

February 19, 2019

Tyler Wilhelm  
Project Manager  
NextEra Energy Resources, LLC  
700 Universe Boulevard  
Juno Beach, FL 33408  
Office: (561) 694-3193  
Tyler.Wilhelm@nee.com

Subject: Crowned Ridge additional structures

Dear Mr. Wilhelm,

This letter is intended to provide updated landowner participation status information that was not included in the original report titled: "Final Report, Crowned Ridge Wind Farm Shadow Flicker Study, Codington and Grant Counties, SD", dated February 6, 2019, submitted by EAPC Wind Energy.

After the report was submitted, I was made aware of updated land parcel and farmstead status databases. There were a number of changes in landowner participation status from the original report. Most were changed from non-participating to participating, with a few that changed from participating to non-participating.

There were no changes in compliance with Codington or Grant County requirements for shadow flicker limits.

I have attached updated maps and results tables that reflect the changes in participation status for the shadow flicker receptors.

Sincerely,



Jay Haley, P.E., Partner  
For EAPC Wind Energy

Attachments:

Appendix A – Crowned Ridge Energy Project Site Overview Map  
Appendix B – Wind Turbine Coordinates  
Appendix C – Table of Sound Results  
Appendix D – Standard Resolution Sound Maps  
Appendix C – Table of Shadow Flicker Results  
Appendix D – Standard Resolution Shadow Flicker Maps

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# **APPENDIX A: CROWNED RIDGE WIND ENERGY PROJECT SITE OVERVIEW MAP**





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### Crowned Ridge Wind Farm Project 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 #:** 20174431

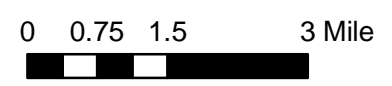
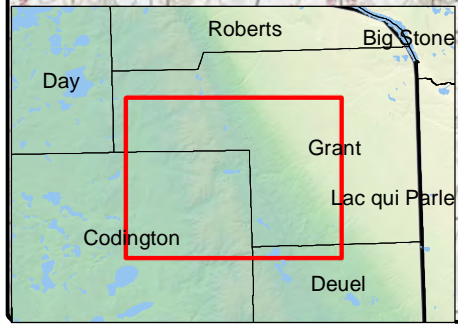
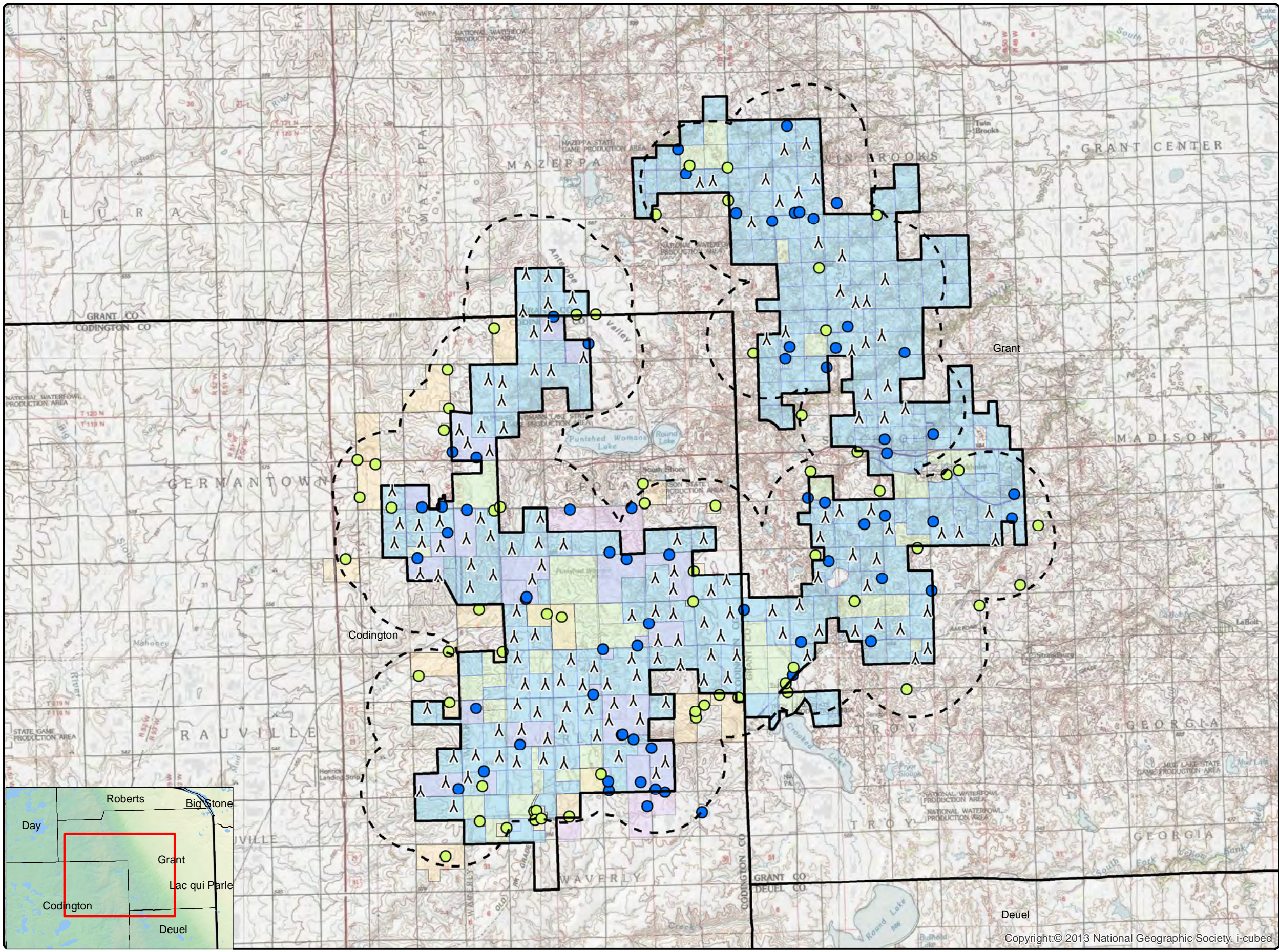
**Issue Dates**

#	Description	Date
1	Original	2019.02.15

Drawn By: AS      Checked By: JH

- Legend**
- ▲ Crowned Ridge Turbines
  - ⬜ 2 km Turbine Buffer
  - ▭ County Lines
  - ▭ CR1 Project Boundary
  - Non-Participants
  - Participants
  - ▭ Participating Codington Parcels
  - ▭ Non-Part. Codington Parcels
  - ▭ Participating Land Parcels
  - ▭ Non-Participating Land Parcels

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## **APPENDIX B: WIND TURBINE COORDINATES**

Crowned Ridge Wind Farm  
 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	584.2	LNTE
CRI-4	GE2.3 116RD 90HH r2.madE	660,173	5,002,120	602.4	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	610.4	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	613.3	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	611.0	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	618.9	LNTE
CRI-16	GE2.3 116RD 90HH r2.madE	657,203	4,997,856	611.9	LNTE
CRI-17	GE2.3 116RD 90HH r2.madE	657,476	4,997,410	611.1	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	594.4	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	594.5	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	606.0	LNTE
CRI-26	GE2.3 116RD 90HH r2.madE	665,405	4,994,191	578.3	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	593.6	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	599.6	LNTE
CRI-35	GE2.3 116RD 90HH r2.madE	657,602	4,993,347	607.5	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	587.2	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-40	GE2.3 116RD 90HH r2.madE	655,889	4,993,035	603.0	LNTE
CRI-41	GE2.3 116RD 90HH r2.madE	663,782	4,992,883	597.2	LNTE

