429	4,988,598	590.9	41.7	2,831
CR1-C29-NP	Non-P	Structure	666,572	4,988,867	575.9	41.2	2,457
CR1-C30-P	Participant	Structure	661,699	4,988,957	615.0	47.8	1,614
CR1-C31-NP	Non-P	Structure	665,939	4,988,950	585.4	43.2	2,126
CR1-C32-NP	Non-P	Structure	655,843	4,989,581	568.8	35.2	9,708
CR1-C33-NP	Non-P	Structure	656,839	4,990,404	569.8	36.9	7,418
CR1-C34-NP	Non-P	Structure	658,661	4,990,389	588.2	44.5	1,726
CR1-C35-P	Participant	Structure	662,025	4,990,475	609.0	43.7	2,123
CR1-C36-P	Participant	Structure	663,181	4,990,600	615.0	45.3	1,532
CR1-C37-NP	Non-P	Structure	663,563	4,991,342	605.1	44.8	1,631
CR1-C38-NP	Non-P	Structure	660,639	4,991,557	597.0	40.9	3,474
CR1-C39-NP	Non-P	Structure	660,144	4,991,670	588.0	42.2	2,605
CR1-C40-NP	Non-P	Structure	657,865	4,991,818	583.7	41.4	2,690
CR1-C41-NP	Non-P	Structure	665,053	4,992,084	576.1	44.1	2,356
CR1-C42-P	Participant	Structure	659,458	4,992,229	580.0	44.6	1,801
CR1-C44-NP	Non-P	Structure	665,076	4,993,095	578.2	43.8	2,155
CR1-C45-NP	Non-P	Structure	653,390	4,993,503	573.2	35.0	5,673
CR1-C46-NP	Non-P	Structure	655,802	4,993,540	609.1	44.4	1,795
CR1-C47-P	Participant	Structure	662,825	4,993,508	613.9	39.2	3,750
CR1-C48-P	Participant	Structure	664,247	4,993,646	588.0	44.6	1,847
CR1-C49-P	Participant	Structure	662,250	4,993,731	609.0	38.2	5,148
CR1-C50-P	Participant	Structure	656,806	4,994,388	621.0	46.8	1,591

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Table C-1: Crowned Ridge Sound Level Tabular Results Sorted by Receptor ID - Updated 7/27/19

Realistic case sound results at occupied structures

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

UTM NAD83 Zone 14

Grant County

continued

Receptor ID	Participation Status	Type	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Sound (dB(A))	Distance to Nearest Turbine (ft)
CR1-G12-NP	Non-P	Structure	668,229	4,989,039	575.0	37.8	4,623
CR1-G13-NP	Non-P	Structure	672,216	4,989,142	558.0	37.2	3,576
CR1-G14-NP	Non-P	Structure	668,156	4,989,332	574.1	38.6	3,940
CR1-G15-P	Participant	Structure	668,396	4,989,607	576.0	39.9	2,746
CR1-G16-NP	Non-P	Structure	668,419	4,989,861	576.0	41.7	2,070
CR1-G18-P	Participant	Structure	668,678	4,990,722	585.0	45.1	1,585
CR1-G19-P	Participant	Structure	671,018	4,990,744	570.0	43.4	2,077
CR1-G21-P	Participant	Structure	666,766	4,991,807	577.1	44.8	1,555
CR1-G22-NP	Non-P	Structure	674,670	4,991,955	527.6	34.8	5,781
CR1-G23-NP	Non-P	Structure	670,471	4,992,104	560.0	42.5	2,185
CR1-G24-P	Participant	Structure	673,058	4,992,440	539.4	35.0	2,231
CR1-G25-P	Participant	Structure	671,391	4,992,858	549.0	43.8	1,804
CR1-G26-P	Participant	Structure	672,589	4,993,869	531.0	39.9	3,140
CR1-G27-NP	Non-P	Structure	676,630	4,994,642	480.8	34.0	4,944
CR1-G28-P	Participant	Structure	673,113	4,994,772	513.9	43.2	1,614
CR1-G32-P	Participant	Structure	669,477	4,995,401	546.0	45.1	1,545
CR1-G33-P	Participant	Structure	668,911	4,995,550	548.7	39.9	2,779
CR1-G34-NP	Non-P	Structure	671,320	4,995,798	531.0	40.8	2,238
CR1-G36-NP	Non-P	Structure	673,559	4,996,344	498.0	35.4	6,211
CR1-G37-NP	Non-P	Structure	668,998	4,996,452	549.0	36.6	5,246
CR1-G38-P	Participant	Structure	673,972	4,996,493	494.5	35.0	5,646
CR1-G41-P	Participant	Structure	671,563	4,997,050	497.6	37.9	3,983
CR1-G42-NP	Non-P	Structure	670,566	4,997,097	518.9	38.0	3,819
CR1-G43-NP	Non-P	Structure	661,141	5,001,721	583.6	42.9	1,909
CR1-G44-NP	Non-P	Structure	661,781	5,001,732	583.7	39.2	3,123
CR1-G59-P	Participant	Structure	675,755	4,994,888	487.7	39.6	2,605
CR1-G60-P	Participant	Structure	675,830	4,995,687	477.0	36.4	3,343
CR1-G65-P	Participant	Structure	671,496	4,994,973	537.0	45.3	1,539
CR1-G66-P	Participant	Structure	670,802	4,994,681	539.7	43.9	1,801
CR1-G67-P	Participant	Structure	669,597	4,993,440	556.1	43.2	2,106
CR1-G68-NP	Non-P	Structure	669,159	4,993,632	565.6	43.0	2,113
CR1-G70-NP	Non-P	Structure	677,465	4,991,043	492.0	29.3	12,651
CR1-G77-NP	Non-P	Structure	676,031	4,992,629	502.7	33.2	5,728
CR1-G81-P	Participant	Structure	671,478	4,997,523	508.8	40.7	2,421
CR1-G105-NP	Non-P	Structure	668,696	4,998,325	549.0	35.2	6,345
CR1-G108-P	Participant	Structure	669,516	5,001,186	522.2	39.7	3,586
CR1-G109-NP	Non-P	Structure	667,064	5,000,425	566.2	40.1	2,152
CR1-G110-NP	Non-P	Structure	671,218	5,005,064	456.2	34.8	5,889

continued

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Table C-2: Crowned Ridge Sound Level Tabular Results Sorted by Sound Level - Updated 7/26/19

Realistic case sound results at land parcel boundaries and occupied structures

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

UTM NAD83 Zone 14

Codington County

Receptor ID	Participation Status	Type	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Sound (dB(A))	Distance to Nearest Turbine (ft)
CR1-C13-NP	Non-P	Boundary	664,428	4,986,270	615.0	49.9	728
CR1-C105-NP	Non-P	Boundary	658,351	5,000,265	609.0	49.8	604
CR1-C55-NP	Non-P	Boundary	660,139	4,994,937	607.0	49.4	722
CR1-C18-NP	Non-P	Boundary	664,396	4,987,007	609.4	49.1	948
CR1-C15-NP	Non-P	Boundary	663,047	4,985,700	612.9	48.7	968
CR1-C62-NP	Non-P	Boundary	658,155	4,994,994	614.5	48.7	820
CR1-C16-NP	Non-P	Boundary	661,642	4,985,677	597.0	48.7	948
CR1-C39-NP	Non-P	Boundary	659,741	4,991,242	583.3	48.5	856
CR1-C107-NP	Non-P	Boundary	655,923	4,998,435	595.6	48.5	673
CR1-C71-NP	Non-P	Boundary	664,683	4,987,355	600.0	48.2	1,047
CR1-C61-NP	Non-P	Boundary	656,926	4,997,851	612.0	47.8	909
CR1-C11-NP	Non-P	Boundary	664,482	4,984,923	608.8	47.4	1,509
CR1-C38-NP	Non-P	Boundary	660,955	4,990,468	591.2	47.3	1,027
CR1-C7-NP	Non-P	Boundary	661,266	4,985,387	591.0	46.5	1,253
CR1-C14-NP	Non-P	Boundary	657,803	4,986,003	609.0	46.1	1,191
CR1-C37-NP	Non-P	Boundary	663,829	4,990,572	594.0	46.1	1,263
CR1-C34-NP	Non-P	Boundary	658,763	4,990,247	589.4	45.8	1,293
CR1-C52-NP	Non-P	Boundary	654,986	4,995,398	603.0	45.8	1,335
CR1-C111-NP	Non-P	Boundary	654,576	4,995,809	599.1	45.5	1,240
CR1-C58-NP	Non-P	Boundary	657,839	4,997,040	615.0	45.4	1,293
CR1-C9-NP	Non-P	Boundary	665,264	4,985,116	609.0	45.3	1,814
CR1-C46-NP	Non-P	Boundary	655,903	4,993,577	609.0	45.1	1,621
CR1-C12-NP	Non-P	Boundary	662,067	4,985,677	605.1	45.1	1,670
CR1-C40-NP	Non-P	Boundary	658,706	4,991,231	579.8	44.8	1,555
CR1-C28-NP	Non-P	Boundary	665,432	4,989,009	583.9	44.7	1,483
CR1-C41-NP	Non-P	Boundary	664,797	4,992,137	578.8	44.5	1,808
CR1-C31-NP	Non-P	Boundary	665,639	4,989,013	584.7	44.3	1,637
CR1-C44-NP	Non-P	Boundary	665,447	4,992,972	578.1	44.3	1,824
CR1-C60-NP	Non-P	Boundary	656,539	4,998,453	609.3	42.6	2,162
CR1-C29-NP	Non-P	Boundary	666,496	4,989,001	574.3	42.5	1,952
CR1-C63-NP	Non-P	Boundary	658,543	4,995,211	606.8	42.4	2,277
CR1-C70-NP	Non-P	Boundary	664,953	4,987,981	596.1	42.2	3,225
CR1-C110-NP	Non-P	Boundary	654,553	4,996,633	588.7	41.3	2,910
CR1-C109-NP	Non-P	Boundary	654,533	4,997,357	592.6	40.9	1,909
CR1-C4-NP	Non-P	Boundary	659,890	4,985,620	605.2	40.4	3,914
CR1-C27-NP	Non-P	Boundary	657,234	4,988,151	587.2	39.5	4,265
CR1-C3-NP	Non-P	Boundary	657,812	4,984,785	603.4	39.3	2,936
CR1-C112-NP	Non-P	Boundary	660,152	4,984,994	604.0	39.2	5,075
CR1-C65-NP	Non-P	Boundary	665,516	4,995,045	578.0	39.1	2,825

