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Subject **Sound Level Analysis for the Rugby Repower Wind Project**

Attention Manuela Elizondo/Avangrid Renewables, LLC

From Mark Bastasch, P.E. (OR), INCE Bd. Cert./Jacobs Engineering Group Inc.

Date November 21, 2023

Rugby Wind, LLC (Rugby Wind), a wholly owned subsidiary of Avangrid Renewables, LLC, operates the Rugby wind farm (Facility) in Pierce County, North Dakota. The Facility began commercial operations in 2009 and has a nameplate capacity of 149.1 megawatts (MW). Facility components include 71 Suzlon S88 wind turbines with a capacity of 2.1 MW each, access roads, buried and overhead electrical collection lines, an electrical substation, an operations and maintenance building, a meteorological tower, and an aircraft detection lighting system. Additionally, a 9.5-mile-long, 230-kilovolt transmission line runs from the Rugby Wind Farm Substation to the existing Rugby Substation.

Rugby Wind proposes to retrofit the Facility for the purpose of improving wind turbine efficiency, increasing energy output, and prolonging the useful life of the wind farm. The retrofitting process is known as “repowering.” The repower scope includes replacing the turbine nacelles and its interior elements, replacing the rotor (hub and blades) and increasing the rotor diameter up to 120 meters, refurbishing generators from 2.1 MW to 2.2 MW, and reinforcing turbine foundations and associated collector lines, as needed. Rugby Wind proposes no changes to turbine locations, hub height, point of interconnection output capacity, or other existing components such as the generation-tie line and collector substation, at this time. Temporary ground disturbance is primarily limited to existing facilities such as turbine pads, electrical collection line easements, access roads, and a laydown yard.

1. Summary of Proposed Repower and Sound Level Analysis Results

Rugby Wind proposes to repower up to all 71, 2.1-MW, Suzlon S88 turbines with 2.1-MW to 2.2-MW turbines. The nameplate capacity would increase from 149.1 MW to 156.2 MW. This technical memorandum provides a sound level analysis for the repowered Facility. The turbine type considered in this analysis was Vestas V120 with Serrated Trailing Edge (STE) blades. Figure 1 (attached) shows the Facility’s predicted sound pressure levels based on the analysis of the turbine type described in this memorandum, as well as the residences identified by Rugby Wind. Predicted sound levels do not exceed 50 dBA at the nearest residences. The predicted sound level of 45 dBA is exceeded within 100 feet of six participating and three nonparticipating occupied residences. Rugby Wind anticipates obtaining waivers or operating turbines at a lower electrical and sound output mode in order to reduce the sound level to less than 45 dBA within 100 feet of occupied residences. Thus, the Facility will be in compliance with the noise standards adopted by the Pierce County Board of County Commissioners and the North Dakota Public Service Commission (ND PSC), respectively.

2. Regulatory Requirements

Pierce County granted a conditional use permit (CUP, 2005-001 – Rugby Wind Farm) to Rugby Wind on July 12, 2005, and an updated CUP on September 3, 2008, prior to construction. Pierce County's Zoning Ordinance Article 2 Section 10(3) states that "*Noise shall be limited to a maximum level of 50 dBA at the nearest property line.*" The Facility's CUP granted an exception allowing the 50 dBA threshold to be assessed at the residence rather than the property line. The County confirmed no additional zoning permits are required for these repowering efforts.

Rugby received a Certificate of Site Compatibility (Certificate) from ND PSC on October 3, 2005, in Case No. PU-05-47. The Certificate was reissued on August 27, 2008, and the final layout was approved by ND PSC on May 22, 2009. Rugby Wind began operations in December 2009. In 2019, ND PSC established a new sound criterion of 45 dBA within 100 feet of an inhabited residence or a community building unless the owner has signed a waiver [ND PSC Chapter 69-06-08-01(4) Energy Conversion Facility Siting Criteria (PU-19-290)]. Rugby Wind anticipates complying with this requirement by obtaining the necessary waivers or operating turbines at a lower electrical and sound output mode.