Crowned Ridge Wind Farm  
 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-43	GE2.3 116RD 90HH r2.madE	666,181	4,992,815	577.8	LNTE
CRI-44	GE2.3 116RD 90HH r2.madE	665,665	4,992,460	576.0	LNTE
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	587.5	LNTE
CRI-49	GE2.3 116RD 90HH r2.madE	664,385	4,991,685	581.6	LNTE
CRI-50	GE2.3 116RD 90HH r2.madE	662,999	4,991,622	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	597.0	LNTE
CRI-56	GE2.3 116RD 90HH r2.madE	664,548	4,990,794	591.9	LNTE
CRI-57	GE2.3 116RD 90HH r2.madE	663,874	4,990,787	600.1	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	593.9	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	600.8	LNTE
CRI-63	GE2.3 116RD 90HH r2.madE	664,627	4,989,977	588.7	LNTE
CRI-64	GE2.3 116RD 90HH r2.madE	663,858	4,990,188	604.5	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	614.9	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	605.4	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	607.4	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	604.2	LNTE
CRI-79	GE2.3 116RD 90HH r2.madE	656,125	4,988,485	595.0	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	606.5	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	606.5	LNTE
CRI-84	GE2.3 116RD 80HH r2.madE	660,677	4,987,880	600.5	LNTE
CRI-85	GE2.3 116RD 90HH r2.madE	659,295	4,987,798	612.0	LNTE

Crowned Ridge Wind Farm  
 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-86	GE2.3 116RD 90HH r2.madE	658,534	4,987,759	613.3	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
CRI-92	GE2.3 116RD 80HH r2.madE	660,039	4,986,804	606.9	LNTE
CRI-93	GE2.3 116RD 80HH r2.madE	659,133	4,986,700	608.0	LNTE
CRI-94	GE2.3 116RD 80HH r2.madE	660,716	4,986,660	600.7	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	592.6	LNTE
CRI-98	GE2.3 116RD 90HH r2.madE	657,015	4,985,192	609.0	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	580.9	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	571.7	LNTE
CRI-106	GE2.3 116RD 90HH r2.madE	671,278	4,991,335	567.0	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	557.3	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	561.8	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	531.0	LNTE
CRI-117	GE2.3 116RD 90HH r2.madE	669,488	4,994,930	545.6	LNTE
CRI-118	GE2.3 116RD 90HH r2.madE	669,961	4,995,134	540.3	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	517.8	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	523.3	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





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## **APPENDIX C: TABLE OF SHADOW FLICKER RESULTS**

**Table C-1: Crowned Ridge 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 2.3-116-80 m HH WTG's**  
**UTM NAD83 Zone 14**  
**Codington County**

Receptor ID	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)	Distance to Nearest Turbine (ft)
CR1-C1-NP	Non-P	656,743.00	4,983,525.00	595.9	0:00	5,541
CR1-C2-NP	Non-P	658,791.00	4,984,483.00	601.6	0:00	6,273
CR1-C3-NP	Non-P	657,888.00	4,984,697.00	604.2	4:10	3,294
CR1-C4-NP	Non-P	659,744.00	4,984,749.00	605.9	0:00	5,981
CR1-C5-NP	Non-P	659,958.00	4,984,794.00	605.2	0:00	5,659
CR1-C6-P	Participant	662,989.00	4,995,228.00	599.8	0:00	6,102
CR1-C7-NP	Non-P	660,893.00	4,984,861.00	593.2	0:00	3,022
CR1-C9-P	Participant	665,352.00	4,985,004.00	609.0	18:25	1,621
CR1-C10-P	Participant	663,510.00	4,985,195.00	609.0	12:59	1,762
CR1-C11-P	Participant	664,111.00	4,985,679.00	609.0	12:03	1,614
CR1-C12-1-P	Participant	662,199.00	4,986,047.00	606.0	10:06	2,818
CR1-C12-P	Participant	662,222.00	4,985,736.00	603.0	18:29	2,201
CR1-C13-P	Participant	663,792.00	4,985,785.00	612.0	22:39	1,739
CR1-C14-NP	Non-P	657,982.00	4,985,894.00	609.0	9:59	1,880
CR1-C15-P	Participant	663,291.00	4,986,026.00	615.0	21:43	1,952
CR1-C16-NP	Non-P	661,960.00	4,986,288.00	606.0	7:49	2,736
CR1-C17-P	Participant	658,031.00	4,986,373.00	609.1	26:40	1,886
CR1-C18-P	Participant	663,651.00	4,987,157.00	610.5	23:07	2,146
CR1-C19-P	Participant	659,243.00	4,987,276.00	611.5	21:20	1,722
CR1-C20-P	Participant	663,054.00	4,987,455.00	606.0	16:02	2,336
CR1-C26-P	Participant	657,767.00	4,988,493.00	597.0	7:32	3,484
CR1-C27-NP	Non-P	656,876.00	4,988,683.00	583.0	6:58	2,549
CR1-C28-NP	Non-P	665,429.00	4,988,598.00	590.8	2:43	2,831
CR1-C29-NP	Non-P	666,572.00	4,988,867.00	575.9	6:54	2,457
CR1-C30-P	Participant	661,699.00	4,988,957.00	615.0	23:21	1,614
CR1-C31-NP	Non-P	665,939.00	4,988,950.00	585.4	0:00	2,126
CR1-C32-NP	Non-P	655,843.00	4,989,581.00	568.6	0:00	3,714
CR1-C33-NP	Non-P	656,839.00	4,990,404.00	569.8	0:00	6,719
CR1-C34-NP	Non-P	658,661.00	4,990,389.00	589.1	26:03	1,726
CR1-C35-P	Participant	662,025.00	4,990,475.00	609.0	11:47	2,123
CR1-C36-P	Participant	663,181.00	4,990,600.00	615.0	25:52	1,532
CR1-C37-P	Participant	663,563.00	4,991,342.00	605.1	27:44	1,631
CR1-C38-NP	Non-P	660,639.00	4,991,557.00	597.0	6:04	3,474
CR1-C39-NP	Non-P	660,144.00	4,991,670.00	588.0	6:55	2,605
CR1-C40-NP	Non-P	657,865.00	4,991,818.00	583.8	6:42	2,690
CR1-C41-NP	Non-P	665,053.00	4,992,084.00	576.1	20:43	2,359
CR1-C42-P	Participant	659,458.00	4,992,229.00	580.0	11:54	1,801
CR1-C44-NP	Non-P	665,076.00	4,993,095.00	578.2	28:20	2,155
CR1-C45-NP	Non-P	653,390.00	4,993,503.00	573.0	1:41	5,673

**Table C-1: Crowned Ridge 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 2.3-116-80 m HH WTG's**  
**UTM NAD83 Zone 14**  
**Codington County**  
*continued*

Receptor ID	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)	Distance to Nearest Turbine (ft)
CR1-C46-P	Participant	655,802.00	4,993,540.00	609.7	25:38	1,680
CR1-C47-P	Participant	662,825.00	4,993,508.00	613.8	5:00	3,750
CR1-C48-P	Participant	664,247.00	4,993,646.00	588.0	3:46	1,847
CR1-C49-P	Participant	662,250.00	4,993,731.00	609.0	1:12	5,148
CR1-C50-P	Participant	656,806.00	4,994,388.00	621.0	28:30	1,591
CR1-C51-P	Participant	657,455.00	4,995,160.00	621.0	24:39	1,768
CR1-C52-NP	Non-P	654,924.00	4,995,231.00	603.0	11:17	1,883
CR1-C53-NP	Non-P	663,376.00	4,996,043.00	578.6	0:00	7,201
CR1-C54-NP	Non-P	663,421.00	4,995,376.00	583.4	0:00	5,351
CR1-C55-P	Participant	660,914.00	4,995,169.00	607.9	2:51	3,360
CR1-C56-P	Participant	655,953.00	4,995,244.00	606.0	28:42	1,972
CR1-C57-P	Participant	656,628.00	4,995,266.00	615.0	10:38	1,568
CR1-C58-P	Participant	657,781.00	4,996,906.00	615.0	17:06	1,647
CR1-C59-P	Participant	661,548.00	5,000,754.00	584.1	7:36	1,644
CR1-C60-NP	Non-P	656,855.00	4,998,565.00	613.5	14:17	2,592
CR1-C61-NP	Non-P	656,690.00	4,997,831.00	612.0	49:06	1,686
CR1-C62-NP	Non-P	658,375.00	4,995,138.00	615.0	18:05	1,676
CR1-C63-NP	Non-P	658,566.00	4,995,254.00	612.6	10:42	2,408
CR1-C64-P	Participant	659,436.00	4,992,174.00	581.0	19:47	1,614
CR1-C65-NP	Non-P	665,805.00	4,995,305.00	579.0	1:29	3,884
CR1-C66-NP	Non-P	659,718.00	4,985,032.00	606.0	0:00	5,800
CR1-C67-NP	Non-P	659,789.00	4,985,057.00	606.0	0:00	5,791
CR1-C68-P	Participant	662,652.00	4,987,606.00	609.0	8:10	2,146
CR1-C69-P	Participant	662,685.00	4,987,619.00	609.0	7:45	2,185
CR1-C70-NP	Non-P	665,135.00	4,988,293.00	595.7	12:05	3,540
CR1-C71-NP	Non-P	665,137.00	4,988,378.00	594.6	7:28	3,448
CR1-C72-NP	Non-P	665,158.00	4,988,170.00	595.2	7:38	3,776
CR1-C105-NP	Non-P	658,372.48	5,001,256.80	601.5	19:53	2,549
CR1-C106-P	Participant	660,365.47	5,001,639.21	605.0	50:20	1,165
CR1-C107-NP	Non-P	656,810.99	4,999,855.15	598.8	9:57	1,401
CR1-C108-P	Participant	656,977.64	4,997,092.26	609.0	16:58	1,939
CR1-C109-NP	Non-P	653,780.18	4,996,828.35	588.0	7:04	4,797
CR1-C110-NP	Non-P	654,384.54	4,996,685.57	593.9	20:47	2,910
CR1-C111-NP	Non-P	653,857.19	4,995,573.17	591.0	11:42	3,678
CR2-C150-P	Participant	657,178.00	4,985,788.00	612.0	9:58	1,640