Table C-2: Crowned Ridge Sound Level Tabular Results Sorted by Sound Level - Updated 7/26/19

Realistic case sound results at land parcel boundaries and occupied structures

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

UTM NAD83 Zone 14

Codington County

continued

Receptor ID	Participation Status	Type	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Sound (dB(A))	Distance to Nearest Turbine (ft)
CR1-C33-NP	Non-P	Boundary	657,126	4,990,843	567.0	37.8	5,856
CR1-C32-NP	Non-P	Boundary	657,160	4,990,373	573.2	37.5	6,421
CR1-C2-NP	Non-P	Boundary	658,435	4,984,609	601.8	37.5	5,036
CR1-C53-NP	Non-P	Boundary	664,171	4,995,340	580.5	37.2	4,009
CR1-C45-NP	Non-P	Boundary	653,821	4,993,552	573.0	36.6	4,291
CR1-C54-NP	Non-P	Boundary	663,495	4,995,329	582.9	36.5	5,075
CR1-C1-NP	Non-P	Boundary	657,276	4,983,921	590.3	36.4	4,258
CR1-C48-P	Participant	Boundary	664,262	4,992,514	586.6	53.5	413
CR1-C10-P	Participant	Boundary	662,871	4,985,402	601.7	52.1	614
CR1-C51-P	Participant	Boundary	657,753	4,994,889	620.0	51.5	564
CR1-C30-P	Participant	Boundary	661,978	4,989,318	612.8	51.3	633
CR2-C150-P	Participant	Boundary	657,308	4,986,173	600.0	51.3	591
CR1-C42-P	Participant	Boundary	659,828	4,992,807	580.1	51.1	604
CR1-C20-P	Participant	Boundary	662,024	4,987,612	604.2	51.0	640
CR1-C59-P	Participant	Boundary	661,380	5,000,092	591.5	50.2	623
CR1-C19-P	Participant	Boundary	660,393	4,987,529	608.4	50.1	784
CR1-C64-P	Participant	Boundary	659,129	4,991,995	576.6	49.9	679
CR1-C17-P	Participant	Boundary	658,819	4,986,842	611.4	49.7	909
CR1-C50-P	Participant	Boundary	656,239	4,994,042	618.0	49.6	984
CR1-C35-P	Participant	Boundary	661,955	4,990,153	606.1	47.1	1,112
CR1-C47-P	Participant	Boundary	663,454	4,992,888	612.0	46.7	1,076
CR1-C36-P	Participant	Boundary	663,116	4,990,548	610.7	46.1	1,293
CR1-C57-P	Participant	Boundary	656,526	4,995,198	616.1	45.8	1,319
CR1-C56-P	Participant	Boundary	655,385	4,995,606	603.0	45.6	1,555
CR1-C26-P	Participant	Boundary	658,015	4,987,993	606.7	43.4	1,867
CR1-C8-P	Participant	Boundary	661,277	4,984,852	597.0	43.0	2,139
CR1-C49-P	Participant	Boundary	662,224	4,993,664	609.0	38.3	5,105
CR1-C6-P	Participant	Boundary	663,383	4,994,502	591.0	38.3	3,878
CR1-C37-NP	Non-P	Structure	663,563	4,991,342	605.1	44.8	1,631
CR1-C9-NP	Non-P	Structure	665,352	4,985,004	609.0	44.7	2,280
CR1-C52-NP	Non-P	Structure	654,924	4,995,231	603.0	44.6	1,883
CR1-C34-NP	Non-P	Structure	658,661	4,990,389	588.2	44.5	1,726
CR1-C46-NP	Non-P	Structure	655,802	4,993,540	609.1	44.4	1,795
CR1-C61-NP	Non-P	Structure	656,690	4,997,831	612.0	44.2	1,686
CR1-C41-NP	Non-P	Structure	665,053	4,992,084	576.1	44.1	2,356
CR1-C12-NP	Non-P	Structure	662,222	4,985,736	603.0	44.0	2,201
CR1-C11-NP	Non-P	Structure	664,111	4,985,679	609.0	44.0	2,615
CR1-C62-NP	Non-P	Structure	658,375	4,995,138	615.0	43.9	1,676

Table C-2: Crowned Ridge Sound Level Tabular Results Sorted by Sound Level - Updated 7/26/19

Realistic case sound results at land parcel boundaries and occupied structures

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

UTM NAD83 Zone 14

Codington County

continued

Receptor ID	Participation Status	Type	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Sound (dB(A))	Distance to Nearest Turbine (ft)
CR1-C107-NP	Non-P	Structure	656,811	4,999,855	598.8	43.9	1,401
CR1-C44-NP	Non-P	Structure	665,076	4,993,095	578.2	43.8	2,155
CR1-C15-NP	Non-P	Structure	663,291	4,986,026	615.0	43.7	2,175
CR1-C58-NP	Non-P	Structure	657,781	4,996,906	615.0	43.7	1,647
CR1-C13-NP	Non-P	Structure	663,792	4,985,785	612.0	43.5	2,713
CR1-C14-NP	Non-P	Structure	657,982	4,985,894	609.0	43.4	1,880
CR1-C12-1-NP	Non-P	Structure	662,199	4,986,047	606.0	43.2	2,818
CR1-C31-NP	Non-P	Structure	665,939	4,988,950	585.4	43.2	2,126
CR1-C16-NP	Non-P	Structure	661,960	4,986,288	606.0	43.0	2,648
CR1-C18-NP	Non-P	Structure	663,651	4,987,157	610.4	42.6	3,409
CR1-C39-NP	Non-P	Structure	660,144	4,991,670	588.0	42.2	2,605
CR1-C60-NP	Non-P	Structure	656,855	4,998,565	613.5	42.1	2,592
CR1-C63-NP	Non-P	Structure	658,566	4,995,254	612.4	42.1	2,408
CR1-C105-NP	Non-P	Structure	658,372	5,001,257	600.3	42.1	2,549
CR1-C28-NP	Non-P	Structure	665,429	4,988,598	590.9	41.7	2,831
CR1-C70-NP	Non-P	Structure	665,135	4,988,293	595.9	41.6	3,540
CR1-C71-NP	Non-P	Structure	665,137	4,988,378	595.6	41.6	3,448
CR1-C72-NP	Non-P	Structure	665,158	4,988,170	594.6	41.6	3,776
CR1-C40-NP	Non-P	Structure	657,865	4,991,818	583.7	41.4	2,690
CR1-C29-NP	Non-P	Structure	666,572	4,988,867	575.9	41.2	2,457
CR1-C7-NP	Non-P	Structure	660,893	4,984,861	593.2	41.1	3,022
CR1-C38-NP	Non-P	Structure	660,639	4,991,557	597.0	40.9	3,474
CR1-C110-NP	Non-P	Structure	654,385	4,996,686	593.9	40.1	2,910
CR1-C55-NP	Non-P	Structure	660,914	4,995,169	607.5	39.4	3,360
CR1-C67-NP	Non-P	Structure	659,789	4,985,057	606.0	38.9	5,791
CR1-C112-NP	Non-P	Structure	660,002	4,984,908	604.6	38.9	5,627
CR1-C3-NP	Non-P	Structure	657,888	4,984,697	604.2	38.7	3,294
CR1-C5-NP	Non-P	Structure	659,958	4,984,794	604.8	38.7	5,659
CR1-C66-NP	Non-P	Structure	659,718	4,985,032	606.0	38.7	5,800
CR1-C4-NP	Non-P	Structure	659,744	4,984,749	606.0	38.4	5,981
CR1-C111-NP	Non-P	Structure	653,857	4,995,573	591.0	38.3	3,678
CR1-C27-NP	Non-P	Structure	656,876	4,988,683	583.0	37.5	5,974
CR1-C2-NP	Non-P	Structure	658,791	4,984,483	602.0	37.2	6,273
CR1-C65-NP	Non-P	Structure	665,805	4,995,305	579.0	37.2	3,884
CR1-C109-NP	Non-P	Structure	653,780	4,996,828	588.0	37.1	4,797
CR1-C33-NP	Non-P	Structure	656,839	4,990,404	569.8	36.9	7,418
CR1-C54-NP	Non-P	Structure	663,421	4,995,376	583.4	36.3	5,351
CR1-C32-NP	Non-P	Structure	655,843	4,989,581	568.8	35.2	9,708

