Memorandum

To	North Dakota Public Service Commission	Pages	3
Subject	Case Number PU-18-280 Emmons-Logan Wind Energy Center Modifications of Energy Conversion Facility and Site Plan		
From	Emmons-Logan Wind, LLC		
Date	March 17, 2019		

Introduction

Pursuant to Certification Relating to Order Provision Number 38, Emmons-Logan Wind, LLC (Emmons-Logan Wind) submits to the North Dakota Public Service Commission (Commission) this supporting documentation for proposed modifications to the Emmons-Logan Wind Energy Center (Project) and Project Site Plan (Attachments 1 through 5). Modifications include different wind turbine generator models, a re-assignment of turbine models at all but eight permitted locations, reassignment of proposed and alternative turbines and subsequent renumbering of turbines, and minor reroutes to the underground collection lines and access roads. The wind turbine modifications will optimize energy production. Underground collection line modifications are a result of the change in wind turbine models, optimization, routing electrical lines to meteorological and aircraft detection lighting system (ADLS) towers, and a landowner request. The access road modifications are per landowner requests.

Wind Turbine Generator Modifications

Emmons-Logan Wind was expecting to use 111 General Electric (GE) 2.5 megawatt (MW) and 12 GE 1.715 MW turbines. Emmons-Logan Wind is now proposing to use 35 GE 1.715 MW turbines and 88 GE 2.72 MW turbines at the previously permitted turbine locations (Attachments 2 and 3).

The GE 1.715 MW turbines will have the same turbine tip heights as originally proposed (431.5 feet). The GE 2.72 MW turbines will use the same 381-foot rotor diameter as proposed for the 2.5 MW turbines, but 68 turbines will have the 295-foot hub height while 20 will have a shorter, 262-foot hub height. Thus, height from the base of the tower to the tip of the upright blade for the GE 2.72 MW turbines will be 485.5 feet and 452.5 feet, respectively. Table 1 compares the permitted turbine models to the proposed modification.

Table 1. Wind Turbine Generator Modification Comparison

Turbine Model	Rotor Diameter (feet)	Hub Height (feet)	Tip Height (feet)	# of Turbines in Permitted Site Plan	# of Turbines in Modified Site Plan
GE 1.715 MW	338	262	431.5	12	35
GE 2.5 MW	381	295	485.5	111	0
GE 2.72 MW	381	295	485.5	0	68
GE 2.72 MW	381	262	452.5	0	20

These modifications in turbine technology will slightly increase the Project's nameplate capacity from 298.1 MW to 299.4 MW. The engineering and operational design considerations for the turbine model modification are consistent with the Findings of Fact, Conclusions of Law and Order, specifically:

- The Project will continue to have up to 123 wind turbines in the permitted locations, but the turbine model assigned on all but eight locations has changed.
- The maximum turbine tip height used for setbacks was unchanged and thus there continue to be no setback exceedances.

- Sound levels, as described below, continue to comply with the Commission's requirement.
- Shadow flicker, as described below, continue to meet the Commission's recognized standard.

Sound Levels

Emmons-Logan Wind contracted AECOM to update the acoustic assessment as a result of the turbine model modifications. AECOM utilized the same methodology outlined in the Project's November 2018 Acoustic Assessment (Docket No. 60). The predicted operational acoustic modeling demonstrates that the Project will not generate exceedances of the Commission threshold at any occupied receptors, but model results suggested three participating receptors may experience sound levels at the Commission's sound limit under maximum rotational conditions. As a mitigation to this slight sound level increase, Emmons-Logan Wind will utilize Low Noise Trailing Edge (LNTE) technology on the 12 turbines nearest these receptors to reduce the Project's operational sound to below the Commission's limit. The 12 turbines are all GE 2.72 MW. Turbines 10, 11, 12, 56, 57, 58, 59, and 121 have a 295-foot hub height and turbines 19, 76, 77, and 120 have a 262-foot hub height.

The acoustic assessment in Scenario A provides the results of the updated acoustic assessment with use of primary turbine locations only. Scenario B provides the results of the updated acoustic assessment with use of both primary and alternative turbine locations. The predictive operational acoustical modeling, inclusive of conservative parameter assumptions and uncertainty corrections, demonstrates that the update with LNTE technology will not generate exceedances of the Commission threshold at any occupied receptor locations. The highest predicted operational sound level is 49.8 dBA for a participating landowner, which was an increase in 0.6 dBA from the November 2018 Acoustic Assessment. Attachments 6 and 7 compare the results of the updated acoustic assessment to the November 2018 Acoustic Assessment, and Attachments 8 and 9 provide acoustic modeling maps.

Shadow Flicker

Emmons-Logan Wind contracted AECOM to update the shadow flicker assessment as a result of the turbine model modifications. AECOM utilized the same methodology outlined in the Project's November 2018 Shadow Flicker Assessment (Docket No. 62). Model results from the November 2018 Shadow Flicker Assessment demonstrated that seven occupied residences may exceed the Commission's recognized 30 hours per year limit. Of these seven residences, two will no longer exceed 30 hours per year, one will experience the same shadow flicker, and four will experience less shadow flicker. No new, additional residences have shadow flicker impacts over 30 hours per year. All residences with shadow flicker exceedances are owned by landowners that are participating in the Project and have signed waivers for shadow flicker exceedances, which have been filed with the Commission.

The shadow flicker assessment in Scenario A provides the results of the updated shadow flicker assessment with use of primary turbine locations only. Scenario B provides the results of the updated shadow flicker assessment with use of both primary and alternative turbine locations. Attachments 10, 11, 12, and 13 compare the results of the updated shadow flicker assessment to the November 2018 Shadow Flicker Assessment, and Attachments 14 and 15 provide shadow flicker modeling maps.

Project Site Plan Modifications

Emmons-Logan Wind proposes certain minor Project Site Plan modifications, including changes to certain collection lines and two access roads. Attachment 4 illustrates locations of the Site Plan modifications, whereas modifications that are imperceptible at the map scale can be viewed using the GIS shapefiles (Attachment 16). Most collection line changes are a result of the turbine model modification, but the collection lines between turbine 64 and the 230 kV substation and between turbine 69 and 93 are a result of landowner requests. This same landowner requested the access road change between turbine 69 and 93 as well. The access road to turbine 49 was also modified to accommodate preferred farming practices of the landowner. Although turbine locations have not changed, new numbers have been designated for most turbines due to the reassignment of proposed and alternative turbines (Attachment 3). The Project Site Plan modifications occur in areas previously surveyed for wetlands, cultural and tribal resources as described below. Attachments 2, 4, and 5 provide updated site plan maps.

Wetlands

The Site Plan modifications avoid wetland impacts per wetland delineations completed by AECOM. Two additional wetlands (EL-F02-WETLAND and EL-F01-WETLAND) were delineated in the vicinity of the Site Plan modifications, but they are located outside the proposed construction easement and will not be impacted (Attachment 17).

Cultural and Tribal Resources

The Site Plan modifications do not impact any cultural or tribal resources per a joint Class III Cultural Resources and tribal survey completed by AECOM. Emmons-Logan Wind will submit an amended Class III Cultural Resources Inventory Report to the State Historical Society of North Dakota for review and concurrence. The concurrence letter will be filed with the Commission before the start of construction.

Other Impacts

The Site Plan modifications fall within areas previously covered by the avian, raptor, lek, and nest surveys and the whooping crane and bat habitat desktop assessments. The Site Plan modifications do not change the results of those studies. No threatened and endangered species or new leks or nests were observed during the field surveys, and there are no new impacts to native prairie or unbroken grasslands. Project Site Plan modifications resulted in negligible changes to the total Project impacts calculations presented in Table 1-4 of the Project Application (Docket No. 1). The Site Plan modifications still follow the Commission's Exclusion and Avoidance Criteria as presented in Tables 3-1 and 3-2 of the Project Application.

Conclusion

The Project modifications comply with Exclusion, Avoidance, Selection, and Policy Criteria and are consistent with the Project's Findings of Fact, Conclusions of Law and Order.

Attachments:

1. Modifications to Late Filed Exhibit 2
2. Modified Energy Conversion Facility Site Plan Overview Map
3. Turbine Modification Comparison Table
4. Site Plan Modification Map Book
5. Modified Energy Conversion Facility Site Plan Map Book
6. Predicted Sound Levels without Alternates (Scenario A)
7. Predicted Sound Levels with Alternates (Scenario B)
8. Predicted Sound Levels without Alternates Map (Scenario A)
9. Predicted Sound Levels with Alternates Map (Scenario B)
10. Predicted Shadow Flicker without Alternatives (Scenario A)
11. Predicted Shadow Flicker at Receptors (Scenario A)
12. Predicted Shadow Flicker with Alternatives (Scenario B)
13. Predicted Shadow Flicker at Receptors (Scenario B)
14. Predicted Shadow Flicker without Alternatives Map (Scenario A)
15. Predicted Shadow Flicker with Alternatives Map (Scenario B)
16. Electronic submittal of GIS shapefiles
17. Delineated Wetlands Overview Map

EMMONS-LOGAN WIND ENERGY CENTER

EMMONS AND LOGAN COUNTIES, ND

Alt 4 Changes to Primary

100 Changes to Alternate

Alt 1 Changes to Primary

Alt 2 Changes to Primary

33 Changes to Alternate

50 Changes to Alternate

LEGEND

- County Road
- Existing 230 kV Heskett-Wishek Transmission Line
- County Boundary
- PLSS Township
- PLSS Section
- Occupied Residence - Participating Landowner
- Occupied Residence - Non-Participating Landowner
- *Non-participating Landowner
- **Non-participating Parcel

Project Features

- Turbine
- Alternative Turbine
- Met Tower
- Alternative Met Tower
- Service Road
- Collection Line
- Crane Path
- 230 kV Transmission Line Route
- 230 kV Transmission Line Corridor
- 230 kV Transmission Line Pole Location
- Original Emmons-Logan Wind Energy Center Project Area (64,563 Acres)
- Revised Emmons-Logan Wind Energy Center Project Area (28,097 Acres)
- Substation
- O&M Building
- Batch Plant
- Laydown Yard

*Non-participating Landowners outside of the Project Area are not shown on map.

**Owns land participating in the Project Area elsewhere.

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Attachment 1

Primary and Alternative Turbine Modifications to Late-Filed Exhibit 2

AECOM

EMMONS-LOGAN WIND ENERGY CENTER

EMMONS AND LOGAN COUNTIES, ND

LEGEND

- County Road
- Existing 230 kV Heskett-Wishek Transmission Line
- County Boundary
- PLSS Township
- PLSS Section
- Occupied Residence - Participating Landowner
- Occupied Residence - Non-Participating Landowner
- *Non-participating Landowner
- **Non-participating Parcel

Project Features

Turbines

- GE1.715 262HH
- GE2.72 262HH
- GE2.72 262HH, LNTE
- GE2.72 295HH
- GE2.72 295HH, LNTE
- Met Tower
- Alternative Met Tower
- Service Road
- Collection Line
- Crane Path
- 230 kV Transmission Line Route
- 230 kV Transmission Line Corridor
- 230 kV Transmission Line Pole Location
- Original Emmons-Logan Wind Energy Center Project Area (64,563 Acres)
- Revised Emmons-Logan Wind Energy Center Project Area (28,097 Acres)
- Substation
- O&M Building
- Batch Plant
- Laydown Yard

*Non-participating Landowners outside of the Project Area are not shown on map.

**Owns land participating in the Project Area elsewhere.

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Miles

Attachment 2

Modified Energy Conversion Facility Site Plan Overview

AECOM

Attachment 3. Turbine Modification Comparison Table

Permitted Site Plan Turbine Number	Permitted Site Plan Turbine Model	Modified Site Plan Turbine Number	Modified Site Plan Turbine Model
1	GE 2.5 MW	1	GE 2.72 MW 295 HH
2	GE 2.5 MW	2	GE 2.72 MW 295 HH
3	GE 2.5 MW	3	GE 2.72 MW 295 HH
4	GE 2.5 MW	4	GE 2.72 MW 295 HH
5	GE 2.5 MW	5	GE 2.72 MW 295 HH
6	GE 1.715 MW	6	GE 2.72 MW 295 HH
7	GE 1.715 MW	7	GE 1.715 MW
8	GE 1.715 MW	8	GE 2.72 MW 295 HH
9	GE 2.5 MW	9	GE 2.72 MW 295 HH
10	GE 2.5 MW	10	GE 2.72 MW 295 HH, LNTE
11	GE 2.5 MW	11	GE 2.72 MW 295 HH, LNTE
12	GE 2.5 MW	12	GE 2.72 MW 295 HH, LNTE
13	GE 2.5 MW	13	GE 2.72 MW 295 HH
14	GE 2.5 MW	14	GE 2.72 MW 295 HH
15	GE 2.5 MW	15	GE 2.72 MW 295 HH
16	GE 2.5 MW	16	GE 2.72 MW 295 HH
17	GE 2.5 MW	17	GE 2.72 MW 295 HH
18	GE 2.5 MW	18	GE 2.72 MW 295 HH
19	GE 2.5 MW	19	GE 2.72 MW 262 HH, LNTE
20	GE 2.5 MW	20	GE 1.715 MW
21	GE 2.5 MW	21	GE 1.715 MW
22	GE 2.5 MW	22	GE 1.715 MW
23	GE 2.5 MW	23	GE 2.72 MW 295 HH
24	GE 2.5 MW	24	GE 2.72 MW 262 HH
25	GE1.715 MW	25	GE 1.715 MW
26	GE 2.5 MW	26	GE 1.715 MW
27	GE 2.5 MW	27	GE 2.72 MW 295 HH
28	GE 2.5 MW	28	GE 2.72 MW 295 HH
29	GE 1.715 MW	29	GE 1.715 MW
30	GE 1.715 MW	30	GE 1.715 MW
31	GE 1.715 MW	31	GE 1.715 MW
32	GE 1.715 MW	32	GE 1.715 MW
33	GE 1.715 MW	Alt1	GE 2.72 MW 295 HH
34	GE 2.5 MW	33	GE 2.72 MW 295 HH
35	GE 2.5 MW	34	GE 2.72 MW 295 HH
36	GE 2.5 MW	35	GE 2.72 MW 295 HH
37	GE 2.5 MW	36	GE 2.72 MW 295 HH
38	GE 2.5 MW	37	GE 1.715 MW
39	GE 2.5 MW	38	GE 1.715 MW
40	GE 2.5 MW	39	GE 2.72 MW 295 HH
41	GE 2.5 MW	40	GE 2.72 MW 295 HH
42	GE 2.5 MW	41	GE 2.72 MW 295 HH
43	GE 2.5 MW	42	GE 2.72 MW 295 HH
44	GE 2.5 MW	43	GE 2.72 MW 295 HH
45	GE 2.5 MW	44	GE 2.72 MW 295 HH
46	GE 2.5 MW	45	GE 2.72 MW 295 HH
47	GE 2.5 MW	46	GE 2.72 MW 295 HH
48	GE 1.715 MW	47	GE 2.72 MW 295 HH
49	GE 2.5 MW	48	GE 2.72 MW 295 HH
50	GE 2.5 MW	Alt5	GE 2.72 MW 295 HH
51	GE 2.5 MW	49	GE 1.715 MW