**Table C-1: Crowned Ridge 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 2.3-116-80 m HH WTG's**  
**UTM NAD83 Zone 14**  
**Grant County**  
*continued*

Receptor ID	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)	Distance to Nearest Turbine (ft)
CR1-G12-NP	Non-P	668,229.00	4,989,039.00	575.0	0:00	4,623
CR1-G13-NP	Non-P	672,216.00	4,989,142.00	558.0	0:00	3,576
CR1-G14-NP	Non-P	668,156.00	4,989,332.00	574.1	0:00	3,940
CR1-G15-P	Participant	668,396.00	4,989,607.00	576.0	0:00	2,746
CR1-G16-NP	Non-P	668,419.00	4,989,861.00	576.0	0:00	2,070
CR1-G18-P	Participant	668,678.00	4,990,722.00	585.0	22:28	1,585
CR1-G19-P	Participant	671,018.00	4,990,744.00	570.0	5:42	2,077
CR1-G21-P	Participant	666,766.00	4,991,807.00	577.1	28:59	1,555
CR1-G22-NP	Non-P	674,670.00	4,991,955.00	527.6	0:00	5,781
CR1-G23-NP	Non-P	670,471.00	4,992,104.00	560.1	5:16	2,185
CR1-G24-P	Participant	673,058.00	4,992,440.00	539.4	0:00	2,231
CR1-G25-P	Participant	671,391.00	4,992,858.00	549.0	14:36	1,804
CR1-G26-NP	Non-P	672,589.00	4,993,869.00	531.0	8:15	3,140
CR1-G27-NP	Non-P	676,630.00	4,994,642.00	480.8	2:54	4,944
CR1-G28-P	Participant	673,113.00	4,994,772.00	514.1	22:47	1,614
CR1-G32-P	Participant	669,477.00	4,995,401.00	546.0	19:55	1,545
CR1-G33-P	Participant	668,911.00	4,995,550.00	548.7	4:00	2,779
CR1-G34-NP	Non-P	671,320.00	4,995,798.00	531.0	1:28	2,238
CR1-G36-NP	Non-P	673,559.00	4,996,344.00	498.1	0:00	6,211
CR1-G37-NP	Non-P	668,998.00	4,996,452.00	549.0	0:00	5,246
CR1-G38-NP	Non-P	673,972.00	4,996,493.00	494.5	0:00	5,646
CR1-G41-P	Participant	671,563.00	4,997,050.00	497.7	0:00	3,983
CR1-G42-NP	Non-P	670,566.00	4,997,097.00	518.9	0:00	3,819
CR1-G43-NP	Non-P	661,141.00	5,001,721.00	584.2	18:19	1,909
CR1-G44-NP	Non-P	661,781.00	5,001,732.00	583.7	2:49	3,123
CR1-G59-P	Participant	675,755.00	4,994,888.00	488.3	12:40	2,605
CR1-G60-P	Participant	675,830.00	4,995,687.00	477.0	5:42	3,343
CR1-G65-P	Participant	671,496.00	4,994,973.00	537.0	29:50	1,539
CR1-G66-P	Participant	670,802.00	4,994,681.00	539.8	16:39	1,801
CR1-G67-P	Participant	669,597.00	4,993,440.00	555.8	12:03	2,106
CR1-G68-NP	Non-P	669,159.00	4,993,632.00	564.7	2:09	2,113
CR1-G77-NP	Non-P	676,031.00	4,992,629.00	503.1	0:00	5,728
CR1-G81-P	Participant	671,478.00	4,997,523.00	508.7	0:00	2,421
CR1-G105-NP	Non-P	668,696.00	4,998,325.00	549.0	0:00	6,345
CR1-G108-NP	Non-P	669,516.00	5,001,186.00	522.2	11:37	3,586
CR1-G109-NP	Non-P	667,064.00	5,000,425.00	566.4	0:59	2,152
CR1-G110-NP	Non-P	671,218.00	5,005,064.00	456.4	0:00	5,889
CR1-G113-NP	Non-P	666,228.00	5,005,549.00	537.0	7:15	2,746



**Table C-2: Crowned Ridge 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 2.3-116-80 m HH WTG's**  
**UTM NAD83 Zone 14**  
**Codrigton County**

Receptor ID	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)	Distance to Nearest Turbine (ft)
CR1-C106-P	Participant	660,365.47	5,001,639.21	605.0	50:20	1,165
CR1-C61-NP	Non-P	656,690.00	4,997,831.00	612.0	49:06	1,686
CR1-C56-P	Participant	655,953.00	4,995,244.00	606.0	28:42	1,972
CR1-C50-P	Participant	656,806.00	4,994,388.00	621.0	28:30	1,591
CR1-C44-NP	Non-P	665,076.00	4,993,095.00	578.2	28:20	2,155
CR1-C37-P	Participant	663,563.00	4,991,342.00	605.1	27:44	1,631
CR1-C17-P	Participant	658,031.00	4,986,373.00	609.1	26:40	1,886
CR1-C34-NP	Non-P	658,661.00	4,990,389.00	589.1	26:03	1,726
CR1-C36-P	Participant	663,181.00	4,990,600.00	615.0	25:52	1,532
CR1-C46-P	Participant	655,802.00	4,993,540.00	609.7	25:38	1,680
CR1-C51-P	Participant	657,455.00	4,995,160.00	621.0	24:39	1,768
CR1-C30-P	Participant	661,699.00	4,988,957.00	615.0	23:21	1,614
CR1-C18-P	Participant	663,651.00	4,987,157.00	610.5	23:07	2,146
CR1-C13-P	Participant	663,792.00	4,985,785.00	612.0	22:39	1,739
CR1-C15-P	Participant	663,291.00	4,986,026.00	615.0	21:43	1,952
CR1-C19-P	Participant	659,243.00	4,987,276.00	611.5	21:20	1,722
CR1-C110-NP	Non-P	654,384.54	4,996,685.57	593.9	20:47	2,910
CR1-C41-NP	Non-P	665,053.00	4,992,084.00	576.1	20:43	2,359
CR1-C105-NP	Non-P	658,372.48	5,001,256.80	601.5	19:53	2,549
CR1-C64-P	Participant	659,436.00	4,992,174.00	581.0	19:47	1,614
CR1-C12-P	Participant	662,222.00	4,985,736.00	603.0	18:29	2,201
CR1-C9-P	Participant	665,352.00	4,985,004.00	609.0	18:25	1,621
CR1-C62-NP	Non-P	658,375.00	4,995,138.00	615.0	18:05	1,676
CR1-C58-P	Participant	657,781.00	4,996,906.00	615.0	17:06	1,647
CR1-C108-P	Participant	656,977.64	4,997,092.26	609.0	16:58	1,939
CR1-C20-P	Participant	663,054.00	4,987,455.00	606.0	16:02	2,336
CR1-C60-NP	Non-P	656,855.00	4,998,565.00	613.5	14:17	2,592
CR1-C10-P	Participant	663,510.00	4,985,195.00	609.0	12:59	1,762
CR1-C70-NP	Non-P	665,135.00	4,988,293.00	595.7	12:05	3,540
CR1-C11-P	Participant	664,111.00	4,985,679.00	609.0	12:03	1,614
CR1-C42-P	Participant	659,458.00	4,992,229.00	580.0	11:54	1,801
CR1-C35-P	Participant	662,025.00	4,990,475.00	609.0	11:47	2,123
CR1-C111-NP	Non-P	653,857.19	4,995,573.17	591.0	11:42	3,678
CR1-C52-NP	Non-P	654,924.00	4,995,231.00	603.0	11:17	1,883
CR1-C63-NP	Non-P	658,566.00	4,995,254.00	612.6	10:42	2,408
CR1-C57-P	Participant	656,628.00	4,995,266.00	615.0	10:38	1,568
CR1-C12-1-P	Participant	662,199.00	4,986,047.00	606.0	10:06	2,818
CR1-C14-NP	Non-P	657,982.00	4,985,894.00	609.0	9:59	1,880
CR2-C150-P	Participant	657,178.00	4,985,788.00	612.0	9:58	1,640