3. Acoustical Modeling Method and Results

Standard acoustical engineering methods were used in the analysis to document the predicted sound level at existing nonparticipating residences as well as participating residences. The sound power levels representing the standard performance of the wind turbines are assigned based on International Electrotechnical Commission (IEC) Standard 61400-11 (IEC 2012) data supplied by the manufacturers to Rugby Wind. The stated maximum turbine sound power level for the Vestas V120 STE is 107.6 decibels on an A-weighted scale (dBA). The substation transformer specifications are expected to require a National Electrical Manufacturers Association sound rating of 74 dBA, resulting in a sound power level of 94 dBA. Using these sound power levels as a basis, the model calculates the sound pressure level that would occur after losses from distance, air absorption, ground effects, and screening are considered.

It is useful to understand the difference between a sound pressure level (or noise level) and a sound power level. A sound power level (commonly abbreviated as PWL or L_w) is analogous to the wattage of a light bulb; it is a measure of the acoustical energy emitted by the source and is, therefore, independent of distance. A sound pressure level (commonly abbreviated as SPL or L_p) is analogous to the brightness or intensity of light experienced at a specific distance from a source and is measured directly with a sound level meter. Sound pressure levels always should be specified with a location or distance from the noise source.

Sound power level data are used in acoustic models to predict sound pressure levels. This is because sound power levels consider the size of the acoustical source and account for the total acoustical energy emitted by the source. For example, the sound pressure level 15 feet from a small radio and a large orchestra may be the same, but the sound power level of the orchestra will be much larger because it emits sound over a larger area. Similarly, 2-horsepower (hp) and 2,000-hp pumps can both achieve 85 dBA at 3 feet (a common specification), but the 2,000-hp pump will have significantly larger sound power level. Consequently, the sound from the 2,000-hp pump will travel farther. A sound power level can be determined from a sound pressure level if the distance from and dimensions of the source are known, and this is accounted for in the IEC 61400-11 standard for wind turbines. Sound power levels always will be greater than sound pressure levels and sound power levels should never be compared to sound pressure levels. The sound power level of commercially available modern wind turbines typically will vary between 100 and 110 dBA depending on make, model, and windspeed. This will result in a sound pressure

level of about 55 to 65 dBA at 130 feet from the turbine. These levels are well below the sound pressure level where hearing protection is considered (85 dBA).

The commercial software used to prepare the acoustical model is CadnaA by DataKustik GmbH, Version 2023 (DataKustik 2023). The sound propagation factors used in the acoustical model have been adopted from International Organization for Standardization 9613-2 (ISO 9613-2), *Acoustics—Sound Attenuation During Propagation Outdoors Part 2: General Method of Calculation* (ISO 1996). The ISO 9613-2 parameters used in this assessment are a receptor height of 4 meters and mixed ground ($G = 0.5$, where G may vary between 0 for acoustically hard or reflective surface and 1 for acoustically absorptive surface), with all turbines operating at their stated sound power level plus 2 dBA. These modeling parameters are consistent with the parameters established in the 2022 ACP/ANSI standard on modeling of wind turbines (ANSI 2022). Multiple bodies of water of varying sizes are situated within the Facility area. These waterbodies were imported into the acoustical model based on features characterized as lakes, ponds, marshes, or swamps in the NHDPlus High Resolution geospatial dataset (USGS 2023). Each waterbody was modeled as a fully reflective ground coefficient ($G = 0$). Sound contours were developed based on a 5-foot grid spacing incorporating the waterbodies as depicted on Figure 1.

The turbines were evaluated with the sound emitted at hub height (79 meters). Atmospheric absorption for conditions of 10 degrees Celsius and 70 percent relative humidity (conditions that favor propagation) was computed in accordance with ISO 9613-1, *Acoustics—Sound Attenuation During Propagation Outdoors, Part 1: Calculation of the Absorption of Sound by the Atmosphere* (ISO 1993). Coordinates of the sound sources and occupied residences (“receiver locations”) included in this assessment have been provided by Rugby Wind. Sound sources and modeled sound power levels for each scenario are included in Table 1. Receiver locations and resulting sound pressure levels are presented in Table 2.