Permitted Site Plan Turbine Number	Permitted Site Plan Turbine Model	Modified Site Plan Turbine Number	Modified Site Plan Turbine Model
52	GE 2.5 MW	50	GE 2.72 MW 262 HH
53	GE 2.5 MW	51	GE 2.72 MW 295 HH
54	GE 2.5 MW	52	GE 2.72 MW 262 HH
55	GE 2.5 MW	53	GE 2.72 MW 262 HH
56	GE 2.5 MW	54	GE 2.72 MW 262 HH
57	GE 2.5 MW	55	GE 2.72 MW 295 HH
58	GE 2.5 MW	56	GE 2.72 MW 295 HH, LNTE
59	GE 2.5 MW	57	GE 2.72 MW 295 HH, LNTE
60	GE 2.5 MW	58	GE 2.72 MW 295 HH, LNTE
61	GE 2.5 MW	59	GE 2.72 MW 295 HH, LNTE
62	GE 2.5 MW	60	GE 2.72 MW 295 HH
63	GE 2.5 MW	61	GE 2.72 MW 295 HH
64	GE 2.5 MW	62	GE 2.72 MW 295 HH
65	GE 2.5 MW	63	GE 2.72 MW 295 HH
66	GE 2.5 MW	64	GE 2.72 MW 295 HH
67	GE 2.5 MW	65	GE 2.72 MW 295 HH
68	GE 2.5 MW	66	GE 2.72 MW 295 HH
69	GE 2.5 MW	67	GE 2.72 MW 295 HH
70	GE 2.5 MW	68	GE 2.72 MW 295 HH
71	GE 2.5 MW	69	GE 2.72 MW 295 HH
72	GE 2.5 MW	70	GE 2.72 MW 295 HH
73	GE 2.5 MW	71	GE 2.72 MW 262 HH
74	GE 2.5 MW	72	GE 2.72 MW 262 HH
75	GE 2.5 MW	73	GE 1.715 MW
76	GE 2.5 MW	74	GE 2.72 MW 262 HH
77	GE 2.5 MW	75	GE 2.72 MW 262 HH
78	GE 2.5 MW	76	GE 2.72 MW 262 HH, LNTE
79	GE 2.5 MW	77	GE 2.72 MW 262 HH, LNTE
80	GE 2.5 MW	78	GE 1.715 MW
81	GE 2.5 MW	80	GE 2.72 MW 295 HH
82	GE 2.5 MW	81	GE 1.715 MW
83	GE 2.5 MW	82	GE 2.72 MW 295 HH
84	GE 2.5 MW	83	GE 2.72 MW 295 HH
85	GE 2.5 MW	84	GE 2.72 MW 295 HH
86	GE 2.5 MW	85	GE 2.72 MW 295 HH
87	GE 2.5 MW	86	GE 2.72 MW 295 HH
88	GE 2.5 MW	87	GE 2.72 MW 295 HH
89	GE 2.5 MW	88	GE 2.72 MW 295 HH
90	GE 2.5 MW	89	GE 2.72 MW 295 HH
91	GE 2.5 MW	90	GE 2.72 MW 295 HH
92	GE 2.5 MW	91	GE 1.715 MW
93	GE 2.5 MW	92	GE 1.715 MW
94	GE 2.5 MW	93	GE 2.72 MW 295 HH
95	GE 2.5 MW	94	GE 2.72 MW 295 HH
96	GE 2.5 MW	95	GE 2.72 MW 295 HH
97	GE 2.5 MW	96	GE 1.715 MW
98	GE 2.5 MW	97	GE 1.715 MW
99	GE 2.5 MW	98	GE 2.72 MW 262 HH
100	GE 2.5 MW	Alt3	GE 2.72 MW 295 HH
101	GE 2.5 MW	99	GE 1.715 MW
102	GE 1.715 MW	100	GE 1.715 MW
103	GE 1.715 MW	101	GE 1.715 MW

Permitted Site Plan Turbine Number	Permitted Site Plan Turbine Model	Modified Site Plan Turbine Number	Modified Site Plan Turbine Model
104	GE 2.5 MW	102	GE 1.715 MW
105	GE 2.5 MW	103	GE 2.72 MW 262 HH
106	GE 2.5 MW	104	GE 1.715 MW
107	GE 2.5 MW	105	GE 1.715 MW
108	GE 2.5 MW	106	GE 1.715 MW
109	GE 2.5 MW	107	GE 1.715 MW
110	GE 2.5 MW	108	GE 1.715 MW
111	GE 2.5 MW	109	GE 1.715 MW
112	GE 2.5 MW	110	GE 2.72 MW 262 HH
113	GE 2.5 MW	111	GE 2.72 MW 295 HH
114	GE 2.5 MW	112	GE 2.72 MW 295 HH
115	GE 2.5 MW	113	GE 2.72 MW 295 HH
116	GE 2.5 MW	114	GE 2.72 MW 262 HH
117	GE 2.5 MW	115	GE 2.72 MW 262 HH
118	GE 2.5 MW	116	GE 1.715 MW
119	GE 2.5 MW	117	GE 1.715 MW
120	GE 2.5 MW	118	GE 1.715 MW
121	GE 2.5 MW	119	GE 1.715 MW
122	GE 2.5 MW	120	GE 2.72 MW 262 HH, LNTE
123	GE 2.5 MW	121	GE 2.72 MW 295 HH, LNTE
Alt1	GE 2.5 MW	122	GE 2.72 MW 262 HH
Alt2	GE 2.5 MW	123	GE 2.72 MW 262 HH
Alt3	GE 2.5 MW	Alt2	GE 2.72 MW 295 HH
Alt4	GE 2.5 MW	79	GE 1.715 MW
Alt5	GE 2.5 MW	Alt6	GE 2.72 MW 295 HH
Alt6	GE 2.5 MW	Alt4	GE 2.72 MW 295 HH

EMMONS-LOGAN WIND ENERGY CENTER

EMMONS AND LOGAN COUNTIES, ND

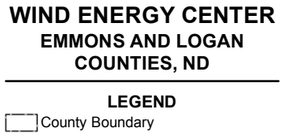
LEGEND

- County Boundary
- Existing Road

Project Features

- Turbine
- Met Tower
- Service Road - No Revisions
- Service Road - October 2018
- Collection Line - No Revisions
- Collection Lines Revised March 2019
- Collection Line - October 2018
- Emmons-Logan Wind Energy Center Project Area
- Substation
- O&M Building

Disclaimer: Call-outs highlight locations of the more notable Site Plan modifications; whereas minor modifications that are imperceptible at the map scale can be viewed using the provided GIS shapefiles.



Map 1 of 6

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Attachment 4

Sheet 1 of 6

Site Plan Modification Map Book

AECOM

EMMONS-LOGAN WIND ENERGY CENTER

EMMONS AND LOGAN COUNTIES, ND

LEGEND

- County Boundary
- Existing Road

Project Features

- Turbine
- Met Tower
- Service Road - No Revisions
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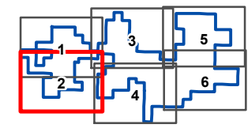

Map 2 of 6

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Attachment 4

Sheet 2 of 6

Site Plan Modification Map Book

AECOM

EMMONS-LOGAN WIND ENERGY CENTER

EMMONS AND LOGAN COUNTIES, ND

LEGEND

- County Boundary
- Existing Road

Project Features

- Turbine
- Service Road - No Revisions
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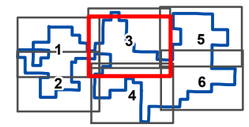

Map 3 of 6

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Attachment 4

Sheet 3 of 6

Site Plan Modification Map Book

AECOM

EMMONS-LOGAN WIND ENERGY CENTER

EMMONS AND LOGAN COUNTIES, ND

LEGEND

- County Boundary
- Existing Road

Project Features

- Turbine
- Met Tower
- Service Road - No Revisions
- Service Roads Revised March 2019
- Service Road - October 2018
- Collection Line - No Revisions
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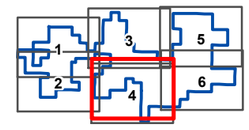

Map 4 of 6

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Attachment 4

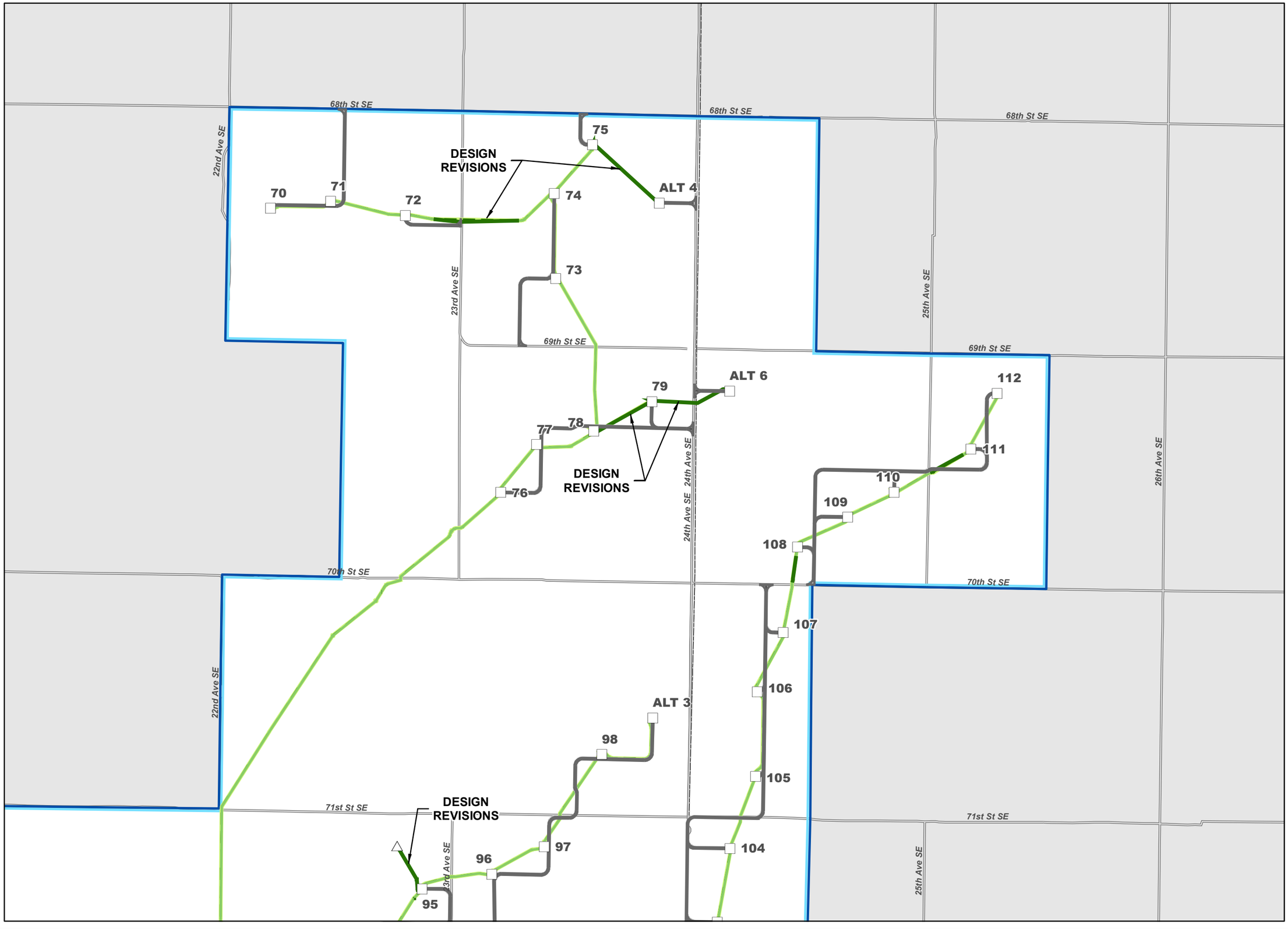
Sheet 4 of 6

Site Plan Modification Map Book

AECOM

EMMONS-LOGAN WIND ENERGY CENTER

EMMONS AND LOGAN COUNTIES, ND



LEGEND

- County Boundary
- Existing Road

Project Features

- Turbine
- Met Tower
- Service Road - No Revisions
- Service Road - October 2018
- Collection Line - No Revisions
- Collection Lines Revised March 2019
- Collection Line - October 2018
- Emmons-Logan Wind Energy Center Project Area

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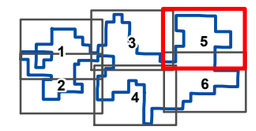

Map 5 of 6

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Attachment 4

Sheet 5 of 6

Site Plan Modification Map Book

AECOM

EMMONS-LOGAN WIND ENERGY CENTER

EMMONS AND LOGAN COUNTIES, ND

LEGEND

- County Boundary
- Existing Road

Project Features

- Turbine
- Met Tower
- Service Road - No Revisions
- Service Roads Revised March 2019
- Service Road - October 2018
- Collection Line - No Revisions
- Collection Lines Revised March 2019
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- Emmons-Logan Wind Energy Center Project Area
- Substation

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DESIGN REVISIONS

DESIGN REVISIONS

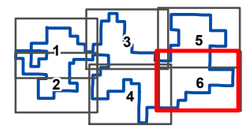
ALT 3

67 68 69 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 113 114 115 116 117 118 119 120 121 122 123

22nd Ave SE
23rd Ave SE
24th Ave SE
25th Ave SE
26th Ave SE

71st St SE
72nd St SE
73rd St SE
74th St SE

EMMONS COUNTY
LOGAN COUNTY



Map 6 of 6

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Attachment 4

Sheet 6 of 6

Site Plan Modification Map Book

AECOM

EMMONS-LOGAN WIND ENERGY CENTER

EMMONS AND LOGAN COUNTIES, ND

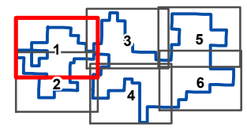
LEGEND

- County Boundary
- PLSS Township
- PLSS Section
- Existing Road

Project Features

Turbines

- GE1.715 262HH
- GE2.72 262HH
- GE2.72 262HH, LNTE
- GE2.72 295HH
- GE2.72 295HH, LNTE
- Alternative Met Tower
- Service Road
- Collection Line
- Collection Line Bore Location
- Crane Path
- Construction Easement
- Emmons-Logan Wind Energy Center Project Area
- Substation
- O&M Building