**Table C-2: Crowned Ridge 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 2.3-116-80 m HH WTG's**  
**UTM NAD83 Zone 14**  
**Codington County**  
*continued*

Receptor ID	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)	Distance to Nearest Turbine (ft)
CR1-C107-NP	Non-P	656,810.99	4,999,855.15	598.8	9:57	1,401
CR1-C68-P	Participant	662,652.00	4,987,606.00	609.0	8:10	2,146
CR1-C16-NP	Non-P	661,960.00	4,986,288.00	606.0	7:49	2,736
CR1-C69-P	Participant	662,685.00	4,987,619.00	609.0	7:45	2,185
CR1-C72-NP	Non-P	665,158.00	4,988,170.00	595.2	7:38	3,776
CR1-C59-P	Participant	661,548.00	5,000,754.00	584.1	7:36	1,644
CR1-C26-P	Participant	657,767.00	4,988,493.00	597.0	7:32	3,484
CR1-C71-NP	Non-P	665,137.00	4,988,378.00	594.6	7:28	3,448
CR1-C109-NP	Non-P	653,780.18	4,996,828.35	588.0	7:04	4,797
CR1-C27-NP	Non-P	656,876.00	4,988,683.00	583.0	6:58	2,549
CR1-C39-NP	Non-P	660,144.00	4,991,670.00	588.0	6:55	2,605
CR1-C29-NP	Non-P	666,572.00	4,988,867.00	575.9	6:54	2,457
CR1-C40-NP	Non-P	657,865.00	4,991,818.00	583.8	6:42	2,690
CR1-C38-NP	Non-P	660,639.00	4,991,557.00	597.0	6:04	3,474
CR1-C47-P	Participant	662,825.00	4,993,508.00	613.8	5:00	3,750
CR1-C3-NP	Non-P	657,888.00	4,984,697.00	604.2	4:10	3,294
CR1-C48-P	Participant	664,247.00	4,993,646.00	588.0	3:46	1,847
CR1-C55-P	Participant	660,914.00	4,995,169.00	607.9	2:51	3,360
CR1-C28-NP	Non-P	665,429.00	4,988,598.00	590.8	2:43	2,831
CR1-C45-NP	Non-P	653,390.00	4,993,503.00	573.0	1:41	5,673
CR1-C65-NP	Non-P	665,805.00	4,995,305.00	579.0	1:29	3,884
CR1-C49-P	Participant	662,250.00	4,993,731.00	609.0	1:12	5,148
CR1-C1-NP	Non-P	656,743.00	4,983,525.00	595.9	0:00	5,541
CR1-C2-NP	Non-P	658,791.00	4,984,483.00	601.6	0:00	6,273
CR1-C7-NP	Non-P	660,893.00	4,984,861.00	593.2	0:00	3,022
CR1-C32-NP	Non-P	655,843.00	4,989,581.00	568.6	0:00	3,714
CR1-C31-NP	Non-P	665,939.00	4,988,950.00	585.4	0:00	2,126
CR1-C54-NP	Non-P	663,421.00	4,995,376.00	583.4	0:00	5,351
CR1-C33-NP	Non-P	656,839.00	4,990,404.00	569.8	0:00	6,719
CR1-C53-NP	Non-P	663,376.00	4,996,043.00	578.6	0:00	7,201
CR1-C6-P	Participant	662,989.00	4,995,228.00	599.8	0:00	6,102
CR1-C66-NP	Non-P	659,718.00	4,985,032.00	606.0	0:00	5,800
CR1-C4-NP	Non-P	659,744.00	4,984,749.00	605.9	0:00	5,981
CR1-C67-NP	Non-P	659,789.00	4,985,057.00	606.0	0:00	5,791
CR1-C5-NP	Non-P	659,958.00	4,984,794.00	605.2	0:00	5,659

**Table C-2: Crowned Ridge 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 2.3-116-80 m HH WTG's**  
**UTM NAD83 Zone 14**  
**Grant County**  
*continued*

Receptor ID	Participation Status	Easting (m)	Northing (m)	Elevation AMSL (m)	Real Case Shadow (hrs/year)	Distance to Nearest Turbine (ft)
CR1-G65-P	Participant	671,496.00	4,994,973.00	537.0	29:50	1,539
CR1-G21-P	Participant	666,766.00	4,991,807.00	577.1	28:59	1,555
CR1-G138-P	Participant	664,809.00	5,006,456.00	549.0	25:18	1,824
CR1-G114-NP	Non-P	666,214.00	5,006,667.00	520.8	23:18	2,205
CR1-G28-P	Participant	673,113.00	4,994,772.00	514.1	22:47	1,614
CR1-G18-P	Participant	668,678.00	4,990,722.00	585.0	22:28	1,585
CR1-G32-P	Participant	669,477.00	4,995,401.00	546.0	19:55	1,545
CR1-G124-P	Participant	669,843.00	5,000,605.00	525.0	19:21	1,791
CR1-G137-P	Participant	666,501.00	5,005,136.00	529.5	18:36	1,939
CR1-G43-NP	Non-P	661,141.00	5,001,721.00	584.2	18:19	1,909
CR1-G66-P	Participant	670,802.00	4,994,681.00	539.8	16:39	1,801
CR1-G125-P	Participant	668,289.00	5,000,643.00	543.0	15:48	1,716
CR1-G128-P	Participant	670,242.00	5,001,314.00	513.0	14:58	2,612
CR1-G25-P	Participant	671,391.00	4,992,858.00	549.0	14:36	1,804
CR1-G59-P	Participant	675,755.00	4,994,888.00	488.3	12:40	2,605
CR1-G149-NP	Non-P	669,284.00	5,003,283.00	503.2	12:39	2,815
CR1-G67-P	Participant	669,597.00	4,993,440.00	555.8	12:03	2,106
CR1-G108-NP	Non-P	669,516.00	5,001,186.00	522.2	11:37	3,586
CR1-G136-P	Participant	667,706.00	5,004,861.00	522.0	10:34	2,277
CR1-G26-NP	Non-P	672,589.00	4,993,869.00	531.0	8:15	3,140
CR1-G135-P	Participant	668,616.00	5,005,161.00	504.2	8:10	2,142
CR1-G139-P	Participant	668,199.00	5,008,062.00	475.9	8:05	2,612
CR1-G115-NP	Non-P	664,933.00	5,006,731.00	544.6	7:58	2,188
CR1-G132-P	Participant	669,098.00	5,004,948.00	501.0	7:38	2,703
CR1-G113-NP	Non-P	666,228.00	5,005,549.00	537.0	7:15	2,746
CR1-G19-P	Participant	671,018.00	4,990,744.00	570.0	5:42	2,077
CR1-G60-P	Participant	675,830.00	4,995,687.00	477.0	5:42	3,343
CR1-G23-NP	Non-P	670,471.00	4,992,104.00	560.1	5:16	2,185
CR1-G33-P	Participant	668,911.00	4,995,550.00	548.7	4:00	2,779
CR1-G133-P	Participant	669,881.00	5,005,460.00	478.8	3:26	3,556
CR1-G126-P	Participant	672,157.00	5,000,446.00	484.3	3:21	3,176
CR1-G27-NP	Non-P	676,630.00	4,994,642.00	480.8	2:54	4,944
CR1-G44-NP	Non-P	661,781.00	5,001,732.00	583.7	2:49	3,123
CR1-G129-P	Participant	673,111.00	4,997,703.00	477.8	2:27	4,153
CR1-G127-P	Participant	669,534.00	4,999,939.00	533.9	2:23	3,369
CR1-G68-NP	Non-P	669,159.00	4,993,632.00	564.7	2:09	2,113
CR1-G117-NP	Non-P	663,801.00	5,005,084.00	581.3	1:54	4,501
CR1-G131-P	Participant	668,466.00	5,005,145.00	505.1	1:31	2,133