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Table C-2: Crowned Ridge Sound Level Tabular Results Sorted by Sound Level - Updated 7/26/19

Realistic case sound results at occupied structures

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

UTM NAD83 Zone 14

Grant County

continued

Receptor ID	Participation Status	Type	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Sound (dB(A))	Distance to Nearest Turbine (ft)
CR1-G68-NP	Non-P	Structure	669,159	4,993,632	565.6	43.0	2,113
CR1-G43-NP	Non-P	Structure	661,141	5,001,721	583.6	42.9	1,909
CR1-G125-NP	Non-P	Structure	668,289	5,000,643	543.0	42.8	1,716
CR1-G23-NP	Non-P	Structure	670,471	4,992,104	560.0	42.5	2,185
CR1-G16-NP	Non-P	Structure	668,419	4,989,861	576.0	41.7	2,070
CR1-G114-NP	Non-P	Structure	666,214	5,006,667	521.1	40.8	2,205
CR1-G34-NP	Non-P	Structure	671,320	4,995,798	531.0	40.8	2,238
CR1-G115-NP	Non-P	Structure	664,933	5,006,731	544.6	40.5	2,188
CR1-G113-NP	Non-P	Structure	666,228	5,005,549	537.0	40.3	2,746
CR1-G109-NP	Non-P	Structure	667,064	5,000,425	566.2	40.1	2,152
CR1-G130-NP	Non-P	Structure	668,147	5,000,233	549.0	39.3	3,005
CR1-G44-NP	Non-P	Structure	661,781	5,001,732	583.7	39.2	3,123
CR1-G14-NP	Non-P	Structure	668,156	4,989,332	574.1	38.6	3,940
CR1-G42-NP	Non-P	Structure	670,566	4,997,097	518.9	38.0	3,819
CR1-G12-NP	Non-P	Structure	668,229	4,989,039	575.0	37.8	4,623
CR1-G13-NP	Non-P	Structure	672,216	4,989,142	558.0	37.2	3,576
CR1-G37-NP	Non-P	Structure	668,998	4,996,452	549.0	36.6	5,246
CR1-G36-NP	Non-P	Structure	673,559	4,996,344	498.0	35.4	6,211
CR1-G117-NP	Non-P	Structure	663,801	5,005,084	581.3	35.3	4,501
CR1-G105-NP	Non-P	Structure	668,696	4,998,325	549.0	35.2	6,345
CR1-G22-NP	Non-P	Structure	674,670	4,991,955	527.6	34.8	5,781
CR1-G110-NP	Non-P	Structure	671,218	5,005,064	456.2	34.8	5,889
CR1-G27-NP	Non-P	Structure	676,630	4,994,642	480.8	34.0	4,944
CR1-G77-NP	Non-P	Structure	676,031	4,992,629	502.7	33.2	5,728
CR1-G70-NP	Non-P	Structure	677,465	4,991,043	492.0	29.3	12,651
CR1-G600-NP	Non-P	Structure	674,301	5,005,773	393.0	28.8	13,186
CR1-G65-P	Participant	Structure	671,496	4,994,973	537.0	45.3	1,539
CR1-G18-P	Participant	Structure	668,678	4,990,722	585.0	45.1	1,585
CR1-G32-P	Participant	Structure	669,477	4,995,401	546.0	45.1	1,545
CR1-G21-P	Participant	Structure	666,766	4,991,807	577.1	44.8	1,555
CR1-G66-P	Participant	Structure	670,802	4,994,681	539.7	43.9	1,801
CR1-G25-P	Participant	Structure	671,391	4,992,858	549.0	43.8	1,804
CR1-G19-P	Participant	Structure	671,018	4,990,744	570.0	43.4	2,077
CR1-G67-P	Participant	Structure	669,597	4,993,440	556.1	43.2	2,106
CR1-G28-P	Participant	Structure	673,113	4,994,772	513.9	43.2	1,614
CR1-G128-P	Participant	Structure	670,242	5,001,314	513.0	42.9	2,612
CR1-G131-P	Participant	Structure	668,466	5,005,145	505.2	42.9	2,133
CR1-G124-P	Participant	Structure	669,843	5,000,605	525.0	42.7	1,791

continued

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Table C-3: Crowned Ridge Sound Level Tabular Results Sorted by Sound Level - Updated 7/27/19

6 turbines removed as suggested by Mr. Hessler

Realistic case sound results at occupied structures

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

UTM NAD83 Zone 14

Codington County

Receptor ID	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Hessler Case Sound (dB(A))	Real Case Sound (dB(A))	Reduction (DB(A))	Distance to Nearest Turbine (ft)
CR1-C37-NP	Non-P	663,563	4,991,342	605.1	44.8	44.8	0.0	1,631
CR1-C9-NP	Non-P	665,352	4,985,004	609.0	44.7	44.7	0.0	2,280
CR1-C46-NP	Non-P	655,802	4,993,540	609.1	44.2	44.4	0.2	1,795
CR1-C61-NP	Non-P	656,690	4,997,831	612.0	44.2	44.2	0.0	1,686
CR1-C41-NP	Non-P	665,053	4,992,084	576.1	44.1	44.1	0.0	2,356
CR1-C11-NP	Non-P	664,111	4,985,679	609.0	43.9	44.0	0.1	2,615
CR1-C12-NP	Non-P	662,222	4,985,736	603.0	43.9	44.0	0.1	2,201
CR1-C62-NP	Non-P	658,375	4,995,138	615.0	43.9	43.9	0.0	1,676
CR1-C107-NP	Non-P	656,811	4,999,855	598.8	43.9	43.9	0.0	1,401
CR1-C15-NP	Non-P	663,291	4,986,026	615.0	43.7	43.7	0.0	2,175
CR1-C44-NP	Non-P	665,076	4,993,095	578.2	43.7	43.8	0.1	2,155
CR1-C58-NP	Non-P	657,781	4,996,906	615.0	43.7	43.7	0.0	1,647
CR1-C13-NP	Non-P	663,792	4,985,785	612.0	43.5	43.5	0.0	2,713
CR1-C14-NP	Non-P	657,982	4,985,894	609.0	43.3	43.4	0.1	1,880
CR1-C12-1-NP	Non-P	662,199	4,986,047	606.0	43.1	43.2	0.1	2,818
CR1-C16-NP	Non-P	661,960	4,986,288	606.0	43.0	43.0	0.0	2,648
CR1-C18-NP	Non-P	663,651	4,987,157	610.4	42.5	42.6	0.1	3,409
CR1-C34-NP	Non-P	658,661	4,990,389	588.2	42.3	44.5	2.2	1,726
CR1-C105-NP	Non-P	658,372	5,001,257	600.3	42.1	42.1	0.0	2,549
CR1-C39-NP	Non-P	660,144	4,991,670	588.0	42.0	42.2	0.2	2,605
CR1-C60-NP	Non-P	656,855	4,998,565	613.5	42.0	42.1	0.1	2,592
CR1-C63-NP	Non-P	658,566	4,995,254	612.4	42.0	42.1	0.1	2,408
CR1-C40-NP	Non-P	657,865	4,991,818	583.7	41.3	41.4	0.1	2,690
CR1-C7-NP	Non-P	660,893	4,984,861	593.2	41.1	41.1	0.0	3,022
CR1-C72-NP	Non-P	665,158	4,988,170	594.6	41.0	41.6	0.6	3,776
CR1-C70-NP	Non-P	665,135	4,988,293	595.9	40.9	41.6	0.7	3,540
CR1-C71-NP	Non-P	665,137	4,988,378	595.6	40.8	41.6	0.8	3,448
CR1-C38-NP	Non-P	660,639	4,991,557	597.0	40.7	40.9	0.2	3,474
CR1-C52-NP	Non-P	654,924	4,995,231	603.0	40.4	44.6	4.2	3,586
CR1-C28-NP	Non-P	665,429	4,988,598	590.9	40.1	41.7	1.6	2,831
CR1-C31-NP	Non-P	665,939	4,988,950	585.4	39.5	43.2	3.7	2,126
CR1-C55-NP	Non-P	660,914	4,995,169	607.5	39.3	39.4	0.1	3,360
CR1-C110-NP	Non-P	654,385	4,996,686	593.9	39.0	40.1	1.1	2,910
CR1-C112-NP	Non-P	660,002	4,984,908	604.6	38.9	38.9	0.0	5,627
CR1-C67-NP	Non-P	659,789	4,985,057	606.0	38.8	38.9	0.1	5,791
CR1-C3-NP	Non-P	657,888	4,984,697	604.2	38.7	38.7	0.0	3,294
CR1-C5-NP	Non-P	659,958	4,984,794	604.8	38.7	38.7	0.0	5,659
CR1-C66-NP	Non-P	659,718	4,985,032	606.0	38.7	38.7	0.0	5,800
CR1-C29-NP	Non-P	666,572	4,988,867	575.9	38.6	41.2	2.6	2,457