Map 1 of 6

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Attachment 5

Sheet 1 of 6

Modified Energy Conversion Facility Site Plan Map Book

AECOM

EMMONS-LOGAN WIND ENERGY CENTER

EMMONS AND LOGAN COUNTIES, ND

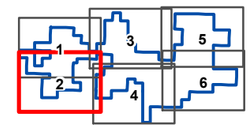
LEGEND

- County Boundary
- PLSS Township
- PLSS Section
- Existing Road

Project Features

Turbines

- GE1.715 262HH
- GE2.72 262HH
- GE2.72 262HH, LNTE
- GE2.72 295HH
- GE2.72 295HH, LNTE
- Met Tower
- Alternative Met Tower
- Service Road
- Collection Line
- Collection Line Bore Location
- Crane Path
- Construction Easement
- Emmons-Logan Wind Energy Center Project Area
- Substation
- O&M Building



Map 2 of 6

0 1,000 2,000

Feet

Attachment 5

Sheet 2 of 6

Modified Energy Conversion Facility Site Plan Map Book

AECOM

EMMONS-LOGAN WIND ENERGY CENTER

EMMONS AND LOGAN COUNTIES, ND

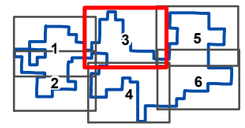
LEGEND

- County Boundary
- PLSS Township
- PLSS Section
- Existing Road

Project Features

Turbines

- GE2.72 295HH
- GE2.72 295HH, LNTE
- Service Road
- Collection Line
- Collection Line Bore Location
- Crane Path
- Construction Easement
- Emmons-Logan Wind Energy Center Project Area



Map 3 of 6

N
W E
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0 1,000 2,000

Feet

Attachment 5

Sheet 3 of 6

Modified Energy Conversion Facility Site Plan Map Book

AECOM

EMMONS-LOGAN WIND ENERGY CENTER

EMMONS AND LOGAN COUNTIES, ND

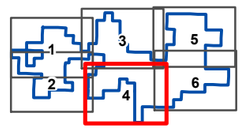
LEGEND

- County Boundary
- PLSS Township
- PLSS Section
- Existing Road

Project Features

Turbines

- GE1.715 262HH
- GE2.72 262HH
- GE2.72 295HH
- GE2.72 295HH, LNTE
- Alternative Met Tower
- Service Road
- Collection Line
- Collection Line Bore Location
- Crane Path
- Construction Easement
- Emmons-Logan Wind Energy Center Project Area
- Substation
- Batch Plant
- Laydown Yard



Map 4 of 6

N
W E
S

0 1,000 2,000

Feet

Attachment 5

Sheet 4 of 6

Modified Energy Conversion Facility Site Plan Map Book

AECOM

EMMONS-LOGAN WIND ENERGY CENTER

EMMONS AND LOGAN COUNTIES, ND

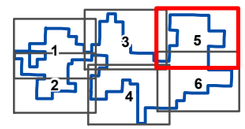
LEGEND

- County Boundary
- PLSS Township
- PLSS Section
- Existing Road

Project Features

Turbines

- GE1.715 262HH
- GE2.72 262HH
- GE2.72 262HH, LNTE
- GE2.72 295HH
- Met Tower
- Service Road
- Collection Line
- Collection Line Bore Location
- Crane Path
- Construction Easement
- Emmons-Logan Wind Energy Center Project Area



Map 5 of 6

N
W E
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0 1,000 2,000

Feet

Attachment 5

Sheet 5 of 6

Modified Energy Conversion Facility Site Plan Map Book

AECOM

EMMONS-LOGAN WIND ENERGY CENTER

EMMONS AND LOGAN COUNTIES, ND

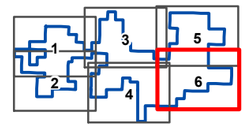
LEGEND

- County Boundary
- PLSS Township
- PLSS Section
- Existing Road

Project Features

Turbines

- GE1.715 262HH
- GE2.72 262HH
- GE2.72 262HH, LNTE
- GE2.72 295HH
- GE2.72 295HH, LNTE
- Met Tower
- Service Road
- Collection Line
- Collection Line Bore Location
- Crane Path
- Construction Easement
- Emmons-Logan Wind Energy Center Project Area



Map 6 of 6

N
W E
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0 1,000 2,000

Feet

Attachment 5

Sheet 6 of 6

Modified Energy Conversion Facility Site Plan Map Book

AECOM

Attachment 6. Predicted Sound Levels without Alternates (Scenario A)

Receiver ID	Participating Landowner?	Nearest Turbine ID	Distance to Nearest Turbine (feet)	Receptor Coordinates (UTM Zone 14, NAD 83)		2018 Acoustic Assessment (Leq, dBA)	Updated Acoustic with 12 LTNE Turbines (Leq, dBA) [1]	Change in Acoustic (Leq, dBA)
				Easting (m)	Northing (m)			
ARCH1a	No	5	9659	411748	5142273	31.6	32.1	0.5
ARCH1b	No	5	9829	411681	5142284	31.3	31.9	0.6
ARCH3	No	8	7766	414922	5142811	33.1	33.9	0.8
ARCH4a	No	43	5430	418970	5142363	37.0	38.1	1.1
ARCH4b	No	43	5522	418976	5142395	36.9	37.9	1.0
ARCH7	No	71	2287	426874	5142180	44.2	45.8	1.6
ARCH9a	Yes	72	2274	427858	5142012	45.1	46.5	1.4
ARCH9b	Yes	72	1900	427845	5141887	46.1	47.6	1.5
ARCH10	Yes	75	3602	429319	5142869	39.0	40.1	1.1
ARCH11	No	Alt4	3449	429934	5142318	38.9	39.9	1.0
ARCH12	No	112	5482	432773	5141382	35.0	35.8	0.8
ARCH14	Yes	4	8917	410443	5140839	32.4	32.9	0.5
ARCH15	Yes	73	1860	428022	5140842	46.7	47.5	0.8
ARCH16a	Yes	78	1683	428633	5140382	48.2	48.9	0.7
ARCH16b	Yes	78	1581	428774	5140389	48.1	49.2	1.1
ARCH17	Yes	48	5584	422884	5139836	38.1	39.1	1.0
ARCH18	Yes	1	5925	410039	5139386	35.4	36.3	0.9
ARCH19	No	4	2152	411861	5139343	44.3	45.8	1.5
ARCH20a	Yes	107	2064	429635	5138886	47.5	47.3	-0.2
ARCH20b	Yes	108	2142	429592	5139083	46.8	46.7	-0.1
ARCH21	No	111	5318	432803	5138909	37.8	38.6	0.8
ARCH22	No	112	11289	434822	5138912	28.8	29.9	1.1
ARCH24	Yes	111	4373	432380	5138841	39.7	40.5	0.8
ARCH25	Yes	108	1634	430597	5138756	49.4	49.5	0.1
ARCH28	Yes	13	2011	413756	5138574	46.4	47.4	1.0
ARCH29	Yes	1	1545	410988	5138194	47.0	48.7	1.7
ARCH30a	No	1	3225	410075	5138403	39.5	40.7	1.2
ARCH30b	No	1	3291	410068	5138425	39.3	40.6	1.3
ARCH31	Yes	10	2372	412313	5137566	45.3	45.9	0.6
ARCH33	Yes	66	2533	424685	5137154	45.2	46.7	1.5
ARCH34	Yes	122	2385	431973	5136509	41.0	45.8	4.8
ARCH35	Yes	59	1722	420653	5136674	48.6	48.8	0.2
ARCH36a	No	23	3245	416487	5136666	43.6	44.2	0.6
ARCH36b	No	23	3251	416500	5136699	43.7	44.3	0.6
ARCH37	Yes	24	1883	415694	5137337	46.7	47.7	1.0

Receiver ID	Participating Landowner?	Nearest Turbine ID	Distance to Nearest Turbine (feet)	Receptor Coordinates (UTM Zone 14, NAD 83)		2018 Acoustic Assessment (Leq, dBA)	Updated Acoustic with 12 LTNE Turbines (Leq, dBA) [1]	Change in Acoustic (Leq, dBA)
				Easting (m)	Northing (m)			
ARCH38	Yes	11	1742	413943	5137194	49.6	49.4	-0.2
ARCH39	Yes	10	2369	413090	5136520	46.7	46.8	0.1
ARCH42	Yes	55	2812	421759	5135832	42.6	43.6	1.0
ARCH45	Yes	123	2856	433280	5135553	36.8	42.4	5.6
ARCH46	Yes	123	1667	432802	5135504	39.9	47.8	7.9
ARCH47	Yes	119	1496	430992	5134971	49.2	49.3	0.1
ARCH48	**Yes**	**115**	**1804**	**429531**	**5135533**	**49.2**	**49.8**	**0.6**
ARCH49a	Yes	84	4981	424296	5134528	41.8	42.8	1.0
ARCH49b	Yes	67	5253	424324	5134624	41.8	42.8	1.0
ARCH51	Yes	53	2349	419802	5134912	45.5	46.6	1.1
ARCH52	Yes	9	2913	411640	5135851	41.8	42.5	0.7
ARCH53	No	29	8432	410166	5134921	34.7	34.9	0.2
ARCH54	Yes	37	1663	414773	5134478	46.6	46.4	-0.2
ARCH55	Yes	91	1663	427252	5134105	47.5	48.0	0.5
ARCH57	Yes	121	7369	432556	5133251	34.0	34.9	0.9
ARCH59	Yes	84	2490	423789	5133578	45.1	46.5	1.4
ARCH60	Yes	82	5413	422205	5133575	39.2	39.7	0.5
ARCH61a	Yes	54	3540	420718	5134080	40.9	41.5	0.6
ARCH62	No	33	3573	411735	5134229	41.4	42.1	0.7
ARCH64	Yes	85	1654	425154	5132657	46.9	48.6	1.7
ARCH66	No	120	9744	431631	5132346	33.1	33.5	0.4
ARCH68	No	33	9495	410162	5132295	29.4	30.1	0.7
ARCH69	No	33	10423	409972	5132060	28.7	29.1	0.4
ARCH70	Yes	113	11585	429825	5130862	25.7	25.1	-0.6
ARCH72	Yes	33	10469	412251	5130545	24.1	24.3	0.2
ARCH73	Yes	36	13107	415645	5130338	25.2	24.8	-0.4
ARCH74	Yes	113	13383	428480	5130176	28.7	28.9	0.2
ARCH75	Yes	113	14347	429070	5129877	22.4	22.8	0.4
ARCH76a	Yes	80	11791	425726	5129279	28.5	28.8	0.3
ARCH76b	Yes	80	11942	425766	5129255	28.7	29.0	0.3
ARCH76c	Yes	80	11719	425673	5129258	28.6	29.0	0.4
ARCH77a	No	80	11063	425349	5129233	27.8	28.2	0.4
ARCH77b	No	80	10984	425314	5129234	29.7	30.1	0.4
ARCH77c	No	80	11165	425393	5129229	28.2	28.3	0.1
ARCH77d	No	80	11296	425391	5129175	26.1	26.5	0.4
ARCH79a	Yes	80	8054	422894	5129362	30.6	31.2	0.6
ARCH79b	Yes	80	8209	422880	5129316	30.4	31.0	0.6
ARCH79c	Yes	80	7651	422886	5129487	31.3	31.8	0.5

Receiver ID	Participating Landowner?	Nearest Turbine ID	Distance to Nearest Turbine (feet)	Receptor Coordinates (UTM Zone 14, NAD 83)		2018 Acoustic Assessment (Leq, dBA)	Updated Acoustic with 12 LTNE Turbines (Leq, dBA) [1]	Change in Acoustic (Leq, dBA)
				Easting (m)	Northing (m)			
ARCH80	No	Alt5	13783	418813	5129471	21.7	17.8	-3.9
ARCH81	No	37	15958	416269	5129655	17.9	16.4	-1.5
ARCH83	Yes	80	10820	424451	5128764	25.2	25.5	0.3
ARCH84	No	33	7277	411554	5131800	32.7	33.3	0.6
ARCH107	No	1	11742	407590	5136204	25.1	25.5	0.4
ARCH108	No	5	12064	410981	5142552	28.3	28.8	0.5
ARCH111a	No	44	10656	422531	5143856	27.7	28.3	0.6
ARCH111b	No	44	10614	422512	5143854	26.4	27.1	0.7
ARCH111c	No	44	10640	422510	5143865	26.5	27.2	0.7
ARCH111d	No	44	10761	422528	5143898	28.4	28.9	0.5
ARCH112	No	70	11860	423893	5143839	26.4	26.7	0.3
ARCH115	Yes	70	10174	424647	5143854	28.0	28.2	0.2
ARCH117	Yes	70	9616	426457	5144375	30.3	31.0	0.7
ARCH119	No	75	9665	427937	5144695	30.4	31.1	0.7
ARCH120a	No	75	8668	429651	5144397	30.8	31.5	0.7
ARCH120b	No	75	9003	429656	5144503	30.2	30.9	0.7
ARCH120c	No	75	9167	429659	5144554	30.0	30.8	0.8
ARCH121a	No	75	8579	430675	5143737	31.9	32.5	0.6
ARCH121b	No	75	8652	430715	5143728	31.8	32.4	0.6
ARCH122	No	75	8461	430727	5143631	32.1	32.7	0.6
ARCH123	Yes	80	10056	424917	5129298	30.2	30.5	0.3
ARCH126	Yes	33	12142	412953	5130014	27.0	27.5	0.5