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## **APPENDIX D: STANDARD RESOLUTION SHADOW FLICKER MAPS**





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### Crowned Ridge Wind Farm Shadow Flicker Iso-Lines 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

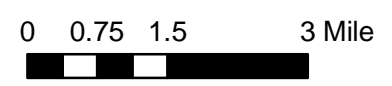
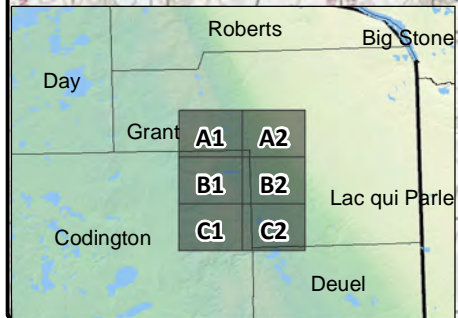
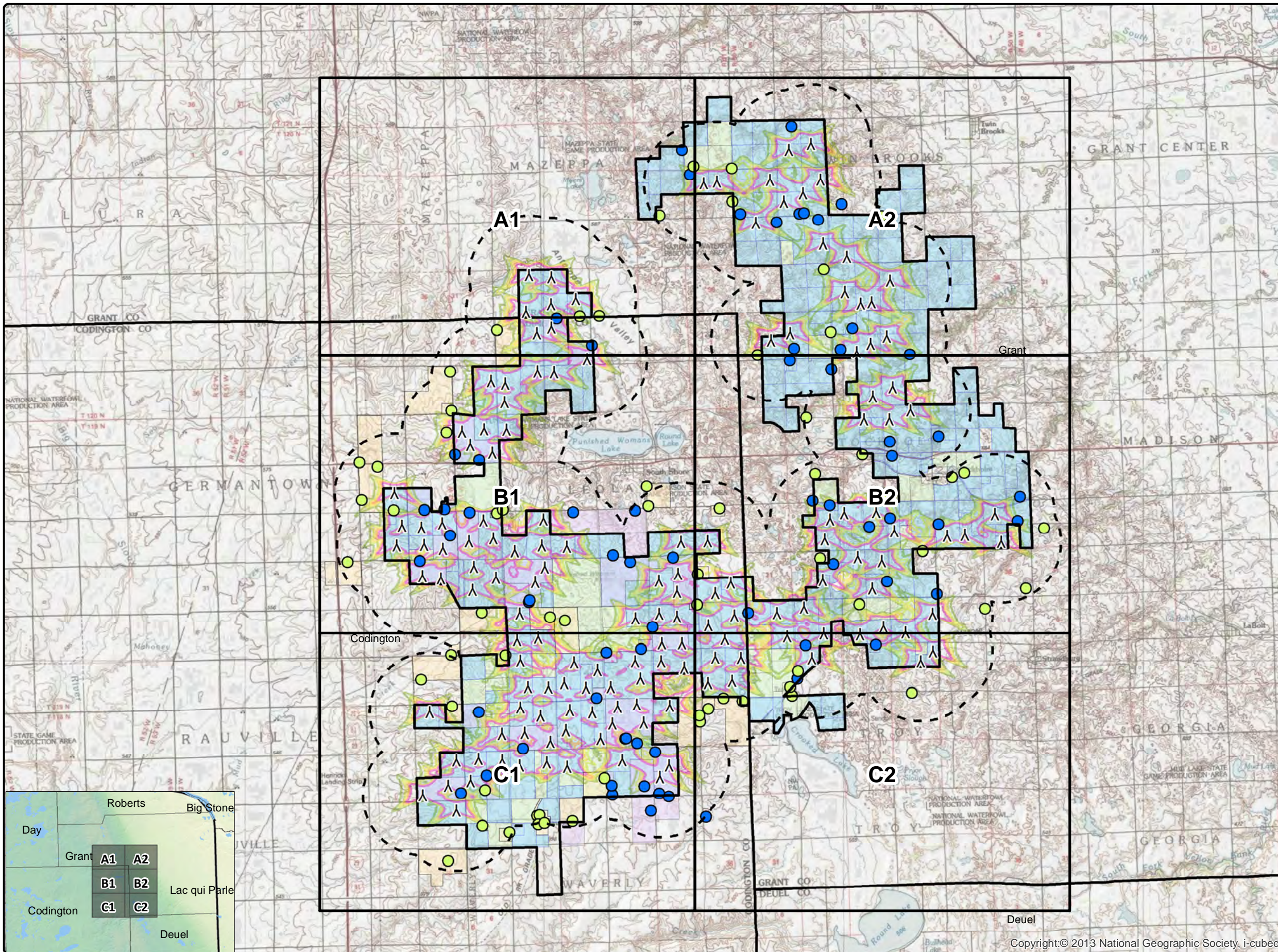
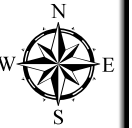
**Issue Dates**

#	Description	Date
1	Original	2019.02.15

Drawn By: AS      Checked By: JH

- Legend**
- ▲ Crowned Ridge Turbines
  - ⬜ 2 km Turbine Buffer
  - ▭ County Lines
  - ▭ CR1 Project Boundary
  - Non-Participants
  - Participants
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### Crowned Ridge Wind Farm 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

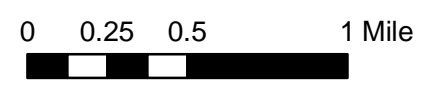
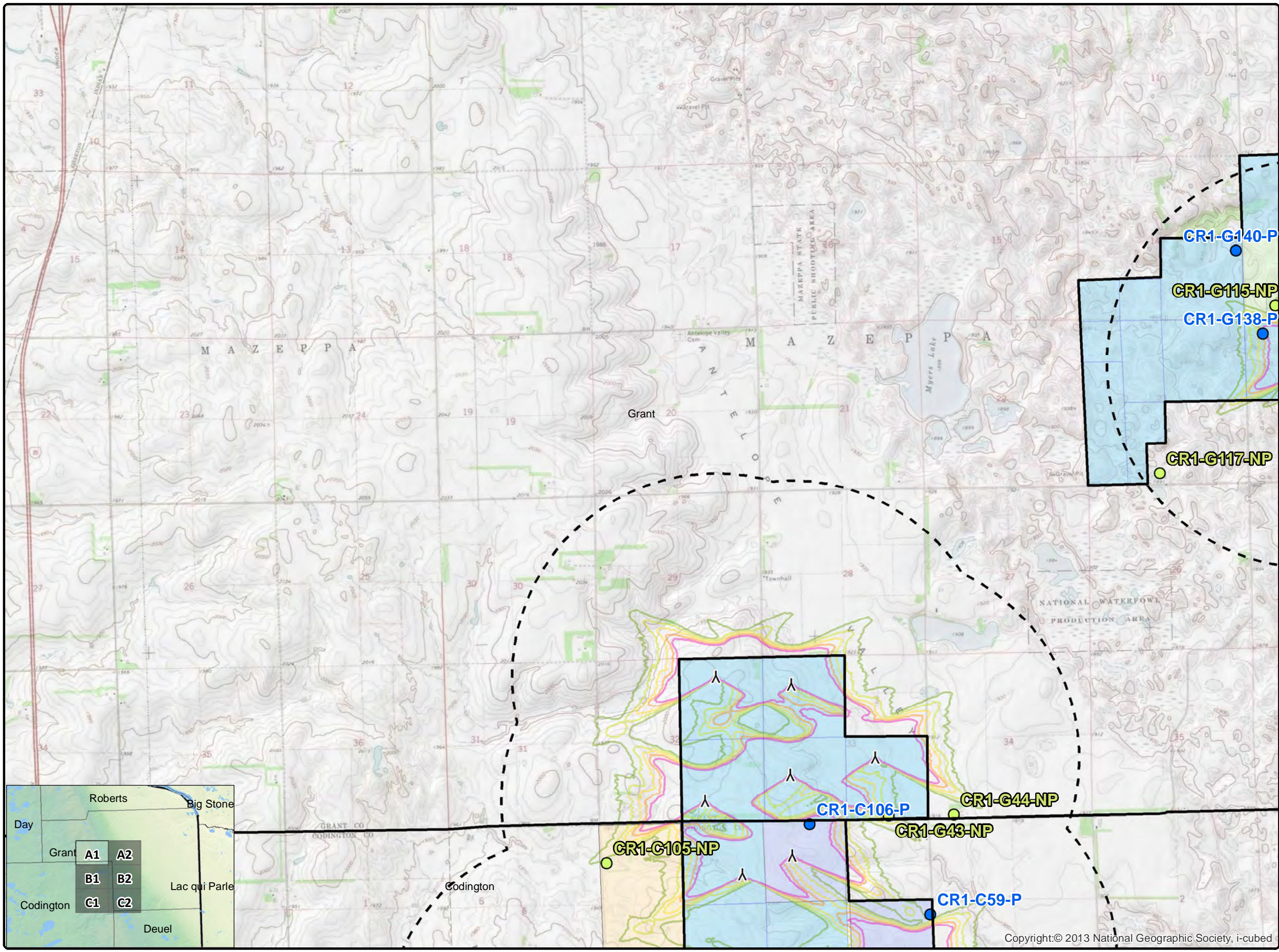
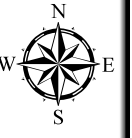
**Issue Dates**