Table C-3: Crowned Ridge Sound Level Tabular Results Sorted by Sound Level - Updated 7/27/19

6 turbines removed as suggested by Mr. Hessler

Realistic case sound results at occupied structures

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

UTM NAD83 Zone 14

Codington County

continued

Receptor ID	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Hessler Case Sound (dB(A))	Real Case Sound (dB(A))	Reduction (DB(A))	Distance to Nearest Turbine (ft)
CR1-C4-NP	Non-P	659,744	4,984,749	606.0	38.3	38.4	0.1	5,981
CR1-C27-NP	Non-P	656,876	4,988,683	583.0	37.4	37.5	0.1	5,974
CR1-C2-NP	Non-P	658,791	4,984,483	602.0	37.2	37.2	0.0	6,273
CR1-C65-NP	Non-P	665,805	4,995,305	579.0	37.2	37.2	0.0	3,884
CR1-C33-NP	Non-P	656,839	4,990,404	569.8	36.6	36.9	0.3	7,418
CR1-C109-NP	Non-P	653,780	4,996,828	588.0	36.3	37.1	0.8	4,797
CR1-C111-NP	Non-P	653,857	4,995,573	591.0	36.3	38.3	2.0	6,289
CR1-C54-NP	Non-P	663,421	4,995,376	583.4	36.2	36.3	0.1	5,351
CR1-C53-NP	Non-P	663,376	4,996,043	578.8	35.1	35.2	0.1	7,201
CR1-C32-NP	Non-P	655,843	4,989,581	568.8	34.9	35.2	0.3	9,708
CR1-C1-NP	Non-P	656,743	4,983,525	596.0	34.8	34.8	0.0	5,541
CR1-C45-NP	Non-P	653,390	4,993,503	573.2	34.4	35.0	0.6	5,673
CR1-C30-P	Participant	661,699	4,988,957	615.0	47.8	47.8	0.0	1,614
CR1-C50-P	Participant	656,806	4,994,388	621.0	46.7	46.8	0.1	1,591
CR1-C19-P	Participant	659,243	4,987,276	611.6	46.3	46.3	0.0	1,722
CR2-C150-P	Participant	657,178	4,985,788	612.0	46.1	46.1	0.0	1,640
CR1-C10-P	Participant	663,510	4,985,195	609.0	46.0	46.0	0.0	1,634
CR1-C36-P	Participant	663,181	4,990,600	615.0	45.3	45.3	0.0	1,532
CR1-C68-P	Participant	662,652	4,987,606	609.0	45.2	45.2	0.0	2,146
CR1-C17-P	Participant	658,031	4,986,373	609.1	45.1	45.1	0.0	1,886
CR1-C69-P	Participant	662,685	4,987,619	609.0	45.1	45.1	0.0	2,185
CR1-C64-P	Participant	659,436	4,992,174	581.0	44.8	44.8	0.0	1,614
CR1-C48-P	Participant	664,247	4,993,646	588.0	44.6	44.6	0.0	1,847
CR1-C57-P	Participant	656,628	4,995,266	615.0	44.6	44.8	0.2	1,568
CR1-C42-P	Participant	659,458	4,992,229	580.0	44.5	44.6	0.1	1,801
CR1-C51-P	Participant	657,455	4,995,160	621.0	44.0	44.0	0.0	1,768
CR1-C56-P	Participant	655,953	4,995,244	606.5	44.0	44.7	0.7	1,972
CR1-C20-P	Participant	663,054	4,987,455	606.0	43.9	44.0	0.1	2,336
CR1-C35-P	Participant	662,025	4,990,475	609.0	43.7	43.7	0.0	2,123
CR1-C59-P	Participant	661,548	5,000,754	584.2	42.7	42.7	0.0	1,644
CR1-C21-P	Participant	660,756	4,984,086	594.0	41.9	41.9	0.0	2,388
CR1-C22-P	Participant	660,755	4,984,082	594.0	41.9	41.9	0.0	2,375
CR1-C23-P	Participant	660,619	4,984,078	595.8	41.4	41.4	0.0	2,523
CR1-C26-P	Participant	657,767	4,988,493	597.0	40.2	40.3	0.1	3,484
CR1-C8-P	Participant	660,532	4,984,445	599.4	39.9	40.0	0.1	3,740
CR1-C47-P	Participant	662,825	4,993,508	613.9	39.1	39.2	0.1	3,750
CR1-C49-P	Participant	662,250	4,993,731	609.0	38.1	38.2	0.1	5,148
CR1-C6-P	Participant	662,989	4,995,228	599.8	36.2	36.3	0.1	6,102

Table C-3: Crowned Ridge Sound Level Tabular Results Sorted by Sound Level - Updated 7/27/19

6 turbines removed as suggested by Mr. Hessler

Realistic case sound results at occupied structures

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

UTM NAD83 Zone 14

Grant County

continued

Receptor ID	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Hessler Case Sound (dB(A))	Real Case Sound (dB(A))	Reduction (DB(A))	Distance to Nearest Turbine (ft)
CR1-G68-NP	Non-P	669,159	4,993,632	565.6	43.0	43.0	0.0	2,113
CR1-G43-NP	Non-P	661,141	5,001,721	583.6	42.9	42.9	0.0	1,909
CR1-G125-NP	Non-P	668,289	5,000,643	543.0	42.8	42.8	0.0	1,716
CR1-G23-NP	Non-P	670,471	4,992,104	560.0	42.5	42.5	0.0	2,185
CR1-G16-NP	Non-P	668,419	4,989,861	576.0	41.6	41.7	0.1	2,070
CR1-G114-NP	Non-P	666,214	5,006,667	521.1	40.8	40.8	0.0	2,205
CR1-G34-NP	Non-P	671,320	4,995,798	531.0	40.8	40.8	0.0	2,238
CR1-G115-NP	Non-P	664,933	5,006,731	544.6	40.5	40.5	0.0	2,188
CR1-G113-NP	Non-P	666,228	5,005,549	537.0	40.3	40.3	0.0	2,746
CR1-G109-NP	Non-P	667,064	5,000,425	566.2	40.1	40.1	0.0	2,152
CR1-G130-NP	Non-P	668,147	5,000,233	549.0	39.3	39.3	0.0	3,005
CR1-G44-NP	Non-P	661,781	5,001,732	583.7	39.2	39.2	0.0	3,123
CR1-G14-NP	Non-P	668,156	4,989,332	574.1	38.2	38.6	0.4	3,940
CR1-G42-NP	Non-P	670,566	4,997,097	518.9	38.0	38.0	0.0	3,819
CR1-G12-NP	Non-P	668,229	4,989,039	575.0	37.4	37.8	0.4	4,623
CR1-G13-NP	Non-P	672,216	4,989,142	558.0	37.2	37.2	0.0	3,576
CR1-G37-NP	Non-P	668,998	4,996,452	549.0	36.5	36.6	0.1	5,246
CR1-G36-NP	Non-P	673,559	4,996,344	498.0	35.4	35.4	0.0	6,211
CR1-G117-NP	Non-P	663,801	5,005,084	581.3	35.3	35.3	0.0	4,501
CR1-G105-NP	Non-P	668,696	4,998,325	549.0	35.2	35.2	0.0	6,345
CR1-G110-NP	Non-P	671,218	5,005,064	456.2	34.8	34.8	0.0	5,889
CR1-G22-NP	Non-P	674,670	4,991,955	527.6	34.8	34.8	0.0	5,781
CR1-G27-NP	Non-P	676,630	4,994,642	480.8	33.9	34.0	0.1	4,944
CR1-G77-NP	Non-P	676,031	4,992,629	502.7	33.1	33.2	0.1	5,728
CR1-G70-NP	Non-P	677,465	4,991,043	492.0	29.3	29.3	0.0	12,651
CR1-G600-NP	Non-P	674,301	5,005,773	393.0	28.8	28.8	0.0	13,186
CR1-G65-P	Participant	671,496	4,994,973	537.0	45.3	45.3	0.0	1,539
CR1-G18-P	Participant	668,678	4,990,722	585.0	45.1	45.1	0.0	1,585
CR1-G32-P	Participant	669,477	4,995,401	546.0	45.1	45.1	0.0	1,545
CR1-G21-P	Participant	666,766	4,991,807	577.1	44.7	44.8	0.1	1,555
CR1-G66-P	Participant	670,802	4,994,681	539.7	43.9	43.9	0.0	1,801
CR1-G25-P	Participant	671,391	4,992,858	549.0	43.8	43.8	0.0	1,804
CR1-G19-P	Participant	671,018	4,990,744	570.0	43.4	43.4	0.0	2,077
CR1-G67-P	Participant	669,597	4,993,440	556.1	43.2	43.2	0.0	2,106
CR1-G28-P	Participant	673,113	4,994,772	513.9	43.2	43.2	0.0	1,614
CR1-G128-P	Participant	670,242	5,001,314	513.0	42.9	42.9	0.0	2,612
CR1-G131-P	Participant	668,466	5,005,145	505.2	42.9	42.9	0.0	2,133
CR1-G124-P	Participant	669,843	5,000,605	525.0	42.7	42.7	0.0	1,791

continued

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Table C-4: Crowned Ridge Sound Level Tabular Results Sorted by Sound Level - Updated 7/26/19