Table 1. Modeled Sound Sources

| Source ID | Sound Power Level (dBA) | Height (m) | Coordinates | |
|-----------|-------------------------|------------|-------------|---------|
| | | | X (m) | Y (m) |
| A2 | 109.6 | 79 | 423645 | 5377150 |
| A3 | 109.6 | 79 | 423910 | 5377216 |
| A4 | 109.6 | 79 | 424329 | 5377057 |
| A5 | 109.6 | 79 | 424563 | 5377190 |
| A6 | 109.6 | 79 | 424994 | 5377084 |
| A7 | 109.6 | 79 | 425433 | 5376948 |
| A8 | 109.6 | 79 | 428471 | 5376484 |
| B1 | 109.6 | 79 | 429034 | 5375884 |
| B2 | 109.6 | 79 | 429252 | 5376109 |
| B3 | 109.6 | 79 | 429657 | 5376158 |
| B4 | 109.6 | 79 | 430024 | 5376181 |
| B5 | 109.6 | 79 | 428972 | 5375500 |
| C1 | 109.6 | 79 | 430982 | 5375718 |
| C2 | 109.6 | 79 | 431276 | 5375873 |
| C3 | 109.6 | 79 | 431719 | 5375959 |

Sound Level Analysis for the Rugby Repower Wind Project

Table 1. Modeled Sound Sources

| Source ID | Sound Power Level (dBA) | Height (m) | Coordinates | |
|-----------|-------------------------|------------|-------------|---------|
| | | | X (m) | Y (m) |
| C4 | 109.6 | 79 | 432176 | 5376028 |
| D1 | 109.6 | 79 | 430523 | 5374844 |
| D2 | 109.6 | 79 | 430868 | 5374838 |
| D3 | 109.6 | 79 | 431193 | 5374935 |
| D4 | 109.6 | 79 | 431651 | 5374996 |
| E1 | 109.6 | 79 | 423615 | 5374761 |
| E2 | 109.6 | 79 | 424058 | 5374768 |
| E3 | 109.6 | 79 | 424073 | 5375125 |
| E4 | 109.6 | 79 | 424515 | 5375069 |
| E5 | 109.6 | 79 | 424767 | 5375181 |
| F1 | 109.6 | 79 | 424713 | 5373432 |
| F2 | 109.6 | 79 | 424924 | 5373593 |
| F3 | 109.6 | 79 | 425466 | 5373611 |
| G1 | 109.6 | 79 | 424768 | 5372777 |
| G2 | 109.6 | 79 | 425429 | 5372749 |
| G3 | 109.6 | 79 | 425948 | 5372738 |
| G4 | 109.6 | 79 | 426825 | 5372766 |
| G5 | 109.6 | 79 | 427051 | 5372908 |
| G6 | 109.6 | 79 | 427269 | 5373064 |
| G7 | 109.6 | 79 | 427500 | 5373255 |
| H1 | 109.6 | 79 | 430182 | 5373530 |
| H2 | 109.6 | 79 | 430534 | 5373608 |
| J1 | 109.6 | 79 | 431677 | 5372648 |
| J2 | 109.6 | 79 | 431461 | 5372487 |
| J3 | 109.6 | 79 | 431248 | 5372322 |
| J4 | 109.6 | 79 | 430933 | 5372293 |
| K1 | 109.6 | 79 | 432407 | 5372990 |
| K2 | 109.6 | 79 | 432573 | 5372467 |
| K3 | 109.6 | 79 | 432405 | 5372219 |
| L1 | 109.6 | 79 | 432619 | 5373627 |
| L2 | 109.6 | 79 | 432303 | 5374200 |
| L3 | 109.6 | 79 | 432879 | 5374220 |
| M1 | 109.6 | 79 | 433259 | 5372899 |