#	Description	Date
1	Original	2019.02.15

Drawn By: AS      Checked By: JH

- Legend**
- ▲ Crowned Ridge Turbines
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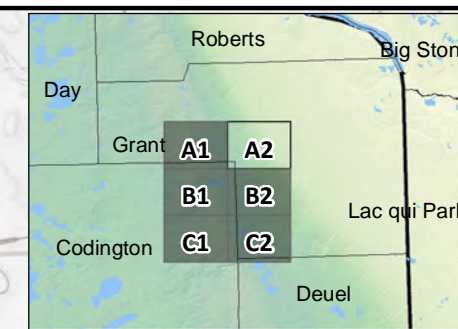
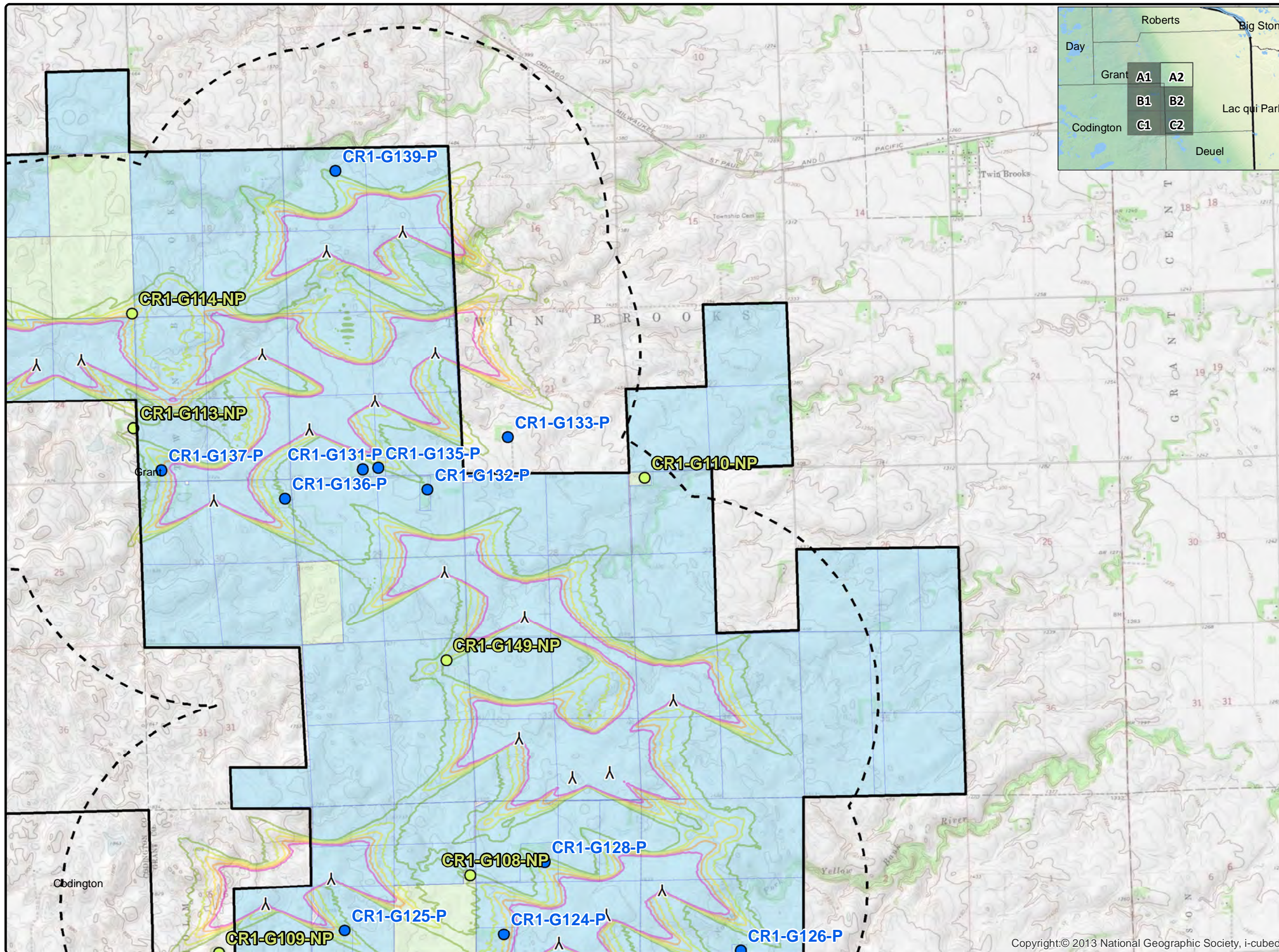
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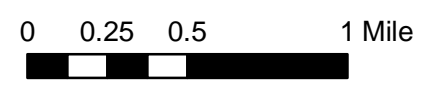