Realistic case sound results 25 ft from occupied structures perimeter

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

UTM NAD83 Zone 14

Codington County

Receptor ID	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Sound (dB(A))	Distance to Nearest Turbine (ft)
CR1-C37-NP	Non-P	663,563	4,991,342	605.1	45.0	1,631
CR1-C9-NP	Non-P	665,352	4,985,004	609.0	44.8	2,280
CR1-C52-NP	Non-P	654,924	4,995,231	603.0	44.7	1,883
CR1-C34-NP	Non-P	658,661	4,990,389	588.2	44.7	1,726
CR1-C46-NP	Non-P	655,802	4,993,540	609.1	44.6	1,795
CR1-C61-NP	Non-P	656,690	4,997,831	612.0	44.3	1,686
CR1-C41-NP	Non-P	665,053	4,992,084	576.1	44.2	2,356
CR1-C12-NP	Non-P	662,222	4,985,736	603.0	44.9	2,201
CR1-C11-NP	Non-P	664,111	4,985,679	609.0	44.0	2,615
CR1-C62-NP	Non-P	658,375	4,995,138	615.0	44.1	1,676
CR1-C107-NP	Non-P	656,811	4,999,855	598.8	44.1	1,401
CR1-C44-NP	Non-P	665,076	4,993,095	578.2	43.8	2,155
CR1-C15-NP	Non-P	663,291	4,986,026	615.0	43.8	2,175
CR1-C58-NP	Non-P	657,781	4,996,906	615.0	43.9	1,647
CR1-C13-NP	Non-P	663,792	4,985,785	612.0	43.5	2,713
CR1-C14-NP	Non-P	657,982	4,985,894	609.0	43.5	1,880
CR1-C12-1-NP	Non-P	662,199	4,986,047	606.0	43.2	2,818
CR1-C31-NP	Non-P	665,939	4,988,950	585.4	43.3	2,126
CR1-C16-NP	Non-P	661,960	4,986,288	606.0	43.0	2,648
CR1-C18-NP	Non-P	663,651	4,987,157	610.4	42.6	3,409
CR1-C39-NP	Non-P	660,144	4,991,670	588.0	42.2	2,605
CR1-C60-NP	Non-P	656,855	4,998,565	613.5	42.1	2,592
CR1-C63-NP	Non-P	658,566	4,995,254	612.4	42.1	2,408
CR1-C105-NP	Non-P	658,372	5,001,257	600.3	42.2	2,549
CR1-C28-NP	Non-P	665,429	4,988,598	590.9	41.8	2,831
CR1-C70-NP	Non-P	665,135	4,988,293	595.9	41.6	3,540
CR1-C71-NP	Non-P	665,137	4,988,378	595.6	41.7	3,448
CR1-C72-NP	Non-P	665,158	4,988,170	594.6	41.6	3,776
CR1-C40-NP	Non-P	657,865	4,991,818	583.7	41.5	2,690
CR1-C29-NP	Non-P	666,572	4,988,867	575.9	41.3	2,457
CR1-C7-NP	Non-P	660,893	4,984,861	593.2	41.2	3,022
CR1-C38-NP	Non-P	660,639	4,991,557	597.0	40.9	3,474
CR1-C110-NP	Non-P	654,385	4,996,686	593.9	40.2	2,910
CR1-C55-NP	Non-P	660,914	4,995,169	607.5	39.4	3,360
CR1-C67-NP	Non-P	659,789	4,985,057	606.0	38.9	5,791
CR1-C112-NP	Non-P	660,002	4,984,908	604.6	38.9	5,627
CR1-C3-NP	Non-P	657,888	4,984,697	604.2	38.8	3,294
CR1-C5-NP	Non-P	659,958	4,984,794	604.8	38.7	5,659
CR1-C66-NP	Non-P	659,718	4,985,032	606.0	38.8	5,800

Table C-4: Crowned Ridge Sound Level Tabular Results Sorted by Sound Level - Updated 7/26/19

Realistic case sound results 25 ft from occupied structures perimeter

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

UTM NAD83 Zone 14

Codington County

continued

Receptor ID	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Sound (dB(A))	Distance to Nearest Turbine (ft)
CR1-C4-NP	Non-P	659,744	4,984,749	606.0	38.4	5,981
CR1-C111-NP	Non-P	653,857	4,995,573	591.0	38.3	3,678
CR1-C27-NP	Non-P	656,876	4,988,683	583.0	37.6	5,974
CR1-C2-NP	Non-P	658,791	4,984,483	602.0	37.3	6,273
CR1-C65-NP	Non-P	665,805	4,995,305	579.0	37.3	3,884
CR1-C109-NP	Non-P	653,780	4,996,828	588.0	37.2	4,797
CR1-C33-NP	Non-P	656,839	4,990,404	569.8	36.9	7,418
CR1-C54-NP	Non-P	663,421	4,995,376	583.4	36.3	5,351
CR1-C32-NP	Non-P	655,843	4,989,581	568.8	35.2	9,708
CR1-C53-NP	Non-P	663,376	4,996,043	578.8	35.2	7,201
CR1-C45-NP	Non-P	653,390	4,993,503	573.2	35.1	5,673
CR1-C1-NP	Non-P	656,743	4,983,525	596.0	34.9	5,541
CR1-C30-P	Participant	661,699	4,988,957	615.0	47.8	1,614
CR1-C50-P	Participant	656,806	4,994,388	621.0	46.8	1,591
CR1-C19-P	Participant	659,243	4,987,276	611.6	39.5	1,722
CR2-C150-P	Participant	657,178	4,985,788	612.0	46.2	1,640
CR1-C10-P	Participant	663,510	4,985,195	609.0	46.1	1,634
CR1-C36-P	Participant	663,181	4,990,600	615.0	45.5	1,532
CR1-C68-P	Participant	662,652	4,987,606	609.0	45.2	2,146
CR1-C17-P	Participant	658,031	4,986,373	609.1	45.2	1,886
CR1-C69-P	Participant	662,685	4,987,619	609.0	45.2	2,185
CR1-C57-P	Participant	656,628	4,995,266	615.0	45.0	1,568
CR1-C64-P	Participant	659,436	4,992,174	581.0	44.9	1,614
CR1-C56-P	Participant	655,953	4,995,244	606.5	44.8	1,972
CR1-C42-P	Participant	659,458	4,992,229	580.0	44.7	1,801
CR1-C48-P	Participant	664,247	4,993,646	588.0	44.7	1,847
CR1-C20-P	Participant	663,054	4,987,455	606.0	44.0	2,336
CR1-C51-P	Participant	657,455	4,995,160	621.0	44.2	1,768
CR1-C35-P	Participant	662,025	4,990,475	609.0	43.8	2,123
CR1-C59-P	Participant	661,548	5,000,754	584.2	42.9	1,644
CR1-C21-P	Participant	660,756	4,984,086	594.0	42.0	2,388
CR1-C22-P	Participant	660,755	4,984,082	594.0	42.0	2,375
CR1-C23-P	Participant	660,619	4,984,078	595.8	41.5	2,523
CR1-C26-P	Participant	657,767	4,988,493	597.0	40.4	3,484
CR1-C8-P	Participant	660,532	4,984,445	599.4	40.0	3,740
CR1-C47-P	Participant	662,825	4,993,508	613.9	39.3	3,750
CR1-C49-P	Participant	662,250	4,993,731	609.0	38.2	5,148
CR1-C6-P	Participant	662,989	4,995,228	599.8	36.3	6,102