[1] Highest level in bold

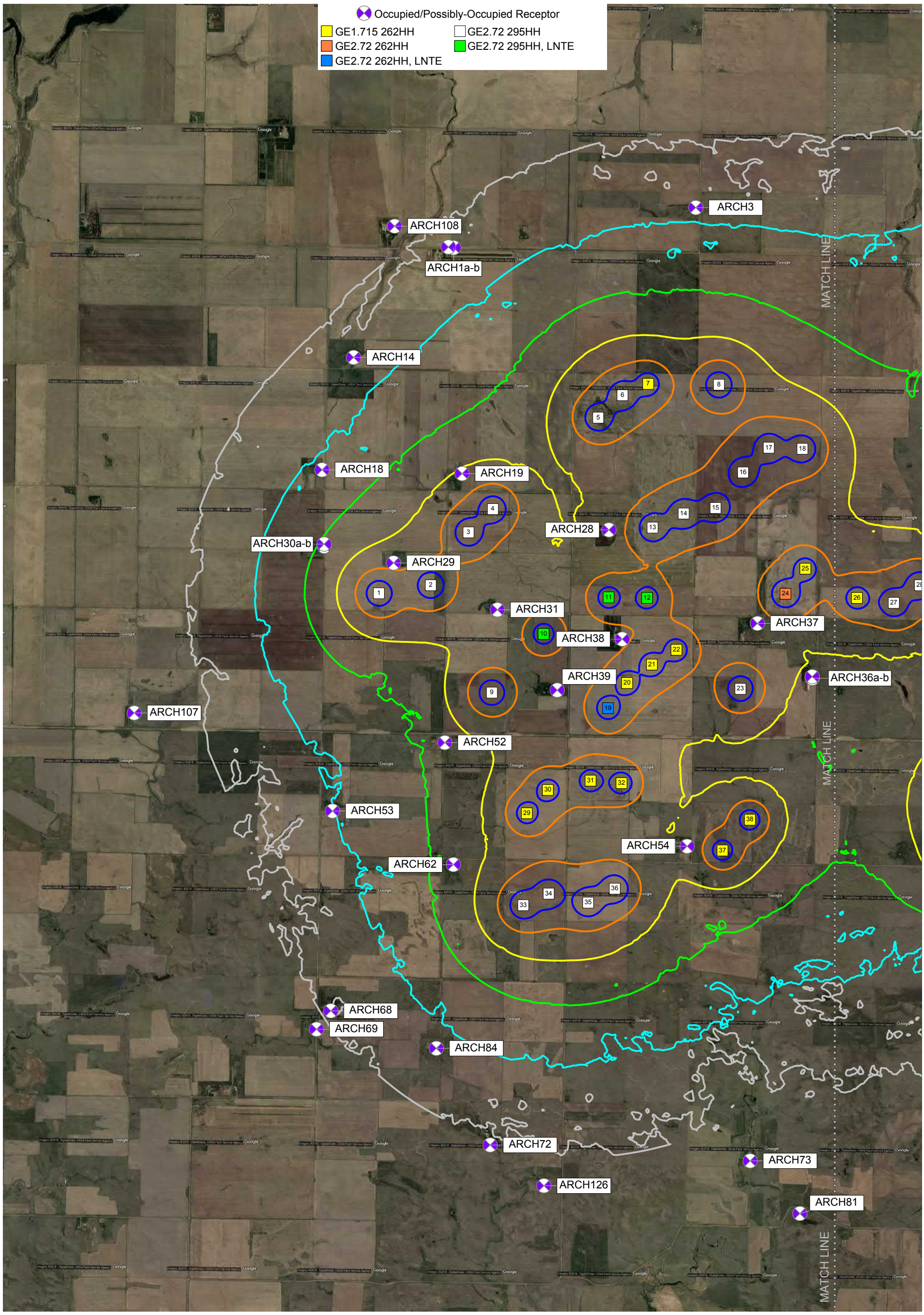
Attachment 7. Predicted Sound Levels with Alternates (Scenario B)

Receiver ID	Participating Landowner?	Nearest Turbine ID	Distance to Nearest Turbine (feet)	Receptor Coordinates (UTM Zone 14, NAD 83)		2018 Acoustic Assessment (Leq, dBA)	Updated Acoustic with 12 LTNE Turbines (Leq, dBA) [1]	Change in Acoustic (Leq, dBA)
				Easting (m)	Northing (m)			
ARCH1a	No	5	9659	411748	5142273	31.6	32.1	0.5
ARCH1b	No	5	9829	411681	5142284	31.3	31.9	0.6
ARCH3	No	8	7766	414922	5142811	33.1	33.9	0.8
ARCH4a	No	43	5430	418970	5142363	37.0	38.1	1.1
ARCH4b	No	43	5522	418976	5142395	36.9	37.9	1.0
ARCH7	No	71	2287	426874	5142180	44.3	45.8	1.5
ARCH9a	Yes	72	2274	427858	5142012	45.4	46.8	1.4
ARCH9b	Yes	72	1900	427845	5141887	46.3	47.8	1.5
ARCH10	Yes	75	3602	429319	5142869	40.1	41.2	1.1
ARCH11	No	Alt4	3449	429934	5142318	41.1	42.1	1.0
ARCH12	No	112	5482	432773	5141382	35.6	36.3	0.7
ARCH14	Yes	4	8917	410443	5140839	32.4	32.9	0.5
ARCH15	Yes	73	1860	428022	5140842	47.1	47.7	0.6
ARCH16a	Yes	78	1683	428633	5140382	49.2	49.2	0.0
ARCH16b	Yes	78	1581	428774	5140389	49.5	49.6	0.1
ARCH17	Yes	48	5584	422884	5139836	38.1	39.1	1.0
ARCH18	Yes	1	5925	410039	5139386	35.4	36.3	0.9
ARCH19	No	4	2152	411861	5139343	44.4	45.8	1.4
ARCH20a	Yes	107	2064	429635	5138886	47.8	47.9	0.1
ARCH20b	Yes	108	2142	429592	5139083	47.3	47.4	0.1
ARCH21	No	111	5318	432803	5138909	38.3	38.8	0.5
ARCH22	No	112	11289	434822	5138912	29.8	29.9	0.1
ARCH24	Yes	111	4373	432380	5138841	40.1	40.7	0.6
ARCH25	Yes	108	1634	430597	5138756	49.5	49.6	0.1
ARCH28	Yes	13	2011	413756	5138574	46.4	47.4	1.0
ARCH29	Yes	1	1545	410988	5138194	47.0	48.7	1.7
ARCH30a	No	1	3225	410075	5138403	39.5	40.7	1.2
ARCH30b	No	1	3291	410068	5138425	39.3	40.6	1.3
ARCH31	Yes	10	2372	412313	5137566	45.3	46.0	0.7
ARCH33	Yes	66	2533	424685	5137154	45.2	46.7	1.5
ARCH34	Yes	122	2385	431973	5136509	44.8	45.8	1.0
ARCH35	Yes	59	1722	420653	5136674	48.6	48.8	0.2
ARCH36a	No	23	3245	416487	5136666	43.8	44.4	0.6
ARCH36b	No	23	3251	416500	5136699	43.8	44.5	0.7
ARCH37	Yes	24	1883	415694	5137337	46.8	47.8	1.0

Receiver ID	Participating Landowner?	Nearest Turbine ID	Distance to Nearest Turbine (feet)	Receptor Coordinates (UTM Zone 14, NAD 83)		2018 Acoustic Assessment (Leq, dBA)	Updated Acoustic with 12 LTNE Turbines (Leq, dBA) [1]	Change in Acoustic (Leq, dBA)
				Easting (m)	Northing (m)			
ARCH38	Yes	11	1742	413943	5137194	49.6	49.6	0.0
ARCH39	Yes	10	2369	413090	5136520	46.8	47.0	0.2
ARCH42	Yes	55	2812	421759	5135832	42.6	43.6	1.0
ARCH45	Yes	123	2856	433280	5135553	41.4	42.4	1.0
ARCH46	Yes	123	1667	432802	5135504	46.3	47.8	1.5
ARCH47	Yes	119	1496	430992	5134971	49.4	49.3	-0.1
ARCH48	**Yes**	**115**	**1804**	**429531**	**5135533**	**49.2**	**49.8**	**0.6**
ARCH49a	Yes	84	4981	424296	5134528	41.8	42.8	1.0
ARCH49b	Yes	67	5253	424324	5134624	41.8	42.8	1.0
ARCH51	Yes	53	2349	419802	5134912	45.5	46.8	1.3
ARCH52	Yes	9	2913	411640	5135851	41.9	42.6	0.7
ARCH53	No	29	8432	410166	5134921	34.8	35.1	0.3
ARCH54	Yes	37	1663	414773	5134478	46.8	47.1	0.3
ARCH55	Yes	91	1663	427252	5134105	47.5	48.0	0.5
ARCH57	Yes	121	7369	432556	5133251	35.0	34.9	-0.1
ARCH59	Yes	84	2490	423789	5133578	45.1	46.5	1.4
ARCH60	Yes	82	5413	422205	5133575	39.2	39.8	0.6
ARCH61a	Yes	54	3540	420718	5134080	40.9	42.0	1.1
ARCH62	No	33	3573	411735	5134229	41.4	42.2	0.8
ARCH64	Yes	85	1654	425154	5132657	46.9	48.6	1.7
ARCH66	No	120	9744	431631	5132346	33.6	33.5	-0.1
ARCH68	No	33	9495	410162	5132295	29.4	30.1	0.7
ARCH69	No	33	10423	409972	5132060	28.7	29.1	0.4
ARCH70	Yes	113	11585	429825	5130862	25.7	25.1	-0.6
ARCH72	Yes	33	10469	412251	5130545	24.1	24.3	0.2
ARCH73	Yes	36	13107	415645	5130338	25.2	25.0	-0.2
ARCH74	Yes	113	13383	428480	5130176	28.7	28.9	0.2
ARCH75	Yes	113	14347	429070	5129877	22.4	22.8	0.4
ARCH76a	Yes	80	11791	425726	5129279	28.5	28.8	0.3
ARCH76b	Yes	80	11942	425766	5129255	28.7	29.0	0.3
ARCH76c	Yes	80	11719	425673	5129258	28.6	29.0	0.4
ARCH77a	No	80	11063	425349	5129233	27.8	28.2	0.4
ARCH77b	No	80	10984	425314	5129234	29.7	30.1	0.4
ARCH77c	No	80	11165	425393	5129229	28.2	28.3	0.1
ARCH77d	No	80	11296	425391	5129175	26.1	26.5	0.4
ARCH79a	Yes	80	8054	422894	5129362	30.6	31.2	0.6
ARCH79b	Yes	80	8209	422880	5129316	30.4	31.0	0.6
ARCH79c	Yes	80	7651	422886	5129487	31.3	31.8	0.5

Receiver ID	Participating Landowner?	Nearest Turbine ID	Distance to Nearest Turbine (feet)	Receptor Coordinates (UTM Zone 14, NAD 83)		2018 Acoustic Assessment (Leq, dBA)	Updated Acoustic with 12 LTNE Turbines (Leq, dBA) [1]	Change in Acoustic (Leq, dBA)
				Easting (m)	Northing (m)			
ARCH80	No	Alt5	13783	418813	5129471	21.7	21.8	0.1
ARCH81	No	37	15958	416269	5129655	17.9	17.7	-0.2
ARCH83	Yes	80	10820	424451	5128764	25.2	25.5	0.3
ARCH84	No	33	7277	411554	5131800	32.7	33.4	0.7
ARCH107	No	1	11742	407590	5136204	25.1	25.5	0.4
ARCH108	No	5	12064	410981	5142552	28.3	28.8	0.5
ARCH111a	No	44	10656	422531	5143856	27.7	28.3	0.6
ARCH111b	No	44	10614	422512	5143854	26.4	27.1	0.7
ARCH111c	No	44	10640	422510	5143865	26.5	27.2	0.7
ARCH111d	No	44	10761	422528	5143898	28.4	28.9	0.5
ARCH112	No	70	11860	423893	5143839	26.4	26.7	0.3
ARCH115	Yes	70	10174	424647	5143854	28.0	28.2	0.2
ARCH117	Yes	70	9616	426457	5144375	30.7	31.3	0.6
ARCH119	No	75	9665	427937	5144695	31.3	31.8	0.5
ARCH120a	No	75	8668	429651	5144397	32.0	32.5	0.5
ARCH120b	No	75	9003	429656	5144503	31.5	32.0	0.5
ARCH120c	No	75	9167	429659	5144554	31.3	31.8	0.5
ARCH121a	No	75	8579	430675	5143737	33.2	33.6	0.4
ARCH121b	No	75	8652	430715	5143728	33.1	33.6	0.5
ARCH122	No	75	8461	430727	5143631	33.4	33.8	0.4
ARCH123	Yes	80	10056	424917	5129298	30.2	30.5	0.3
ARCH126	Yes	33	12142	412953	5130014	27.0	27.5	0.5

[1] Highest level in bold



N

Date Created:
03/12/2019

Created by:
CK

AECOM Imagine it. Delivered.

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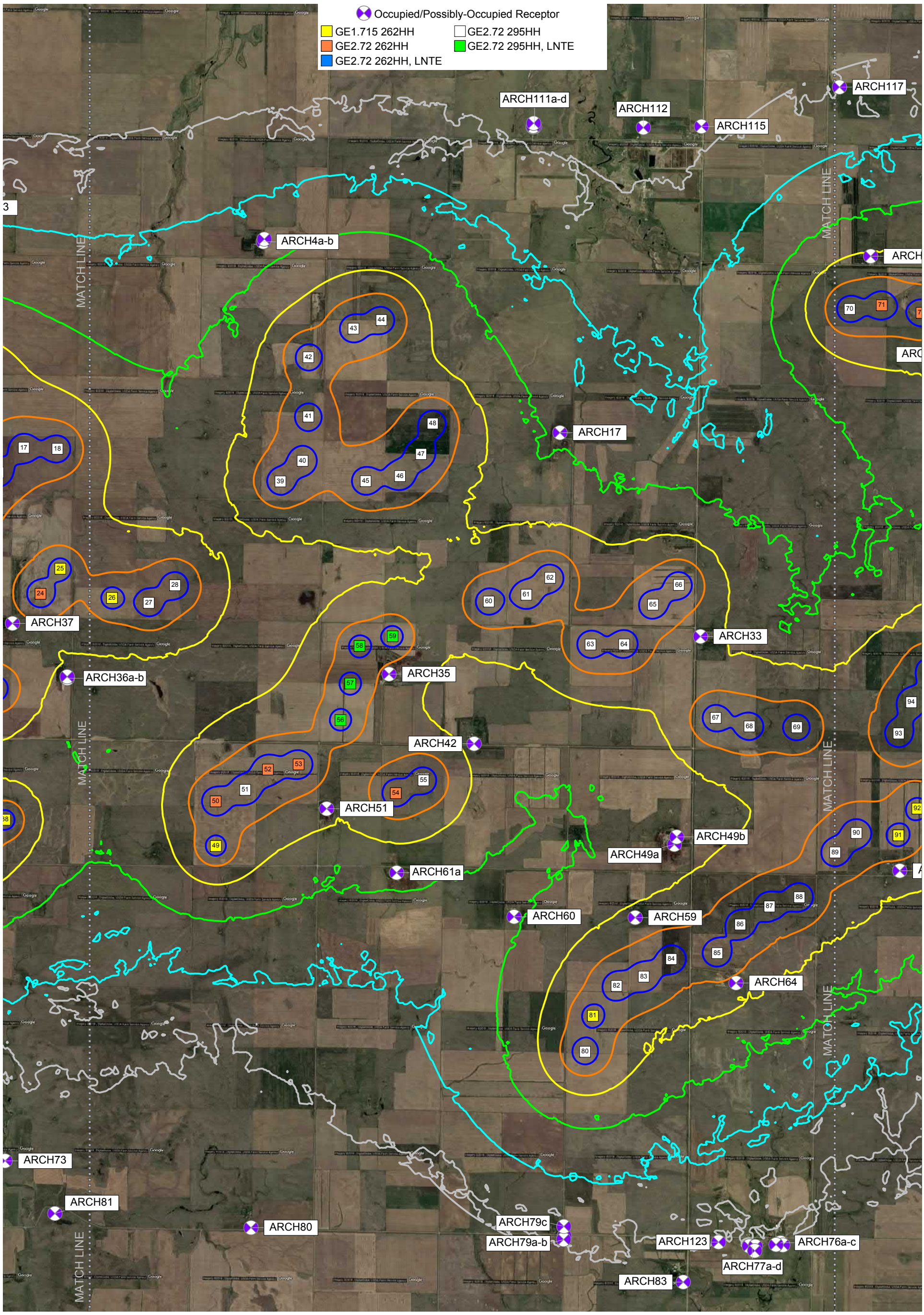
Attachment 8a - Scenario A
No Alternates & 12 Low Noise Trailing Edge Turbines
Wind Turbines at Maximum Rotational Wind Speed