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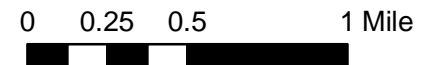
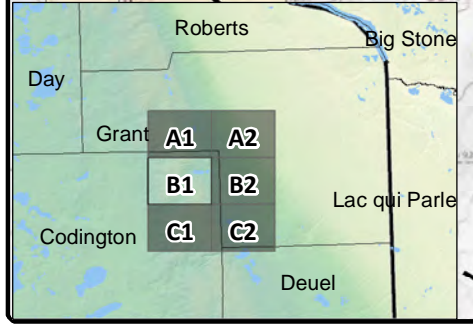
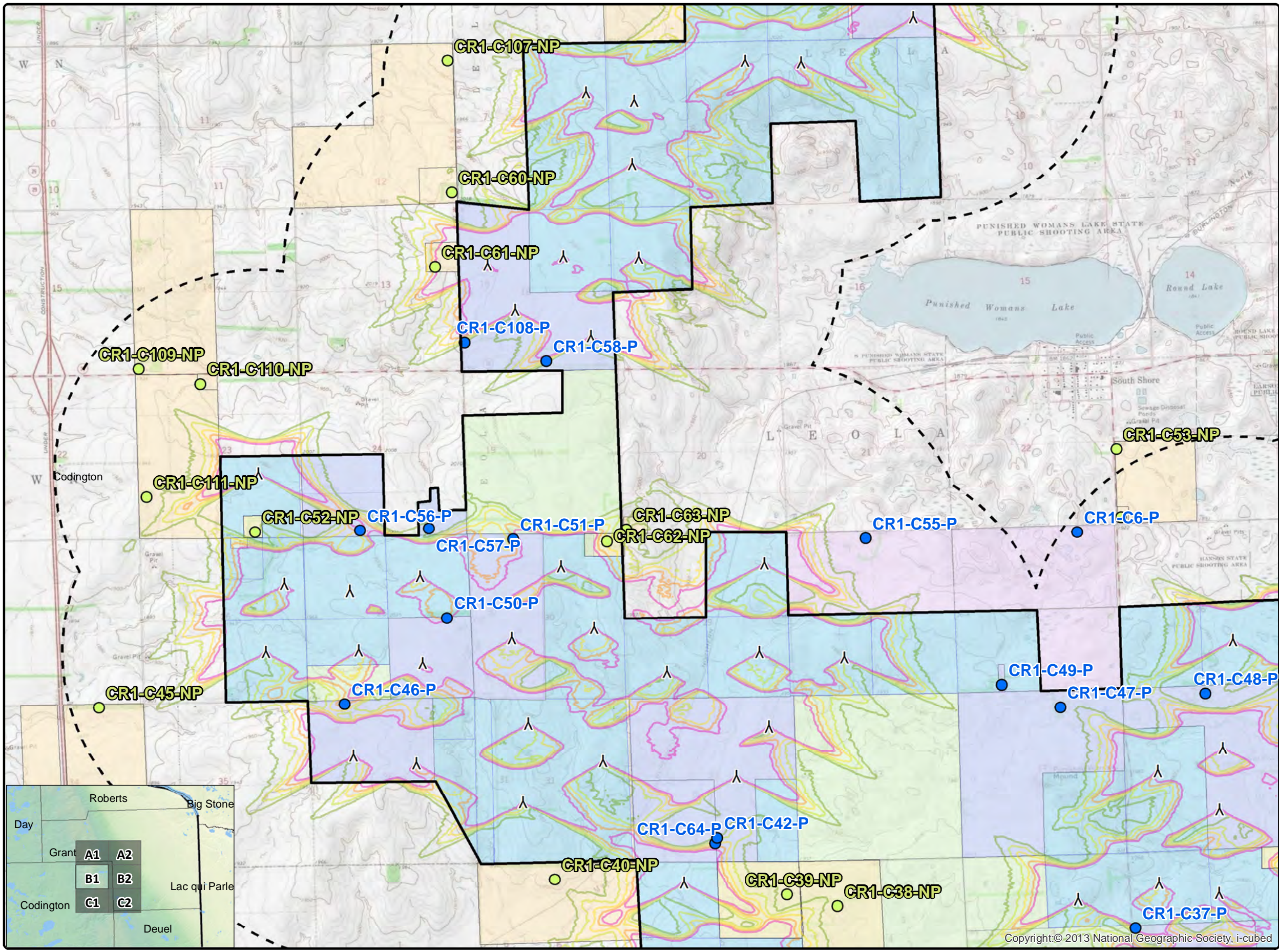
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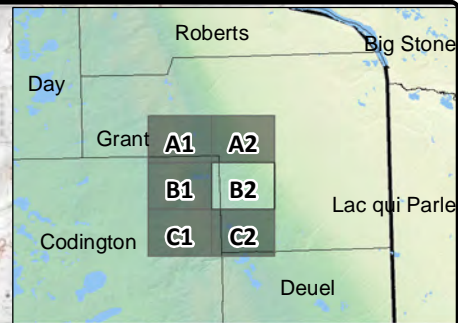
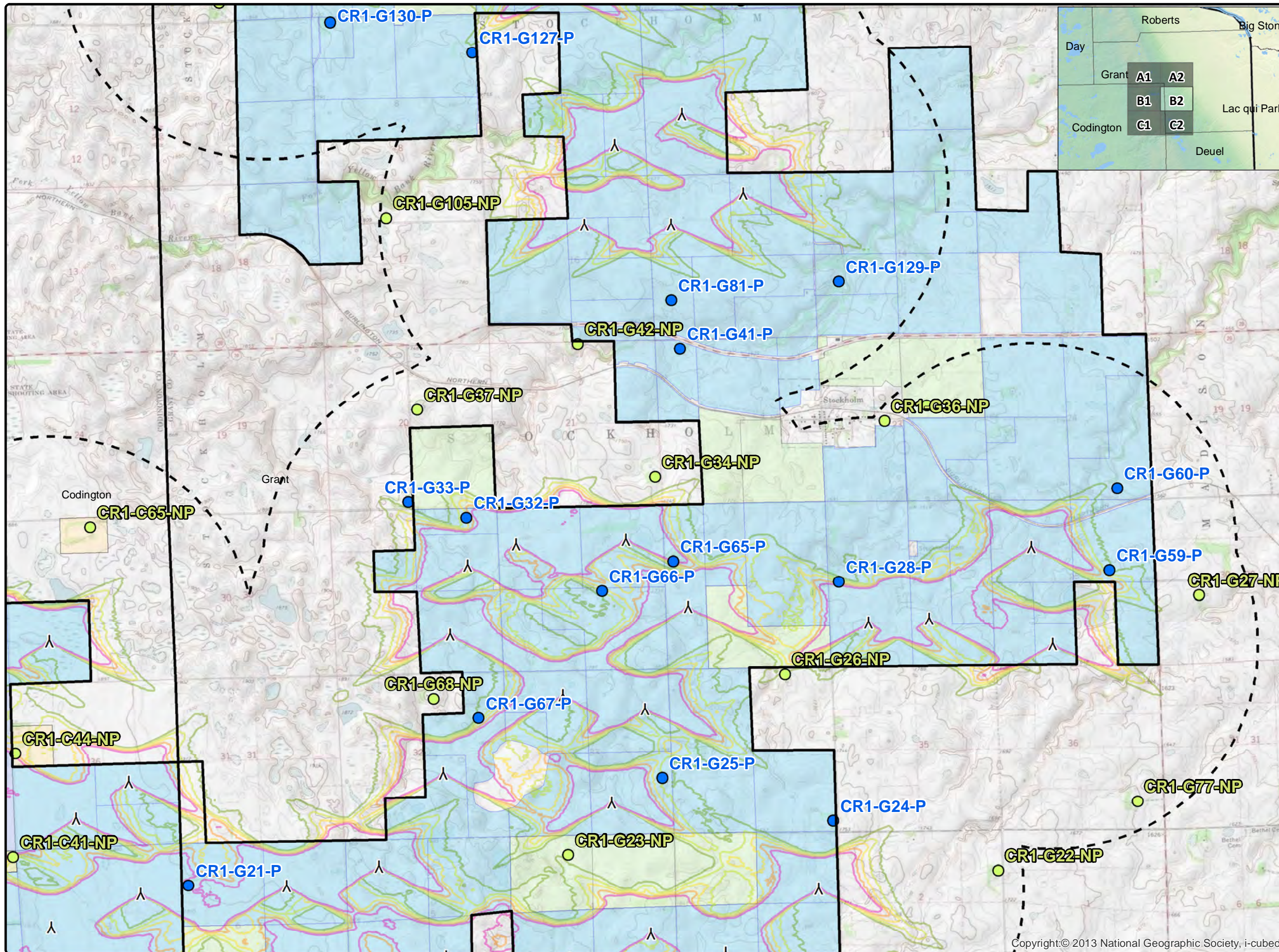
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**Legend**