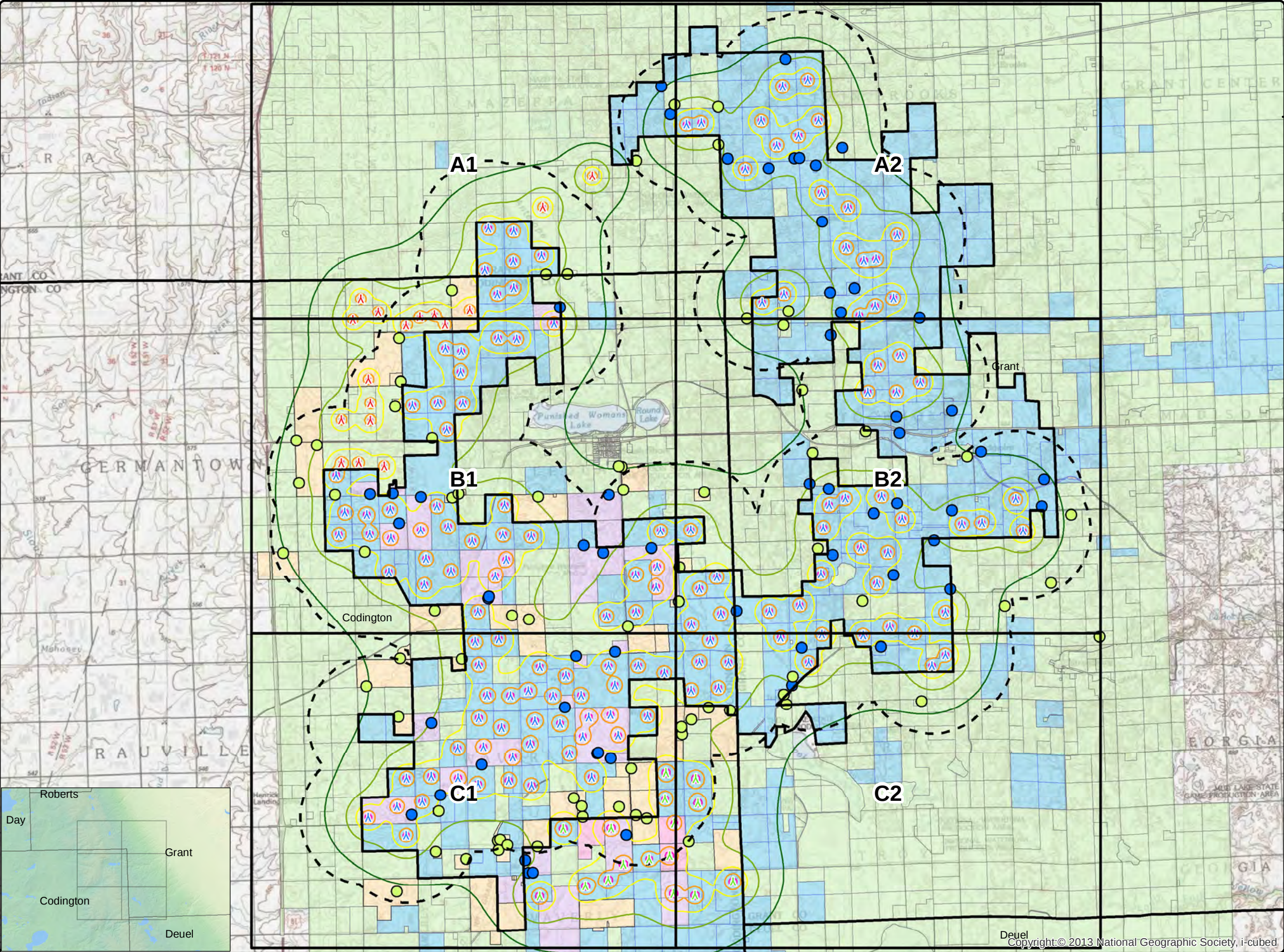
Table C-4: Crowned Ridge Sound Level Tabular Results Sorted by Sound Level - Updated 7/26/19
Realistic case sound results 25 ft from occupied structures perimeter
Results using GE 2.3-116-90 m HH, GE 2.3-116-80 m HH WTG's
UTM NAD83 Zone 14
Grant County
continued

Receptor ID	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Sound (dB(A))	Distance to Nearest Turbine (ft)
CR1-G68-NP	Non-P	669,159	4,993,632	565.6	43.0	2,113
CR1-G43-NP	Non-P	661,141	5,001,721	583.6	42.9	1,909
CR1-G125-NP	Non-P	668,289	5,000,643	543.0	42.8	1,716
CR1-G23-NP	Non-P	670,471	4,992,104	560.0	42.5	2,185
CR1-G16-NP	Non-P	668,419	4,989,861	576.0	41.7	2,070
CR1-G114-NP	Non-P	666,214	5,006,667	521.1	40.8	2,205
CR1-G34-NP	Non-P	671,320	4,995,798	531.0	40.8	2,238
CR1-G115-NP	Non-P	664,933	5,006,731	544.6	40.5	2,188
CR1-G113-NP	Non-P	666,228	5,005,549	537.0	40.3	2,746
CR1-G109-NP	Non-P	667,064	5,000,425	566.2	40.1	2,152
CR1-G130-NP	Non-P	668,147	5,000,233	549.0	39.3	3,005
CR1-G44-NP	Non-P	661,781	5,001,732	583.7	39.2	3,123
CR1-G14-NP	Non-P	668,156	4,989,332	574.1	38.6	3,940
CR1-G42-NP	Non-P	670,566	4,997,097	518.9	38.0	3,819
CR1-G12-NP	Non-P	668,229	4,989,039	575.0	37.8	4,623
CR1-G13-NP	Non-P	672,216	4,989,142	558.0	37.2	3,576
CR1-G37-NP	Non-P	668,998	4,996,452	549.0	36.6	5,246
CR1-G36-NP	Non-P	673,559	4,996,344	498.0	35.4	6,211
CR1-G117-NP	Non-P	663,801	5,005,084	581.3	35.3	4,501
CR1-G105-NP	Non-P	668,696	4,998,325	549.0	35.2	6,345
CR1-G22-NP	Non-P	674,670	4,991,955	527.6	34.8	5,781
CR1-G110-NP	Non-P	671,218	5,005,064	456.2	34.8	5,889
CR1-G27-NP	Non-P	676,630	4,994,642	480.8	34.0	4,944
CR1-G77-NP	Non-P	676,031	4,992,629	502.7	33.2	5,728
CR1-G70-NP	Non-P	677,465	4,991,043	492.0	29.3	12,651
CR1-G600-NP	Non-P	674,301	5,005,773	393.0	28.8	13,186
CR1-G65-P	Participant	671,496	4,994,973	537.0	45.3	1,539
CR1-G18-P	Participant	668,678	4,990,722	585.0	45.1	1,585
CR1-G32-P	Participant	669,477	4,995,401	546.0	45.1	1,545
CR1-G21-P	Participant	666,766	4,991,807	577.1	44.8	1,555
CR1-G66-P	Participant	670,802	4,994,681	539.7	43.9	1,801
CR1-G25-P	Participant	671,391	4,992,858	549.0	43.8	1,804
CR1-G19-P	Participant	671,018	4,990,744	570.0	43.4	2,077
CR1-G67-P	Participant	669,597	4,993,440	556.1	43.2	2,106
CR1-G28-P	Participant	673,113	4,994,772	513.9	43.2	1,614
CR1-G128-P	Participant	670,242	5,001,314	513.0	42.9	2,612
CR1-G131-P	Participant	668,466	5,005,145	505.2	42.9	2,133
CR1-G124-P	Participant	669,843	5,000,605	525.0	42.7	1,791

continued

[illegible]

APPENDIX D: STANDARD RESOLUTION SOUND MAPS





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**Crowned Ridge Wind Farm
Sound Pressure Iso-Lines
Overview Map**

Client
SWCA Environmental Consultants

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

Predicted sound pressure levels at existing residences and land parcel boundaries.

Additional 2 dBA added.

Location: Watertown, SD
Project #: 20174430

Issue Dates

1	Original	2019.07.27
#	Description	Date

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

Legend

- Crowned Ridge Turbines
- Crowned Ridge II Turbines
- Dakota Range Turbines
- 2 km Turbine Buffer
- County Lines
- CR1 Project Boundary
- Non Participants
- Participants

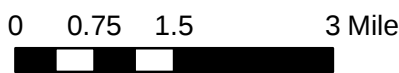
Sound Pressure (dBA)