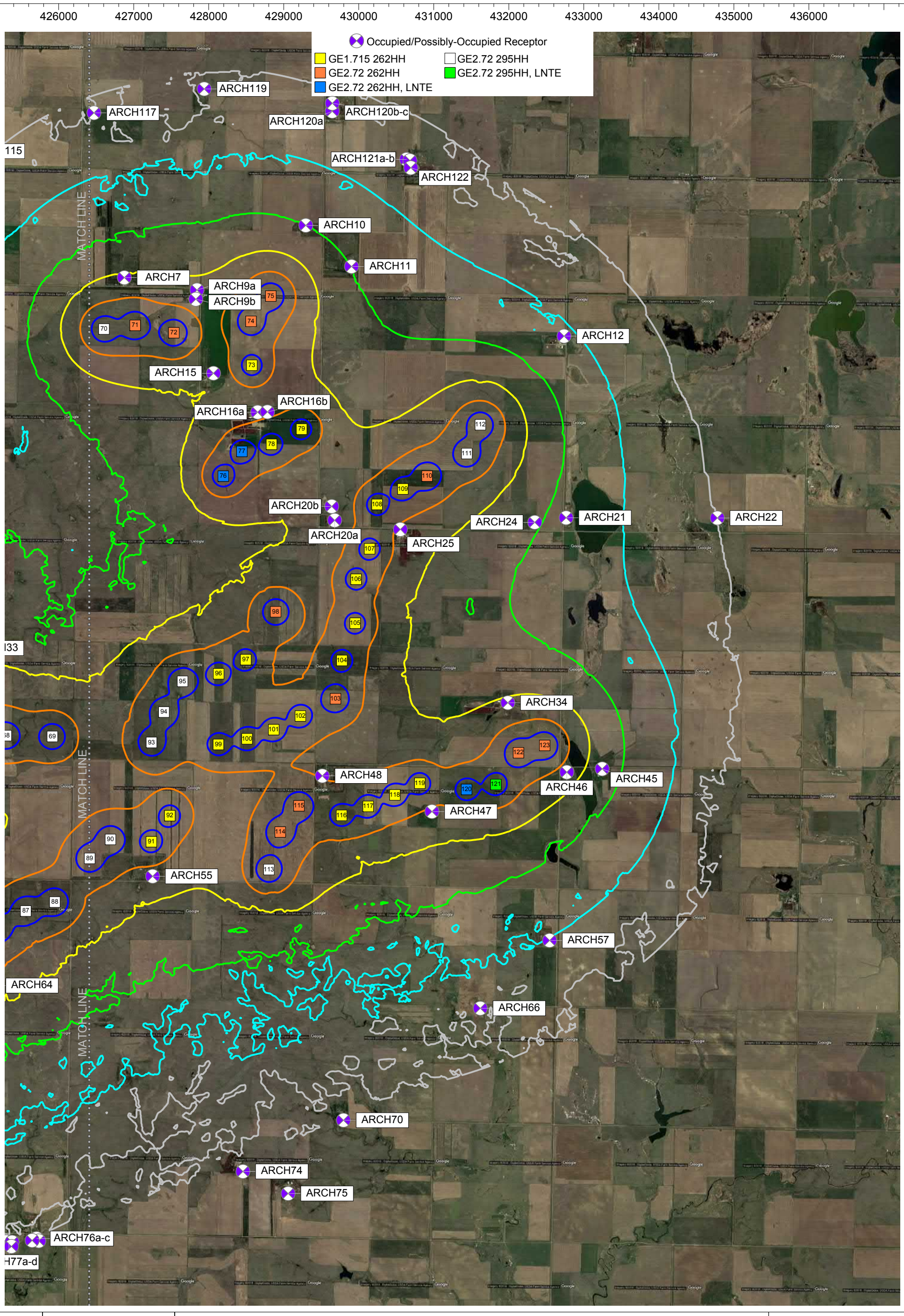
Predicted Project Operation Noise Contours
Emmons-Logan Wind Energy Center
Emmons and Logan Counties, ND

Sound Level Contour Ranges (dBA)

- 30 dBA
- 35 dBA
- 40 dBA
- 45 dBA
- 50 dBA
- 55 dBA



N	Date Created: 03/12/2019	**Attachment 8b - Scenario A** **No Alternates & 12 Low Noise Trailing Edge Turbines** **Wind Turbines at Maximum Rotational Wind Speed**	**Sound Level Contour Ranges (dBA)**
	Created by: CK		30 dBA 35 dBA 40 dBA 45 dBA 50 dBA 55 dBA
AECOM Imagine it. Delivered. Acoustics & Noise Control Practice		**Predicted Project Operation Noise Contours** **Emmons-Logan Wind Energy Center** **Emmons and Logan Counties, ND**	



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Date Created: 03/12/2019

Created by: CK

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Acoustics & Noise Control Practice

Attachment 8c - Scenario A
No Alternates & 12 Low Noise Trailing Edge Turbines
Wind Turbines at Maximum Rotational Wind Speed

Predicted Project Operation Noise Contours
Emmons-Logan Wind Energy Center
Emmons and Logan Counties, ND

Sound Level Contour Ranges (dBA)

- 30 dBA
- 35 dBA
- 40 dBA
- 45 dBA
- 50 dBA
- 55 dBA

Occupied/Possibly-Occupied Receptor

GE1.715 262HH
GE2.72 262HH
GE2.72 262HH, LNTE
GE2.72 295HH
GE2.72 295HH, LNTE

ARCH3
ARCH108
ARCH1a-b
ARCH14
ARCH18
ARCH19
ARCH28
ARCH30a-b
ARCH29
ARCH31
ARCH37
ARCH38
ARCH39
ARCH36a-b
ARCH107
ARCH52
ARCH53
ARCH54
ARCH62
ARCH68
ARCH69
ARCH84
ARCH72
ARCH73
ARCH126
ARCH81

MATCH LINE

Attachment 9a - Scenario B
With Alternates & 12 Low Noise Trailing Edge Turbines
Wind Turbines at Maximum Rotational Wind Speed

Date Created: 03/12/2019

Created by: CK

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Predicted Project Operation Noise Contours
Emmons-Logan Wind Energy Center
Emmons and Logan Counties, ND

Sound Level Contour Ranges (dBA)

30 dBA
35 dBA
40 dBA
45 dBA
50 dBA
55 dBA

Occupied/Possibly-Occupied Receptor

GE1.715 262HH
GE2.72 262HH
GE2.72 262HH, LNTE
GE2.72 295HH
GE2.72 295HH, LNTE

ARCH111a-d
ARCH112
ARCH115
ARCH117
ARCH4a-b
ARCH17
ARCH37
ARCH36a-b
ARCH35
ARCH33
ARCH42
ARCH51
ARCH49b
ARCH49a
ARCH61a
ARCH60
ARCH59
ARCH64
ARCH73
ARCH81
ARCH80
ARCH79c
ARCH79a-b
ARCH123
ARCH76a-c
ARCH77a-d
ARCH83

MATCH LINE

416000 417000 418000 419000 420000 421000 422000 423000 424000 425000 426000 427000

5145000 5144000 5143000 5142000 5141000 5140000 5139000 5138000 5137000 5136000 5135000 5134000 5133000 5132000 5131000 5130000 5129000

N

Date Created: 03/12/2019

Created by: CK

Attachment 9b - Scenario B
With Alternates & 12 Low Noise Trailing Edge Turbines
Wind Turbines at Maximum Rotational Wind Speed

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Acoustics & Noise Control Practice

Predicted Project Operation Noise Contours
Emmons-Logan Wind Energy Center
Emmons and Logan Counties, ND

Sound Level Contour Ranges (dBA)

30 dBA
35 dBA
40 dBA
45 dBA
50 dBA
55 dBA

Occupied/Possibly-Occupied Receptor

GE1.715 262HH
GE2.72 262HH
GE2.72 262HH, LNTE
GE2.72 295HH
GE2.72 295HH, LNTE

426000 427000 428000 429000 430000 431000 432000 433000 434000 435000 436000

5145000 5144000 5143000 5142000 5141000 5140000 5139000 5138000 5137000 5136000 5135000 5134000 5133000 5132000 5131000 5130000 5129000

ARCH119
ARCH117
ARCH120a
ARCH120b-c
115
ARCH121a-b
ARCH122
MATCH LINE
ARCH10
ARCH11
ARCH7
ARCH9a
ARCH9b
70 71 72 75 74 Alt4 73
ARCH12
ARCH15
ARCH16b
ARCH16a
79 Alt6 78 77 76 112 111 110 109 108 107 106 Alt3 98 105 104 103 102 101 100 99 97 96 95 94 93 69
ARCH20b
ARCH20a
ARCH24
ARCH21
ARCH22
ARCH25
I33
ARCH34
ARCH48
ARCH46
ARCH45
122 123 121 120 119 118 117 116 115 114 113 92 91 90 89 88 87
ARCH47
ARCH55
ARCH57
ARCH64
ARCH66
ARCH70
ARCH74
ARCH75
ARCH76a-c
H77a-d

N

Date Created: 03/12/2019

Created by: CK

Attachment 9c - Scenario B
With Alternates & 12 Low Noise Trailing Edge Turbines
Wind Turbines at Maximum Rotational Wind Speed

AECOM Imagine it. Delivered.
Acoustics & Noise Control Practice

Predicted Project Operation Noise Contours
Emmons-Logan Wind Energy Center
Emmons and Logan Counties, ND

Sound Level Contour Ranges (dBA)

30 dBA
35 dBA
40 dBA
45 dBA
50 dBA
55 dBA

Attachment 10. Predicted Shadow Flicker without Alternatives (Scenario A)

Receiver ID	Participating Landowner?	Nearest Turbine ID	Distance to Nearest Turbine (feet)	Receptor Coordinates (UTM Zone 14, NAD 83)		2018 Shadow Flicker Assessment (hours/year)	Updated Shadow Flicker (hours/year) [1]	Change in Shadow Flicker (hours/year)
				Easting (m)	Northing (m)			
ARCH1a	No	5	9659	411748	5142273	0	0	0
ARCH1b	No	5	9829	411681	5142284	0	0	0
ARCH3	No	8	7766	414922	5142811	0	0	0
ARCH4a	No	43	5430	418970	5142363	0	0	0
ARCH4b	No	43	5522	418976	5142395	0	0	0
ARCH7	No	71	2287	426874	5142180	0	0	0
ARCH9a	Yes	72	2274	427858	5142012	20	18	-2
ARCH9b	Yes	72	1900	427845	5141887	21	18	-3
ARCH10	Yes	75	3602	429319	5142869	0	0	0
ARCH11	No	Alt4	3449	429934	5142318	0	0	0
ARCH12	No	112	5482	432773	5141382	0	0	0
ARCH14	Yes	4	8917	410443	5140839	0	0	0
ARCH15	Yes	73	1860	428022	5140842	22	17	-5
ARCH16a	Yes	78	1683	428633	5140382	0	9	9
ARCH16b	Yes	78	1581	428774	5140389	0	16	16
ARCH17	Yes	48	5584	422884	5139836	0	0	0
ARCH18	Yes	1	5925	410039	5139386	0	0	0
ARCH19	No	4	2152	411861	5139343	17	17	0
ARCH20a	**Yes**	**107**	**2064**	**429635**	**5138886**	**48**	**37**	**-11**
ARCH20b	Yes	108	2142	429592	5139083	30	22	-8
ARCH21	No	111	5318	432803	5138909	0	0	0
ARCH22	No	112	11289	434822	5138912	0	0	0
ARCH24	Yes	111	4373	432380	5138841	0	0	0
ARCH25	Yes	108	1634	430597	5138756	29	21	-8
ARCH28	Yes	13	2011	413756	5138574	18	18	0
ARCH29	Yes	1	1545	410988	5138194	27	27	0
ARCH30a	No	1	3225	410075	5138403	12	12	0
ARCH30b	No	1	3291	410068	5138425	11	11	0
ARCH31	Yes	10	2372	412313	5137566	18	18	0
ARCH33	Yes	66	2533	424685	5137154	4	4	0
ARCH34	Yes	122	2385	431973	5136509	0	3	3
ARCH35	**Yes**	**59**	**1722**	**420653**	**5136674**	**30**	**30**	**0**
ARCH36a	No	23	3245	416487	5136666	4	4	0
ARCH36b	No	23	3251	416500	5136699	4	4	0
ARCH37	Yes	24	1883	415694	5137337	4	3	-1