Table 1. Modeled Sound Sources

| Source ID | Sound Power Level (dBA) | Height (m) | Coordinates | |
|-------------|-------------------------|------------|-------------|---------|
| | | | X (m) | Y (m) |
| M2 | 109.6 | 79 | 433420 | 5373184 |
| M3 | 109.6 | 79 | 433938 | 5372625 |
| M4 | 109.6 | 79 | 434180 | 5372914 |
| M5 | 109.6 | 79 | 434328 | 5373194 |
| M6 | 109.6 | 79 | 434338 | 5373764 |
| M7 | 109.6 | 79 | 434340 | 5374150 |
| N1 | 109.6 | 79 | 430250 | 5370380 |
| N2 | 109.6 | 79 | 430508 | 5370416 |
| P1 | 109.6 | 79 | 432162 | 5369802 |
| P2 | 109.6 | 79 | 432452 | 5369979 |
| Q1 | 109.6 | 79 | 428730 | 5369235 |
| Q2 | 109.6 | 79 | 428859 | 5369569 |
| Q3 | 109.6 | 79 | 429136 | 5369642 |
| Q4 | 109.6 | 79 | 429595 | 5369621 |
| R1 | 109.6 | 79 | 431880 | 5368792 |
| R2 | 109.6 | 79 | 432142 | 5368856 |
| R3 | 109.6 | 79 | 432383 | 5369032 |
| R4 | 109.6 | 79 | 432614 | 5369180 |
| S1 | 109.6 | 79 | 432931 | 5367819 |
| S2 | 109.6 | 79 | 433135 | 5368068 |
| S3 | 109.6 | 79 | 434029 | 5368017 |
| S4 | 109.6 | 79 | 434142 | 5367203 |
| S5 | 109.6 | 79 | 433994 | 5366981 |
| Transformer | 94 | 4 | 428582 | 5370839 |

Notes:

dBA = decibel (A-weighted scale)

ID = identifier

m = meter(s)

Sound Level Analysis for the Rugby Repower Wind Project

Table 2. Modeled Receiver Locations and Sound Pressure Levels

| Receiver Status | Receiver ID | Coordinates | | Sound Pressure Level (dBA) | Distance to 45 dBA Contour (ft) |
|------------------|-------------|-------------|---------|----------------------------|---------------------------------|
| | | X (m) | Y (m) | | |
| Participating | REC10 | 427444 | 5372591 | 49 | Within 100 ft of 45 dBA |
| Nonparticipating | REC13 | 429213 | 5370074 | 49 | Within 100 ft of 45 dBA |
| Participating | REC18 | 432920 | 5367309 | 47 | Within 100 ft of 45 dBA |
| Nonparticipating | REC04 | 425106 | 5377692 | 47 | Within 100 ft of 45 dBA |
| Participating | REC19 | 433357 | 5367173 | 47 | Within 100 ft of 45 dBA |
| Participating | REC34 | 423800 | 5375837 | 46 | Within 100 ft of 45 dBA |
| Participating | REC14 | 431323 | 5368466 | 45 | Within 100 ft of 45 dBA |
| Participating | REC33 | 423661 | 5376293 | 45 | Within 100 ft of 45 dBA |
| Nonparticipating | REC39 | 423186 | 5375339 | 45 | Within 100 ft of 45 dBA |
| Nonparticipating | REC15 | 432989 | 5371214 | 44 | 345 |
| Participating | REC07 | 425672 | 5375293 | 44 | 630 |
| Participating | REC08 | 433360 | 5375223 | 43 | >1,000 |
| Participating | REC35 | 423578 | 5373574 | 43 | >1,000 |
| Participating | REC44 | 426194 | 5376303 | 42 | >1,000 |
| Nonparticipating | REC12 | 426634 | 5371313 | 40 | >1,000 |
| Nonparticipating | REC06 | 428370 | 5377614 | 40 | >1,000 |
| Nonparticipating | REC59 | 422487 | 5375868 | 39 | >1,000 |
| Participating | REC23 | 435372 | 5374993 | 39 | >1,000 |
| Participating | REC11 | 425699 | 5370908 | 38 | >1,000 |
| Participating | REC20 | 433138 | 5365907 | 38 | >1,000 |
| Nonparticipating | REC38 | 423222 | 5372146 | 38 | >1,000 |
| Nonparticipating | REC58 | 422113 | 5375952 | 38 | >1,000 |
| Nonparticipating | REC30 | 434641 | 5365645 | 37 | >1,000 |
| Nonparticipating | REC16 | 431215 | 5366507 | 37 | >1,000 |
| Nonparticipating | REC57 | 421887 | 5374243 | 37 | >1,000 |
| Nonparticipating | REC25 | 436397 | 5372533 | 36 | >1,000 |
| Nonparticipating | REC55 | 422545 | 5372689 | 36 | >1,000 |
| Participating | REC60 | 429848 | 5366794 | 35 | >1,000 |
| Nonparticipating | REC36 | 423463 | 5371000 | 35 | >1,000 |
| Participating | REC27 | 436154 | 5368809 | 35 | >1,000 |
| Nonparticipating | REC56 | 421745 | 5373378 | 35 | >1,000 |
| Nonparticipating | REC05 | 427876 | 5379003 | 35 | >1,000 |
| Participating | REC17 | 426580 | 5368203 | 34 | >1,000 |