- 35
- 40
- 45
- 50
- 55

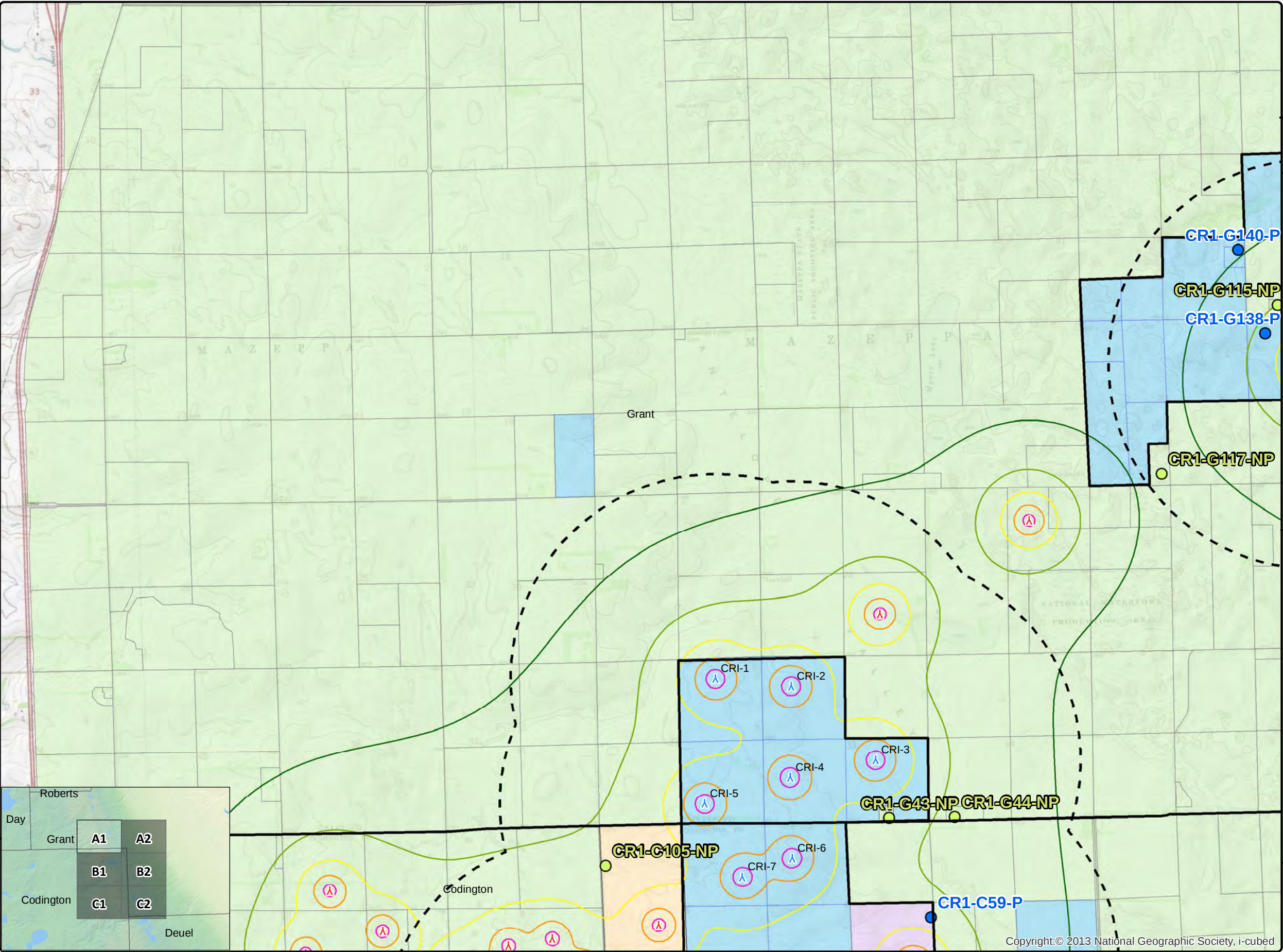
- Non-Part. Occupied Codington Parcels
- Participating Occupied Codington Parcels
- Non-Participating Parcels
- Participating Parcels
- Pending Parcels

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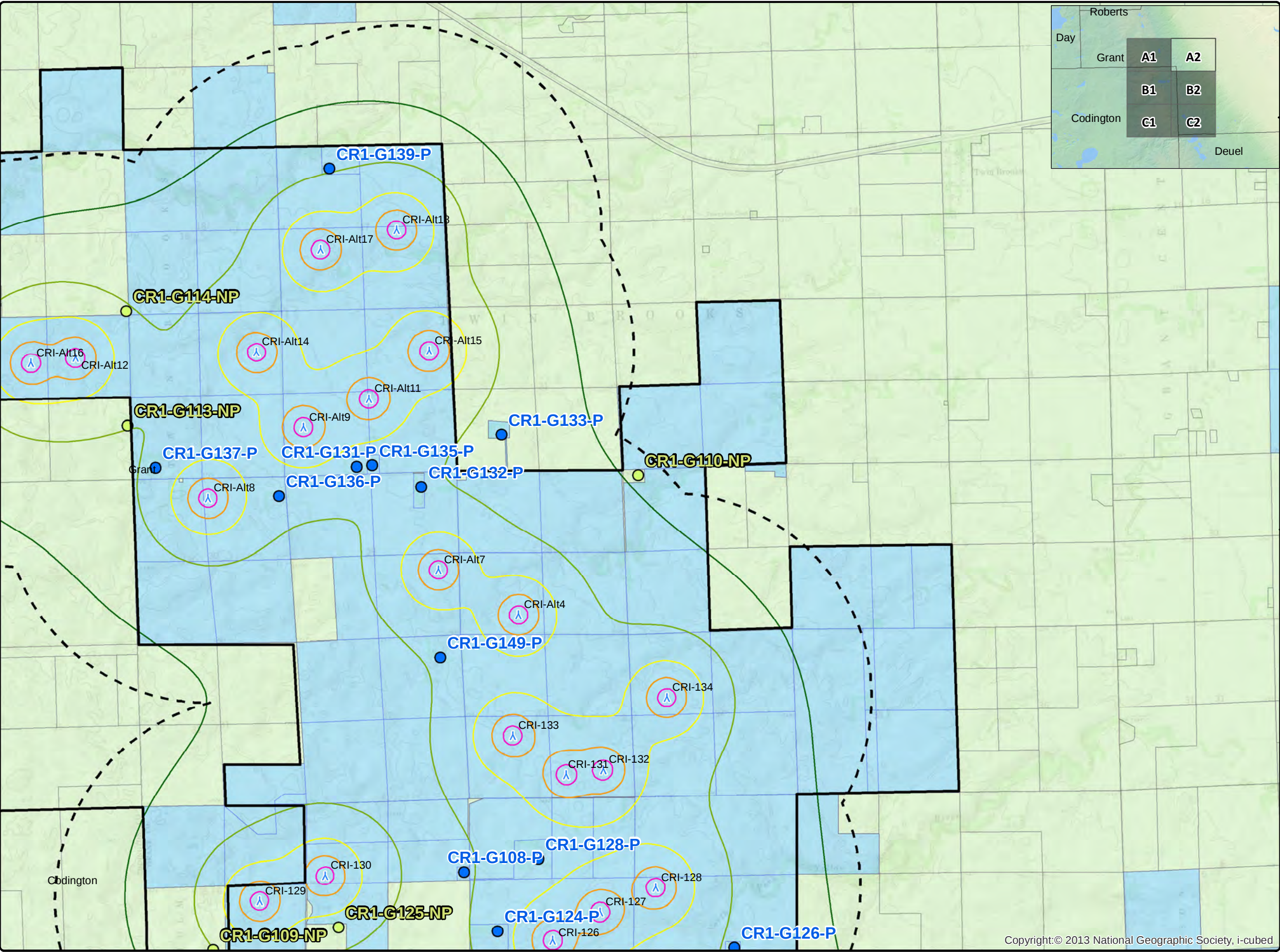
Sound Pressure (dBA)

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- 40
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- 55

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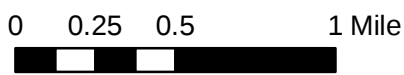
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- 40
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- 50
- 55

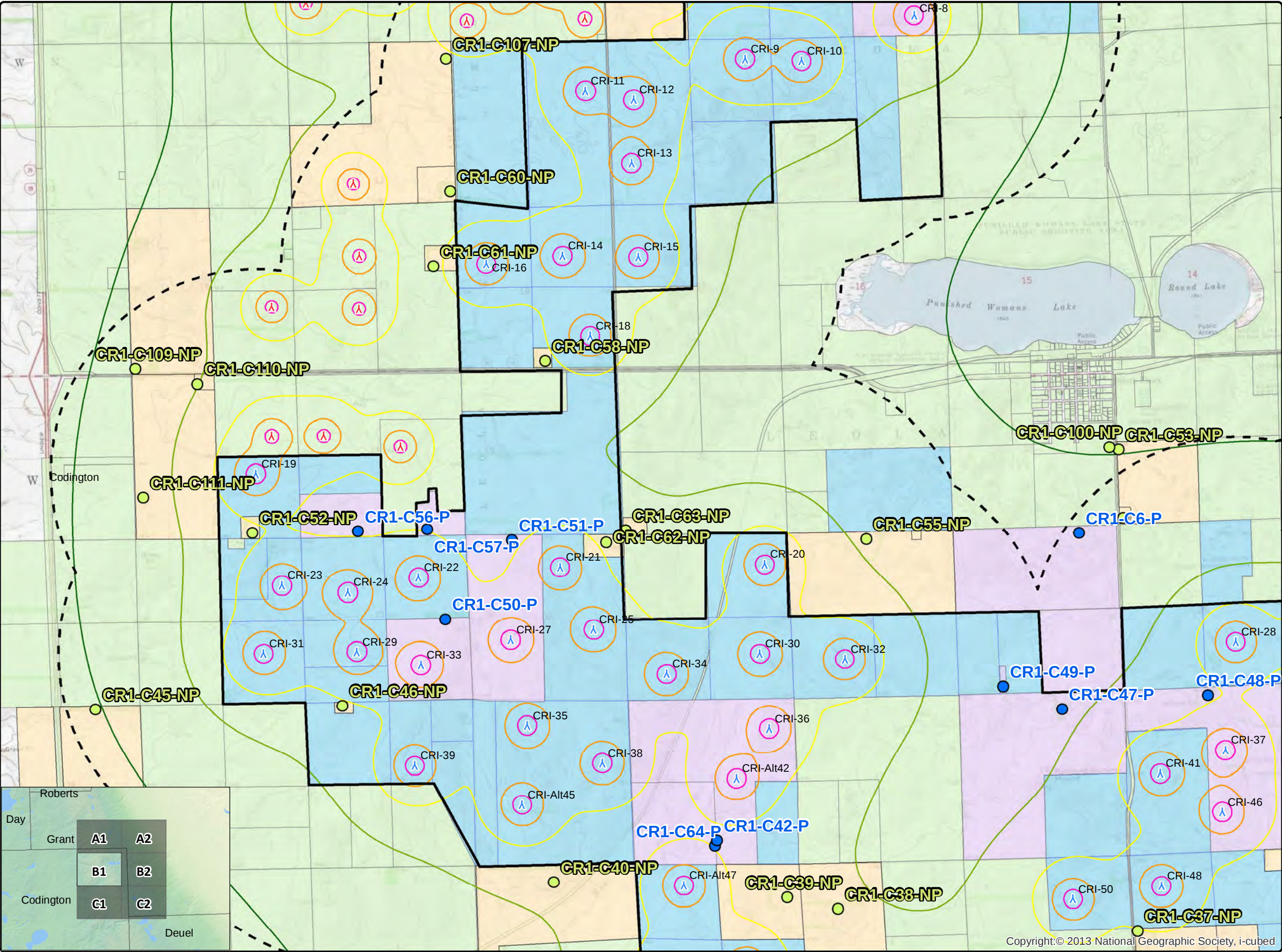
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-  County Lines
-  CR1 Project Boundary
-  Non Participants
-  Participants