Receiver ID	Participating Landowner?	Nearest Turbine ID	Distance to Nearest Turbine (feet)	Receptor Coordinates (UTM Zone 14, NAD 83)		2018 Shadow Flicker Assessment (hours/year)	Updated Shadow Flicker (hours/year) [1]	Change in Shadow Flicker (hours/year)
				Easting (m)	Northing (m)			
ARCH38	**Yes**	**11**	**1742**	**413943**	**5137194**	**42**	**36**	**-6**
ARCH39	Yes	10	2369	413090	5136520	21	20	-1
ARCH42	Yes	55	2812	421759	5135832	13	13	0
ARCH45	Yes	123	2856	433280	5135553	0	11	11
ARCH46	Yes	123	1667	432802	5135504	5	26	21
ARCH47	**Yes**	**119**	**1496**	**430992**	**5134971**	**40**	**37**	**-3**
ARCH48	**Yes**	**115**	**1804**	**429531**	**5135533**	**39**	**32**	**-7**
ARCH49a	Yes	84	4981	424296	5134528	0	0	0
ARCH49b	Yes	67	5253	424324	5134624	0	0	0
ARCH51	Yes	53	2349	419802	5134912	11	10	-1
ARCH52	Yes	9	2913	411640	5135851	0	0	0
ARCH53	No	29	8432	410166	5134921	0	0	0
ARCH54	Yes	37	1663	414773	5134478	35	28	-7
ARCH55	Yes	91	1663	427252	5134105	9	9	0
ARCH57	Yes	121	7369	432556	5133251	0	0	0
ARCH59	Yes	84	2490	423789	5133578	11	11	0
ARCH60	Yes	82	5413	422205	5133575	0	0	0
ARCH61a	Yes	54	3540	420718	5134080	0	0	0
ARCH62	No	33	3573	411735	5134229	5	5	0
ARCH64	Yes	85	1654	425154	5132657	10	10	0
ARCH66	No	120	9744	431631	5132346	0	0	0
ARCH68	No	33	9495	410162	5132295	0	0	0
ARCH69	No	33	10423	409972	5132060	0	0	0
ARCH70	Yes	113	11585	429825	5130862	0	0	0
ARCH72	Yes	33	10469	412251	5130545	0	0	0
ARCH73	Yes	36	13107	415645	5130338	0	0	0
ARCH74	Yes	113	13383	428480	5130176	0	0	0
ARCH75	Yes	113	14347	429070	5129877	0	0	0
ARCH76a	Yes	80	11791	425726	5129279	0	0	0
ARCH76b	Yes	80	11942	425766	5129255	0	0	0
ARCH76c	Yes	80	11719	425673	5129258	0	0	0
ARCH77a	No	80	11063	425349	5129233	0	0	0
ARCH77b	No	80	10984	425314	5129234	0	0	0
ARCH77c	No	80	11165	425393	5129229	0	0	0
ARCH77d	No	80	11296	425391	5129175	0	0	0
ARCH79a	Yes	80	8054	422894	5129362	0	0	0
ARCH79b	Yes	80	8209	422880	5129316	0	0	0
ARCH79c	Yes	80	7651	422886	5129487	0	0	0

Receiver ID	Participating Landowner?	Nearest Turbine ID	Distance to Nearest Turbine (feet)	Receptor Coordinates (UTM Zone 14, NAD 83)		2018 Shadow Flicker Assessment (hours/year)	Updated Shadow Flicker (hours/year) [1]	Change in Shadow Flicker (hours/year)
				Easting (m)	Northing (m)			
ARCH80	No	Alt5	13783	418813	5129471	0	0	0
ARCH81	No	37	15958	416269	5129655	0	0	0
ARCH83	Yes	80	10820	424451	5128764	0	0	0
ARCH84	No	33	7277	411554	5131800	0	0	0
ARCH107	No	1	11742	407590	5136204	0	0	0
ARCH108	No	5	12064	410981	5142552	0	0	0
ARCH111a	No	44	10656	422531	5143856	0	0	0
ARCH111b	No	44	10614	422512	5143854	0	0	0
ARCH111c	No	44	10640	422510	5143865	0	0	0
ARCH111d	No	44	10761	422528	5143898	0	0	0
ARCH112	No	70	11860	423893	5143839	0	0	0
ARCH115	Yes	70	10174	424647	5143854	0	0	0
ARCH117	Yes	70	9616	426457	5144375	0	0	0
ARCH119	No	75	9665	427937	5144695	0	0	0
ARCH120a	No	75	8668	429651	5144397	0	0	0
ARCH120b	No	75	9003	429656	5144503	0	0	0
ARCH120c	No	75	9167	429659	5144554	0	0	0
ARCH121a	No	75	8579	430675	5143737	0	0	0
ARCH121b	No	75	8652	430715	5143728	0	0	0
ARCH122	No	75	8461	430727	5143631	0	0	0
ARCH123	Yes	80	10056	424917	5129298	0	0	0
ARCH126	Yes	33	12142	412953	5130014	0	0	0

[1] Updated shadow flicker at or over 30 hours per year in bold.

Attachment 11. Predicted Shadow Flicker at Receptors (Scenario A)

Total Shadow Flicker Time (expected)	2018 Shadow Flicker Assessment (number of receptors)	Updated Shadow Flicker (number of receptors)
Total	95	95
= 0 Hours	66	62
> 0 Hours < 10 Hours	7	8
> 10 Hours < 20 Hours	9	15
> 20 Hours < 30 Hours	6	5
> 30 Hours	7	5

Attachment 12. Predicted Shadow Flicker with Alternatives (Scenario B)

Receiver ID	Participating Landowner?	Nearest Turbine ID	Distance to Nearest Turbine (feet)	Receptor Coordinates (UTM Zone 14, NAD 83)		2018 Shadow Flicker Assessment (hours/year)	Updated Shadow Flicker (hours/year) [1]	Change in Shadow Flicker (hours/year)
				Easting (m)	Northing (m)			
ARCH1a	No	5	9659	411748	5142273	0	0	0
ARCH1b	No	5	9829	411681	5142284	0	0	0
ARCH3	No	8	7766	414922	5142811	0	0	0
ARCH4a	No	43	5430	418970	5142363	0	0	0
ARCH4b	No	43	5522	418976	5142395	0	0	0
ARCH7	No	71	2287	426874	5142180	0	0	0
ARCH9a	Yes	72	2274	427858	5142012	20	18	-2
ARCH9b	Yes	72	1900	427845	5141887	21	18	-3
ARCH10	Yes	75	3602	429319	5142869	0	0	0
ARCH11	No	Alt4	3449	429934	5142318	0	0	0
ARCH12	No	112	5482	432773	5141382	0	0	0
ARCH14	Yes	4	8917	410443	5140839	0	0	0
ARCH15	Yes	73	1860	428022	5140842	22	17	-5
ARCH16a	Yes	78	1683	428633	5140382	14	12	-2
ARCH16b	Yes	78	1581	428774	5140389	24	20	-4
ARCH17	Yes	48	5584	422884	5139836	0	0	0
ARCH18	Yes	1	5925	410039	5139386	0	0	0
ARCH19	No	4	2152	411861	5139343	17	17	0
ARCH20a	**Yes**	**107**	**2064**	**429635**	**5138886**	**48**	**37**	**-11**
ARCH20b	Yes	108	2142	429592	5139083	30	22	-8
ARCH21	No	111	5318	432803	5138909	0	0	0
ARCH22	No	112	11289	434822	5138912	0	0	0
ARCH24	Yes	111	4373	432380	5138841	0	0	0
ARCH25	Yes	108	1634	430597	5138756	29	21	-8
ARCH28	Yes	13	2011	413756	5138574	18	18	0
ARCH29	Yes	1	1545	410988	5138194	27	27	0
ARCH30a	No	1	3225	410075	5138403	12	12	0
ARCH30b	No	1	3291	410068	5138425	11	11	0
ARCH31	Yes	10	2372	412313	5137566	18	18	0
ARCH33	Yes	66	2533	424685	5137154	4	4	0
ARCH34	Yes	122	2385	431973	5136509	5	3	-2
ARCH35	**Yes**	**59**	**1722**	**420653**	**5136674**	**30**	**30**	**0**
ARCH36a	No	23	3245	416487	5136666	4	4	0
ARCH36b	No	23	3251	416500	5136699	4	4	0
ARCH37	Yes	24	1883	415694	5137337	4	3	-1

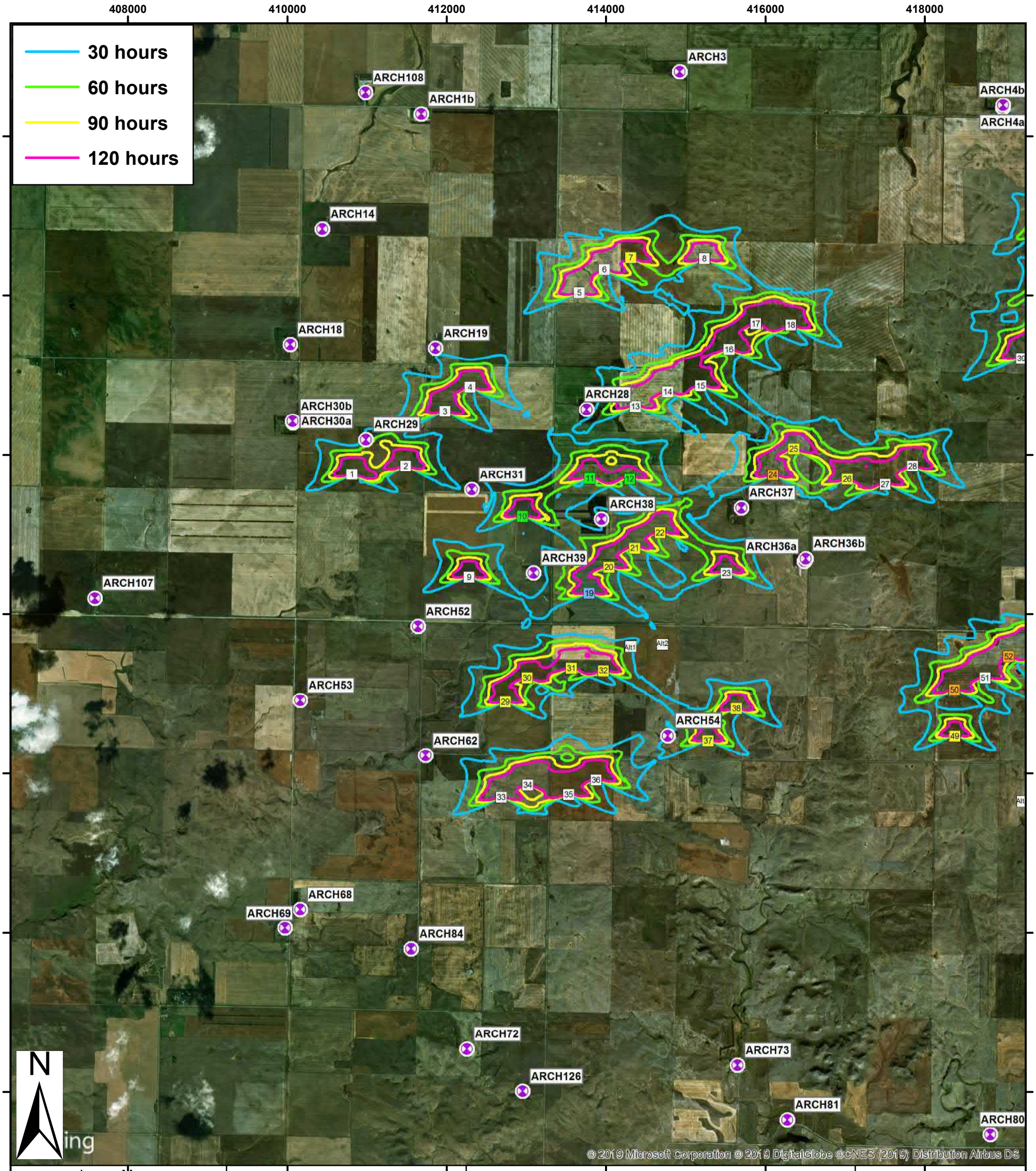
Receiver ID	Participating Landowner?	Nearest Turbine ID	Distance to Nearest Turbine (feet)	Receptor Coordinates (UTM Zone 14, NAD 83)		2018 Shadow Flicker Assessment (hours/year)	Updated Shadow Flicker (hours/year) [1]	Change in Shadow Flicker (hours/year)
				Easting (m)	Northing (m)			
ARCH38	**Yes**	**11**	**1742**	**413943**	**5137194**	**42**	**36**	**-6**
ARCH39	Yes	10	2369	413090	5136520	21	20	-1
ARCH42	Yes	55	2812	421759	5135832	13	13	0
ARCH45	Yes	123	2856	433280	5135553	13	11	-2
ARCH46	Yes	123	1667	432802	5135504	26	26	0
ARCH47	**Yes**	**119**	**1496**	**430992**	**5134971**	**40**	**37**	**-3**
ARCH48	**Yes**	**115**	**1804**	**429531**	**5135533**	**39**	**32**	**-7**
ARCH49a	Yes	84	4981	424296	5134528	0	0	0
ARCH49b	Yes	67	5253	424324	5134624	0	0	0
ARCH51	Yes	53	2349	419802	5134912	11	10	-1
ARCH52	Yes	9	2913	411640	5135851	0	0	0
ARCH53	No	29	8432	410166	5134921	0	0	0
ARCH54	Yes	37	1663	414773	5134478	36	28	-8
ARCH55	Yes	91	1663	427252	5134105	9	9	0
ARCH57	Yes	121	7369	432556	5133251	0	0	0
ARCH59	Yes	84	2490	423789	5133578	11	11	0
ARCH60	Yes	82	5413	422205	5133575	0	0	0
ARCH61a	Yes	54	3540	420718	5134080	0	0	0
ARCH62	No	33	3573	411735	5134229	5	5	0
ARCH64	Yes	85	1654	425154	5132657	10	10	0
ARCH66	No	120	9744	431631	5132346	0	0	0
ARCH68	No	33	9495	410162	5132295	0	0	0
ARCH69	No	33	10423	409972	5132060	0	0	0
ARCH70	Yes	113	11585	429825	5130862	0	0	0
ARCH72	Yes	33	10469	412251	5130545	0	0	0
ARCH73	Yes	36	13107	415645	5130338	0	0	0
ARCH74	Yes	113	13383	428480	5130176	0	0	0
ARCH75	Yes	113	14347	429070	5129877	0	0	0
ARCH76a	Yes	80	11791	425726	5129279	0	0	0
ARCH76b	Yes	80	11942	425766	5129255	0	0	0
ARCH76c	Yes	80	11719	425673	5129258	0	0	0
ARCH77a	No	80	11063	425349	5129233	0	0	0
ARCH77b	No	80	10984	425314	5129234	0	0	0
ARCH77c	No	80	11165	425393	5129229	0	0	0
ARCH77d	No	80	11296	425391	5129175	0	0	0
ARCH79a	Yes	80	8054	422894	5129362	0	0	0
ARCH79b	Yes	80	8209	422880	5129316	0	0	0
ARCH79c	Yes	80	7651	422886	5129487	0	0	0

Receiver ID	Participating Landowner?	Nearest Turbine ID	Distance to Nearest Turbine (feet)	Receptor Coordinates (UTM Zone 14, NAD 83)		2018 Shadow Flicker Assessment (hours/year)	Updated Shadow Flicker (hours/year) [1]	Change in Shadow Flicker (hours/year)
				Easting (m)	Northing (m)			
ARCH80	No	Alt5	13783	418813	5129471	0	0	0
ARCH81	No	37	15958	416269	5129655	0	0	0
ARCH83	Yes	80	10820	424451	5128764	0	0	0
ARCH84	No	33	7277	411554	5131800	0	0	0
ARCH107	No	1	11742	407590	5136204	0	0	0
ARCH108	No	5	12064	410981	5142552	0	0	0
ARCH111a	No	44	10656	422531	5143856	0	0	0
ARCH111b	No	44	10614	422512	5143854	0	0	0
ARCH111c	No	44	10640	422510	5143865	0	0	0
ARCH111d	No	44	10761	422528	5143898	0	0	0
ARCH112	No	70	11860	423893	5143839	0	0	0
ARCH115	Yes	70	10174	424647	5143854	0	0	0
ARCH117	Yes	70	9616	426457	5144375	0	0	0
ARCH119	No	75	9665	427937	5144695	0	0	0
ARCH120a	No	75	8668	429651	5144397	0	0	0
ARCH120b	No	75	9003	429656	5144503	0	0	0
ARCH120c	No	75	9167	429659	5144554	0	0	0
ARCH121a	No	75	8579	430675	5143737	0	0	0
ARCH121b	No	75	8652	430715	5143728	0	0	0
ARCH122	No	75	8461	430727	5143631	0	0	0
ARCH123	Yes	80	10056	424917	5129298	0	0	0
ARCH126	Yes	33	12142	412953	5130014	0	0	0

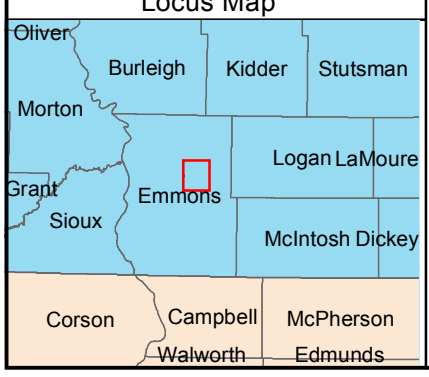
[1] Updated shadow flicker at or over 30 hours per year in bold.