Table 2. Modeled Receiver Locations and Sound Pressure Levels

| Receiver Status | Receiver ID | Coordinates | | Sound Pressure Level (dBA) | Distance to 45 dBA Contour (ft) |
|------------------|-------------|-------------|---------|----------------------------|---------------------------------|
| | | X (m) | Y (m) | | |
| Nonparticipating | REC37 | 424736 | 5369835 | 34 | >1,000 |
| Nonparticipating | REC63 | 437098 | 5372305 | 34 | >1,000 |
| Nonparticipating | REC03 | 425070 | 5379856 | 34 | >1,000 |
| Nonparticipating | REC47 | 422614 | 5371019 | 33 | >1,000 |
| Nonparticipating | REC28 | 436117 | 5365894 | 33 | >1,000 |
| Nonparticipating | REC02 | 425012 | 5380574 | 32 | >1,000 |
| Nonparticipating | REC01 | 423459 | 5380440 | 31 | >1,000 |
| Nonparticipating | REC48 | 421813 | 5370887 | 31 | >1,000 |
| Nonparticipating | REC52 | 437832 | 5375630 | 31 | >1,000 |
| Nonparticipating | REC50 | 432868 | 5363892 | 31 | >1,000 |
| Nonparticipating | REC22 | 428923 | 5364470 | 29 | >1,000 |
| Nonparticipating | REC62 | 434301 | 5363345 | 29 | >1,000 |
| Nonparticipating | REC49 | 421929 | 5369060 | 29 | >1,000 |
| Nonparticipating | REC61 | 429637 | 5363884 | 29 | >1,000 |
| Nonparticipating | REC31 | 436215 | 5363795 | 28 | >1,000 |
| Nonparticipating | REC51 | 437078 | 5364423 | 28 | >1,000 |
| Nonparticipating | REC29 | 437713 | 5365035 | 28 | >1,000 |
| Nonparticipating | REC41 | 424801 | 5366011 | 28 | >1,000 |
| Nonparticipating | REC32 | 433061 | 5362491 | 27 | >1,000 |
| Nonparticipating | REC40 | 422998 | 5367053 | 27 | >1,000 |
| Nonparticipating | REC21 | 427132 | 5363714 | 26 | >1,000 |
| Nonparticipating | REC42 | 423349 | 5365751 | 26 | >1,000 |
| Nonparticipating | REC43 | 423335 | 5364105 | 24 | >1,000 |
| Nonparticipating | REC46 | 422508 | 5364580 | 24 | >1,000 |

4. Conclusions

As indicated in Table 2, the highest predicted level is 49 dBA at the nearest occupied residences. The predicted sound level of 45 dBA is exceeded within 100 feet of six participating and three nonparticipating occupied residences. Rugby Wind anticipates obtaining waivers or operating turbines at a lower electrical and sound output mode in order to reduce the sound level to less than 45 dBA within 100 feet of occupied residences. Thus, the Facility will be in compliance with the noise standards adopted by the Pierce County Board of County Commissioners and the ND PSC, respectively.