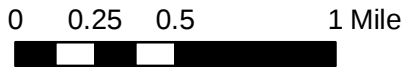
Sound Pressure (dBA)

-  35
-  40
-  45
-  50
-  55

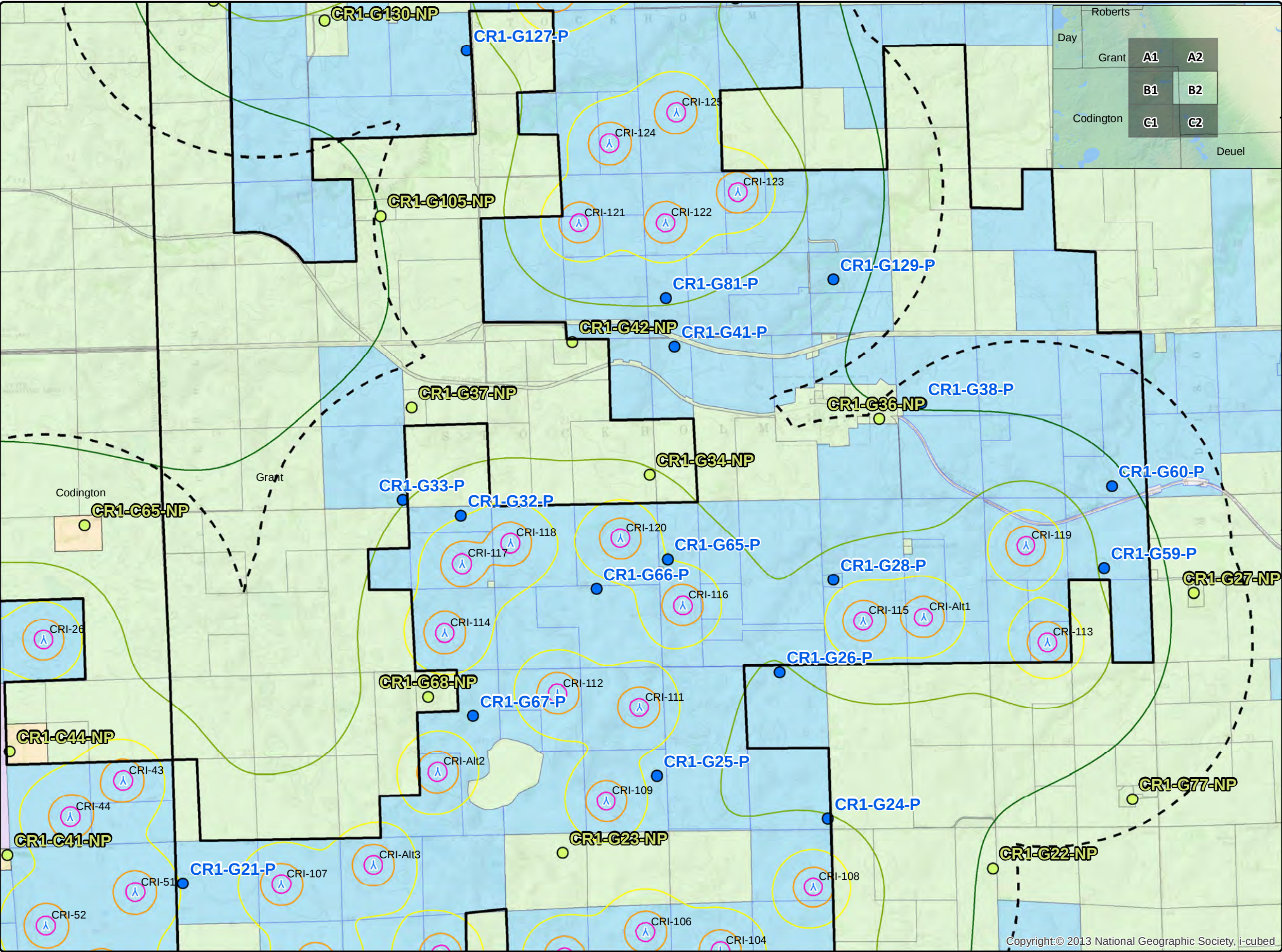
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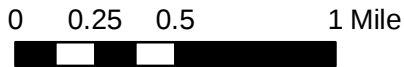
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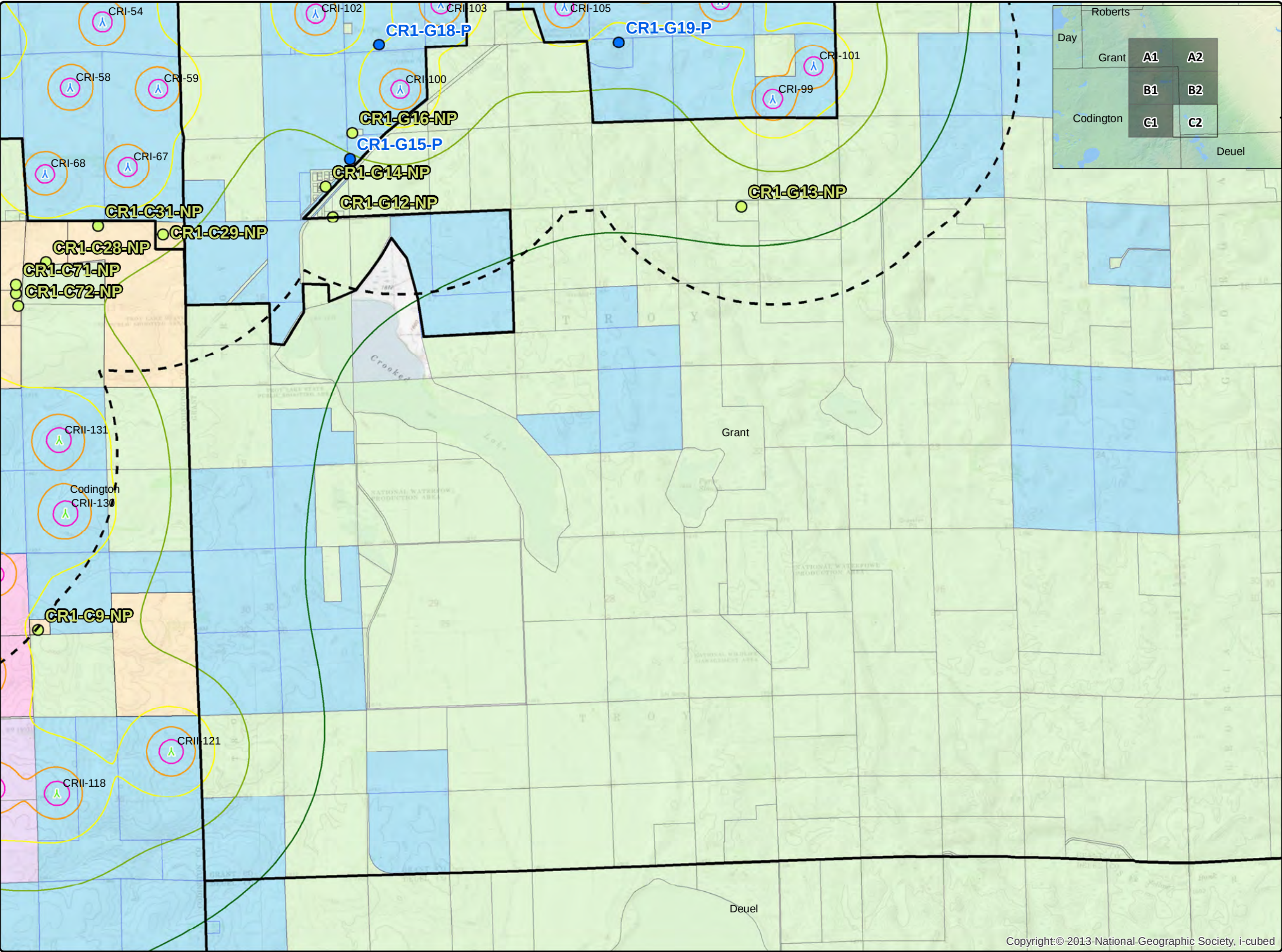
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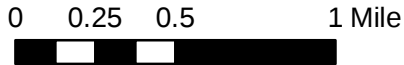
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