Attachment 13. Predicted Shadow Flicker at Receptors (Scenario B)

Total Shadow Flicker Time (expected)	2018 Shadow Flicker Assessment (number of receptors)	Updated Shadow Flicker (number of receptors)
Total	95	95
= 0 Hours	62	62
> 0 Hours < 10 Hours	7	7
> 10 Hours < 20 Hours	11	14
> 20 Hours < 30 Hours	8	7
> 30 Hours	7	5



Locus Map



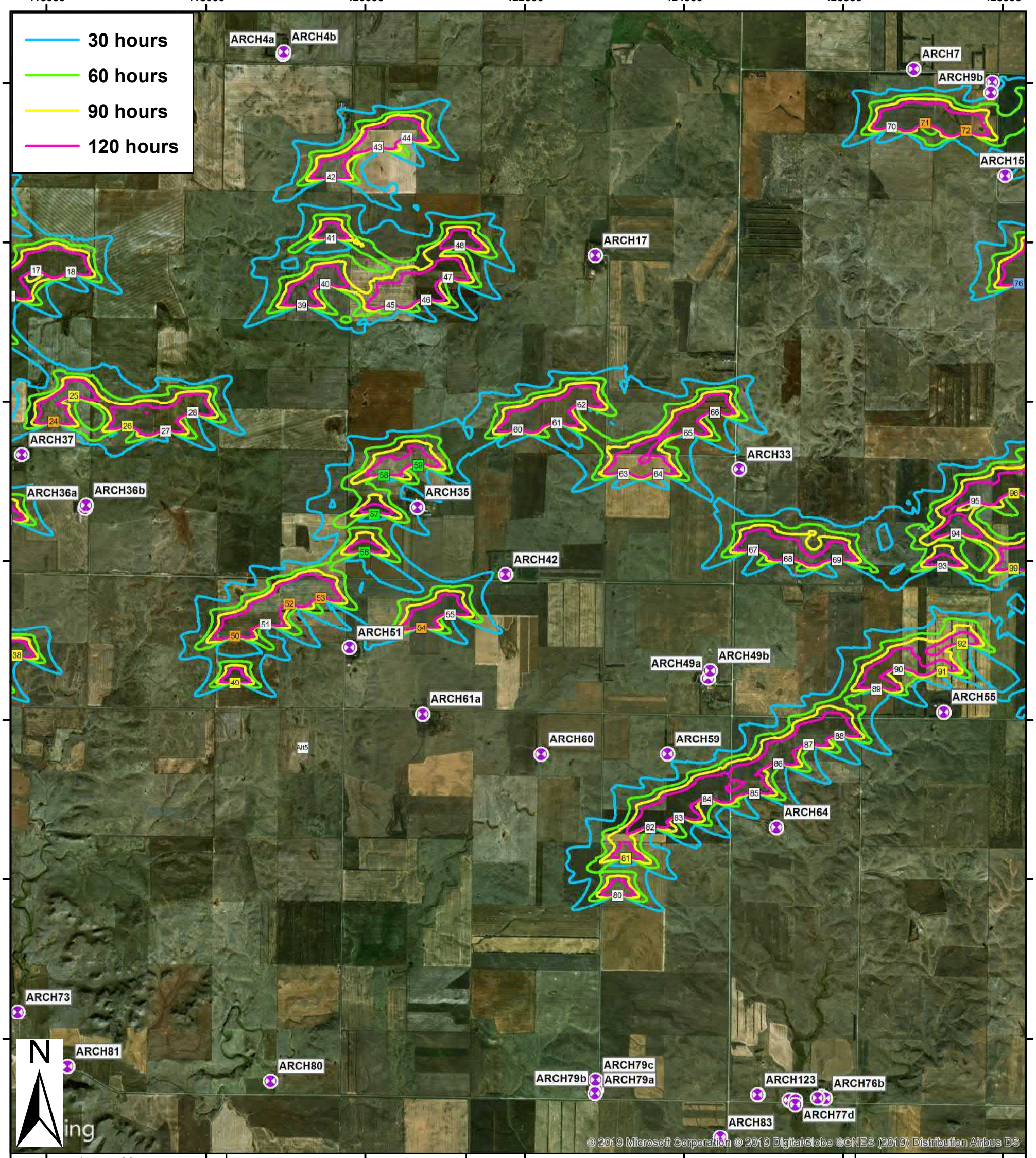
- GE1.715 338RD 262HH
- GE2.72 381RD 262HH
- GE2.72 381RD 262HH, LNTE
- GE2.72 381RD 295HH
- GE2.72 381RD 295HH, LNTE
- Occupied / Possibly Occupied Receptor

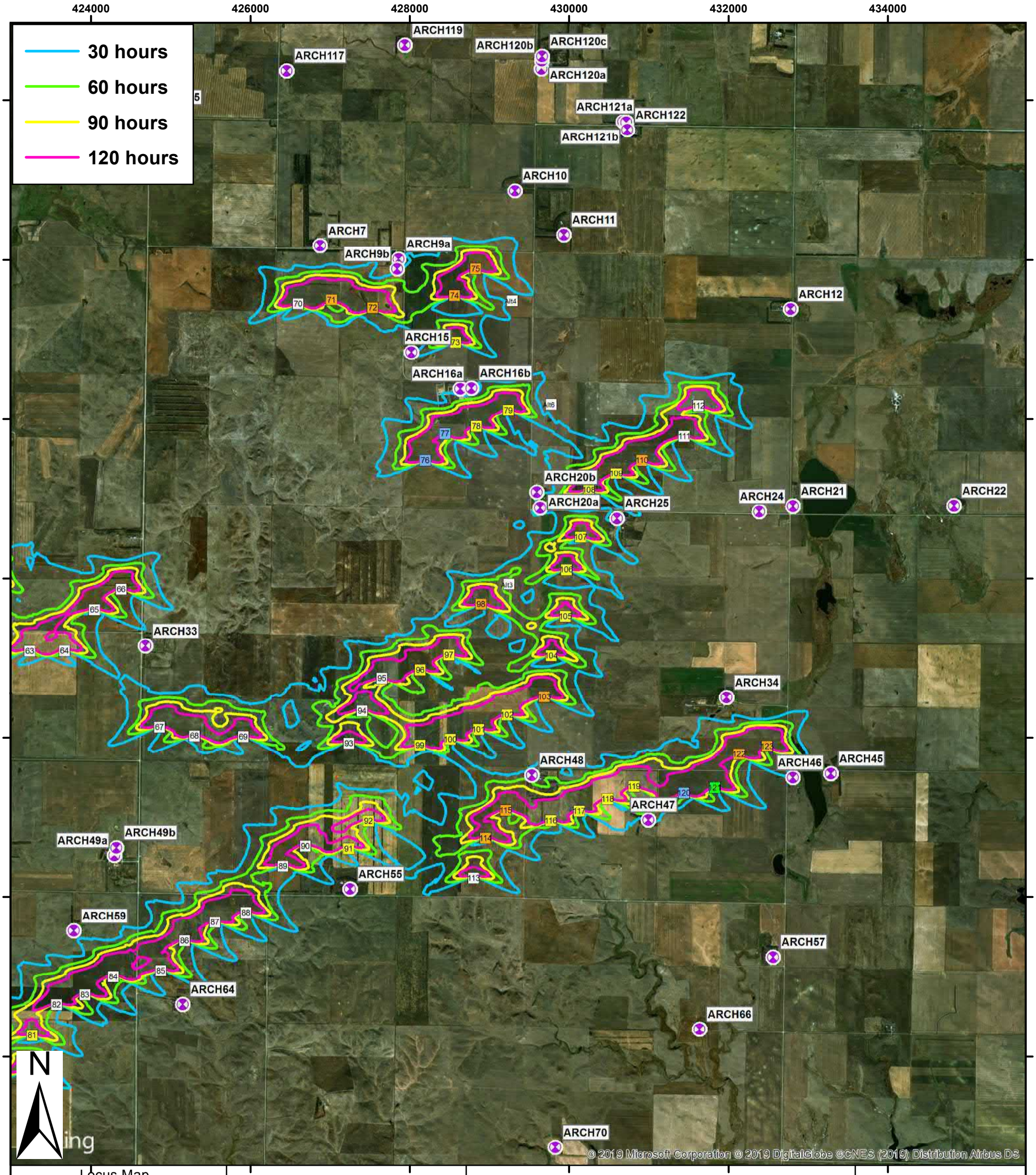
Emmons-Logan Wind Energy Center
Emmons and Logan Counties, ND

Attachment 14a - Scenario A Predicted Shadow Flicker without Alternatives Map

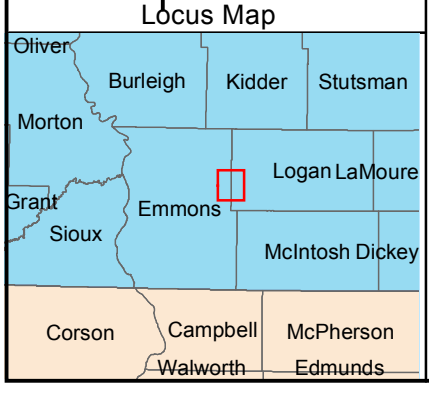
AECOM

Scale 0 0.5 1 2 3 4 Kilometers


30 hours
60 hours
90 hours
120 hours
416000
418000
420000
422000
424000
426000
428000
5142000
5140000
5138000
5136000
5134000
5132000
5130000
ARCH4a
ARCH4b
ARCH7
ARCH9b
ARCH15
ARCH17
ARCH37
ARCH36a
ARCH36b
ARCH35
ARCH33
ARCH42
ARCH51
ARCH49a
ARCH49b
ARCH55
ARCH61a
ARCH60
ARCH59
ARCH64
ARCH73
ARCH81
ARCH80
ARCH79c
ARCH79b
ARCH79a
ARCH123
ARCH76b
ARCH77d
ARCH83
N
© 2019 Microsoft Corporation © 2019 DigitalGlobe ©CNES (2019) Distribution Airbus DS
Locus Map
Oliver
Burleigh
Kidder
Stutsman
Morton
Logan
LaMoure
Grant
Emmons
Sioux
McIntosh
Dickey
Corson
Campbell
McPherson
Walworth
Edmunds
GE1.715 338RD 262HH
GE2.72 381RD 262HH
GE2.72 381RD 262HH, LNTE
GE2.72 381RD 295HH
GE2.72 381RD 295HH, LNTE
Occupied / Possibly Occupied Receptor
Emmons-Logan Wind Energy Center
Emmons and Logan Counties, ND
Attachment 14b - Scenario A
Predicted Shadow Flicker
without Alternatives Map
AECOM
Scale 0 0.5 1 2 3 4
Kilometers