5. References

American National Standards Institute (ANSI). 2022. ANSI/ACP 111-1-2022. *Wind Turbine Sound Modeling*.

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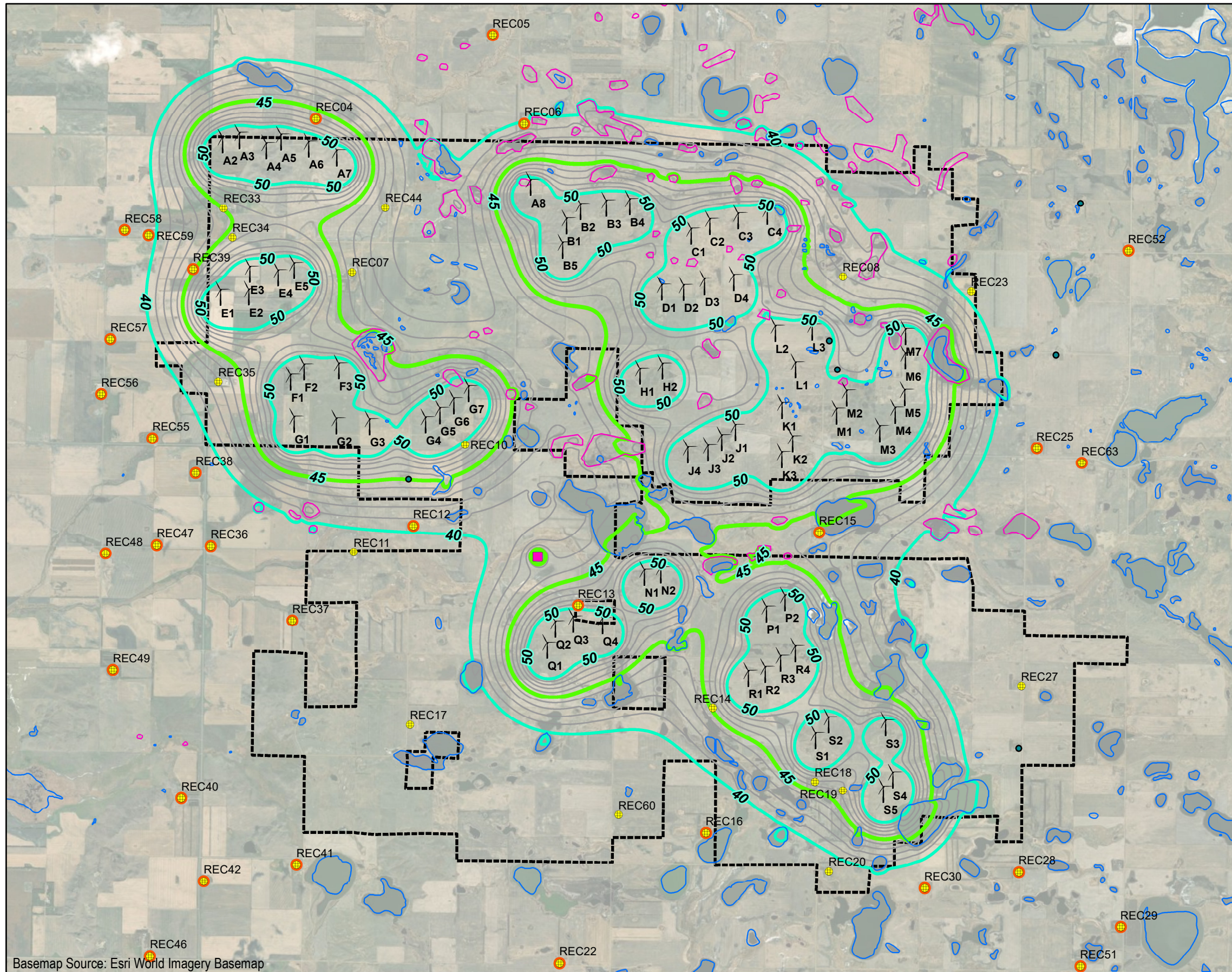
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Figure