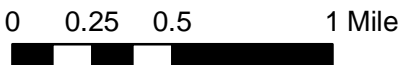
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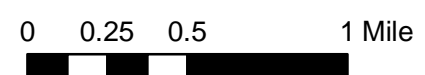
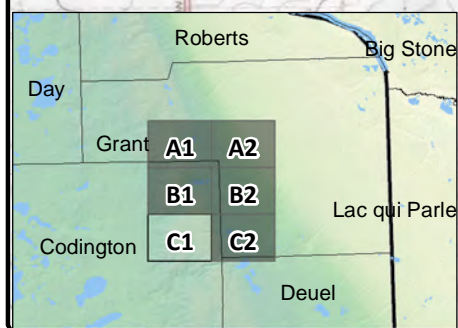
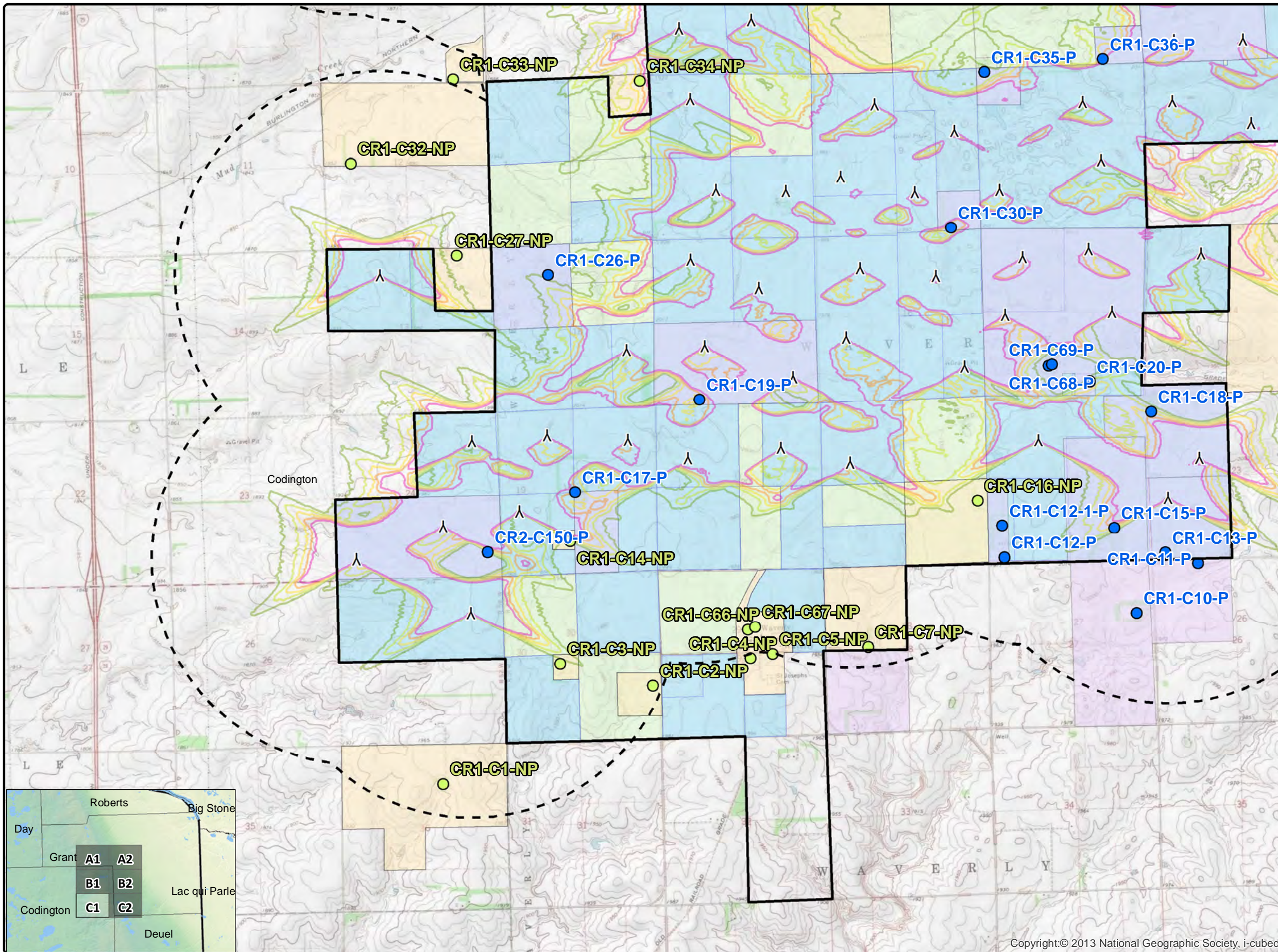
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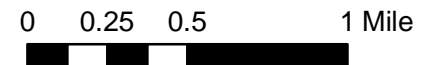
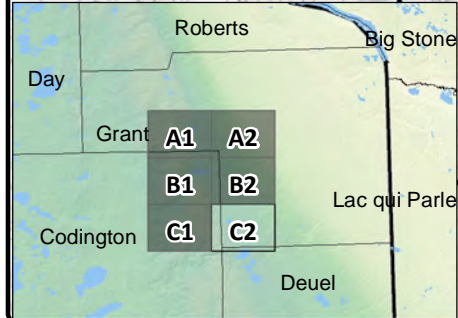
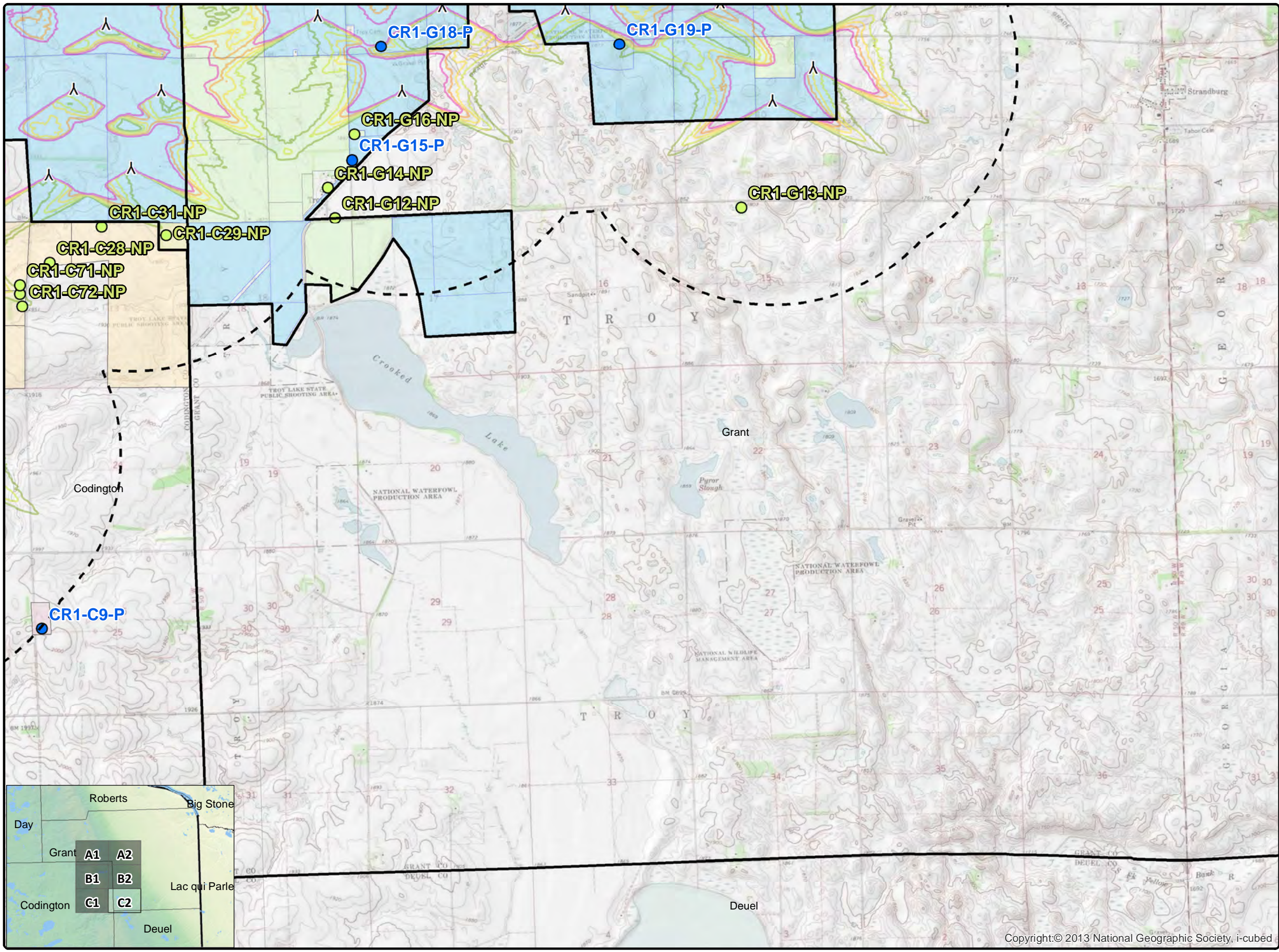
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