Locus Map



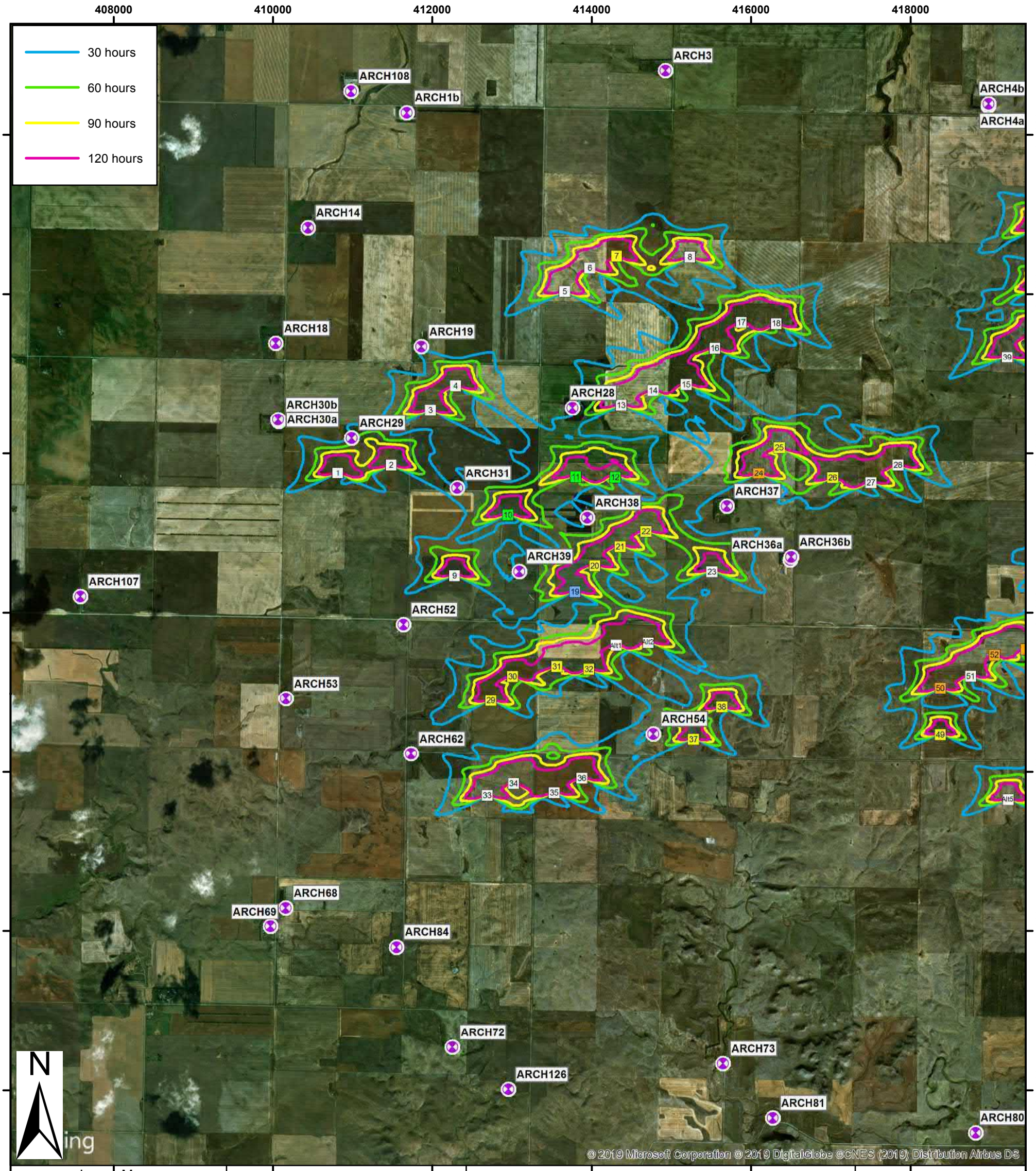
- GE1.715 338RD 262HH
- GE2.72 381RD 262HH
- GE2.72 381RD 262HH, LNTE
- GE2.72 381RD 295HH
- GE2.72 381RD 295HH, LNTE
- Occupied / Possibly Occupied Receptor

Emmons-Logan Wind Energy Center
Emmons and Logan Counties, ND

Attachment 14c - Scenario A Predicted Shadow Flicker without Alternatives Map

AECOM

Scale 0 0.5 1 2 3 4 Kilometers


408000
410000
412000
414000
416000
418000
5142000
5140000
5138000
5136000
5134000
5132000
5130000
30 hours
60 hours
90 hours
120 hours
ARCH3
ARCH108
ARCH1b
ARCH4b
ARCH4a
ARCH14
ARCH18
ARCH19
ARCH28
ARCH30b
ARCH30a
ARCH29
ARCH31
ARCH37
ARCH38
ARCH36a
ARCH36b
ARCH39
ARCH107
ARCH52
ARCH53
ARCH54
ARCH62
ARCH68
ARCH69
ARCH84
ARCH72
ARCH73
ARCH126
ARCH81
ARCH80
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Alt1
Alt2
Alt5
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Locus Map
Oliver
Burleigh
Kidder
Stutsman
Morton
Logan
LaMoure
Grant
Emmons
Sioux
McIntosh
Dickey
Corson
Campbell
McPherson
Walworth
Edmunds
GE1.715 338RD 262HH
GE2.72 381RD 262HH
GE2.72 381RD 262HH, LNTE
GE2.72 381RD 295HH
GE2.72 381RD 295HH, LNTE
Occupied / Possibly Occupied Receptor
Emmons-Logan Wind Energy Center
Emmons and Logan Counties, ND
Attachment 15a - Scenario B
Predicted Shadow Flicker
with Alternatives Map
AECOM
Scale 0 0.5 1 2 3 4
Kilometers

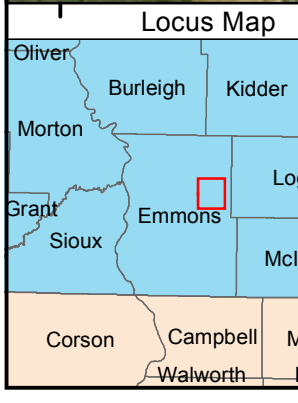
414000 416000 418000 420000 422000 424000 426000

5144000 5142000 5140000 5138000 5136000 5134000 5132000

30 hours
60 hours
90 hours
120 hours

ARCH111c ARCH111d ARCH111a ARCH111b ARCH112 ARCH115
ARCH4a ARCH4b
ARCH17
ARCH28 ARCH37 ARCH38 ARCH36a ARCH36b ARCH35 ARCH33
ARCH42
ARCH51
ARCH54
ARCH49a ARCH49b
ARCH61a
ARCH60 ARCH59 ARCH64
ARCH73

N



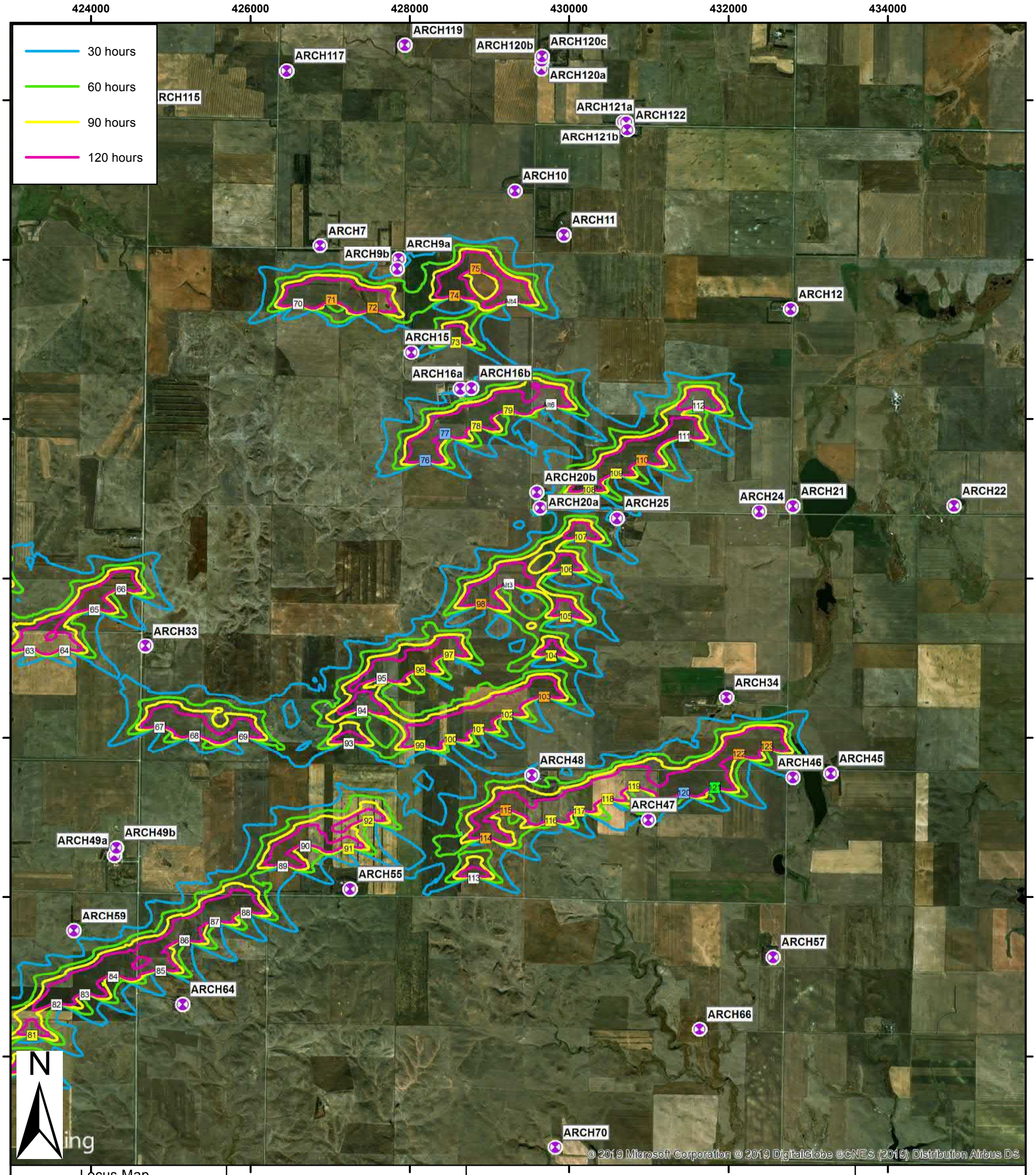
GE1.715 338RD 262HH
GE2.72 381RD 262HH
GE2.72 381RD 262HH, LNTE
GE2.72 381RD 295HH
GE2.72 381RD 295HH, LNTE
Occupied / Possibly Occupied Receptor

Emmons-Logan Wind Energy Center
Emmons and Logan Counties, ND

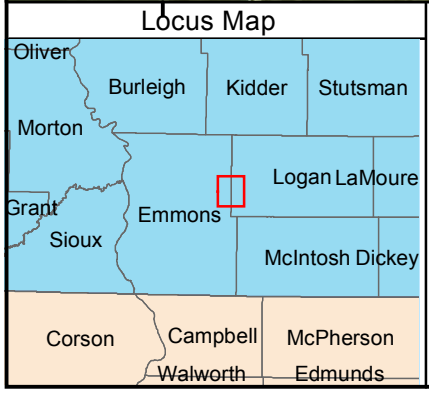
Attachment 15b - Scenario B
Predicted Shadow Flicker with Alternatives Map

AECOM

Scale 0 0.5 1 2 3 4 Kilometers



Locus Map



- GE1.715 338RD 262HH
- GE2.72 381RD 262HH
- GE2.72 381RD 262HH, LNTE
- GE2.72 381RD 295HH
- GE2.72 381RD 295HH, LNTE
- Occupied / Possibly Occupied Receptor

Emmons-Logan Wind Energy Center
Emmons and Logan Counties, ND

Attachment 15c - Scenario B
Predicted Shadow Flicker with Alternatives Map

AECOM

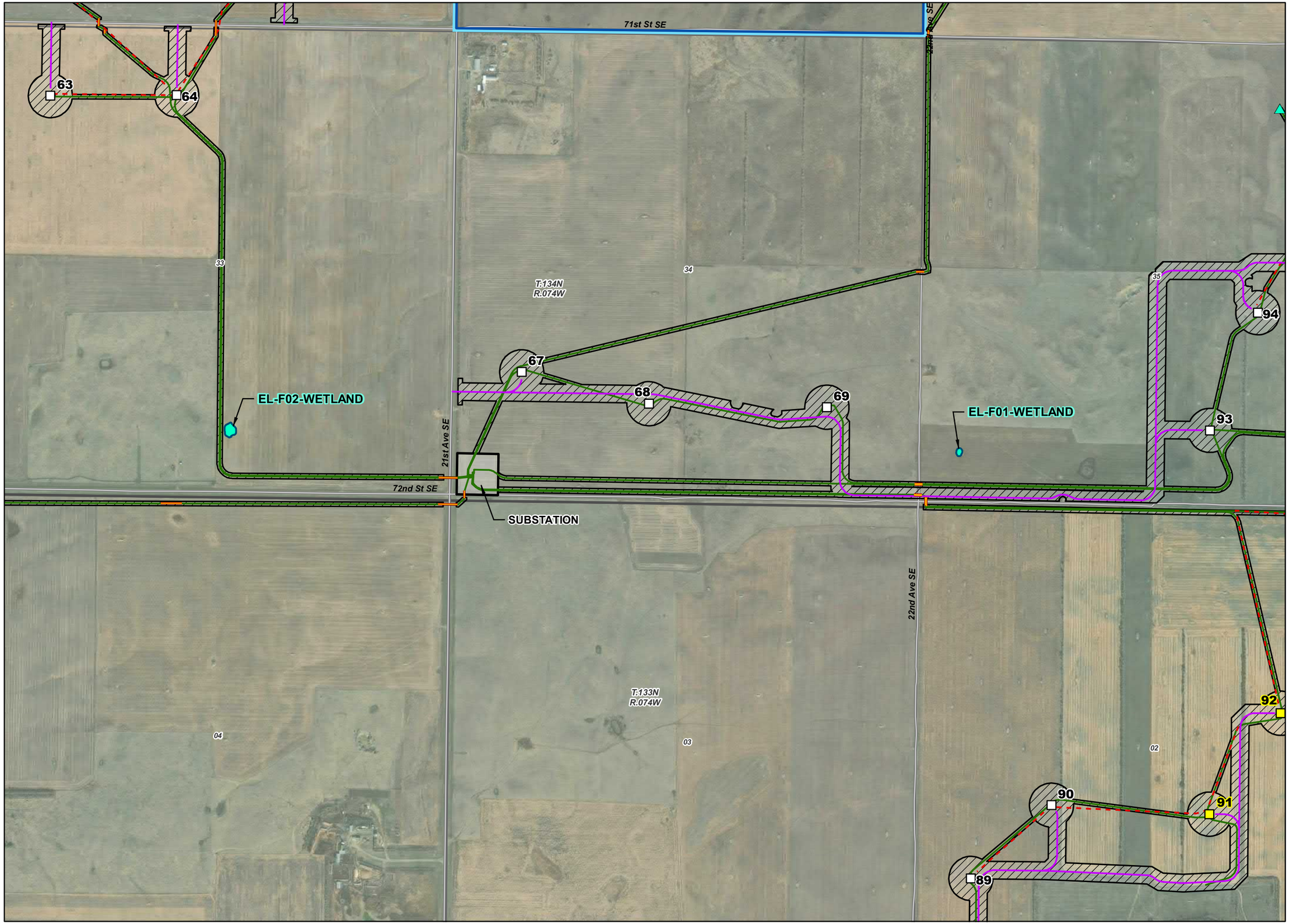
Scale 0 0.5 1 2 3 4 Kilometers

Attachment 16

GIS ShapeFiles

EMMONS-LOGAN WIND ENERGY CENTER

EMMONS AND LOGAN COUNTIES, ND



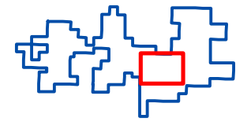
LEGEND

- PLSS Township
- PLSS Section
- Existing Road
- Delineated Wetland

Project Features

Turbines

- GE1.715 262HH
- GE2.72 295HH
- Met Tower
- Service Road
- Collection Line
- Collection Line Bore Location
- Crane Path
- Construction Easement
- Emmons-Logan Wind Energy Center Project Area
- Substation



Map Extent Shown in Red.

0 500 1,000

Feet

Attachment 17

Delineated Wetlands Overview Map

AECOM