LEGEND

- Rugby Wind Turbine
- Transformer
- Residence
- Nonparticipating Residence

Predicted Sound Pressure Level (dBA)

- 5 dBA Contour Interval
- 1 dBA Contour Interval
- 100-foot buffer from 45 dBA Sound Pressure Level

Other Features:

- Facility Site Boundary
- Lakes and Ponds¹
- Marshes and Swamps¹

Note:
 STE = Serrated Trailing Edge
¹High Resolution National Hydrography Dataset (USGS 2023)

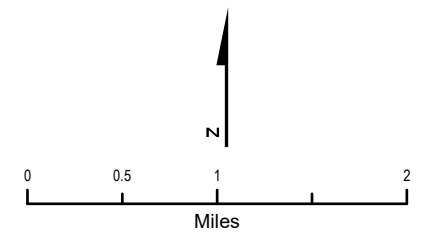
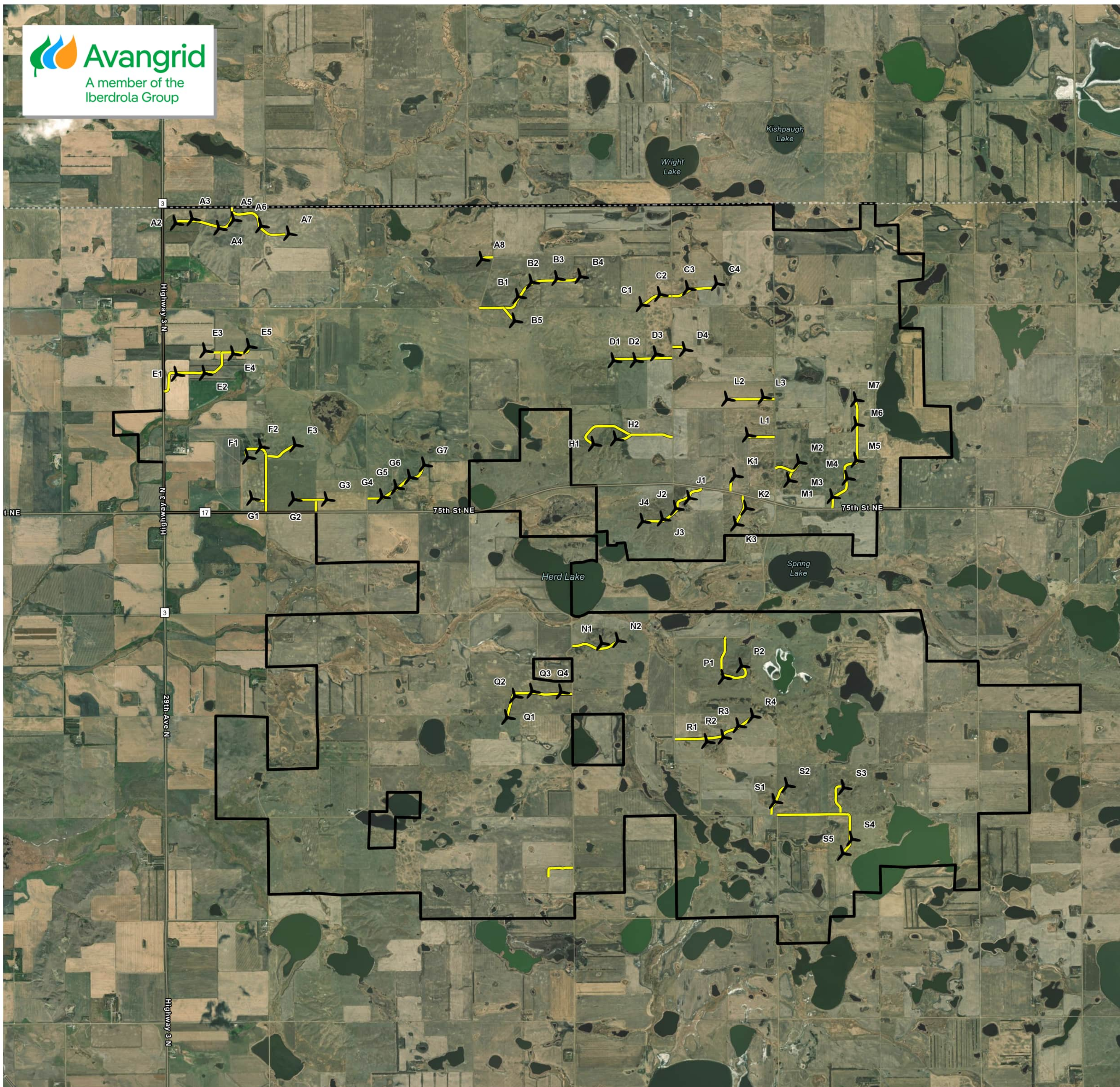





Figure 1
 Predicted Sound Pressure Level (dBA)
 Vestas V120 Repower STE Blades
 Rugby Repower Wind Project

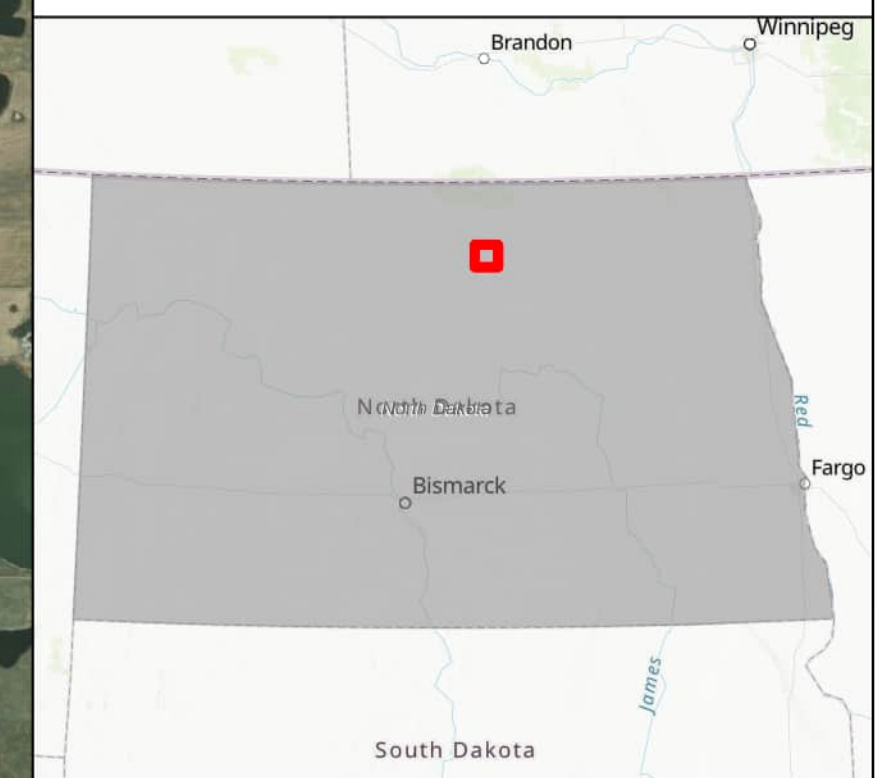
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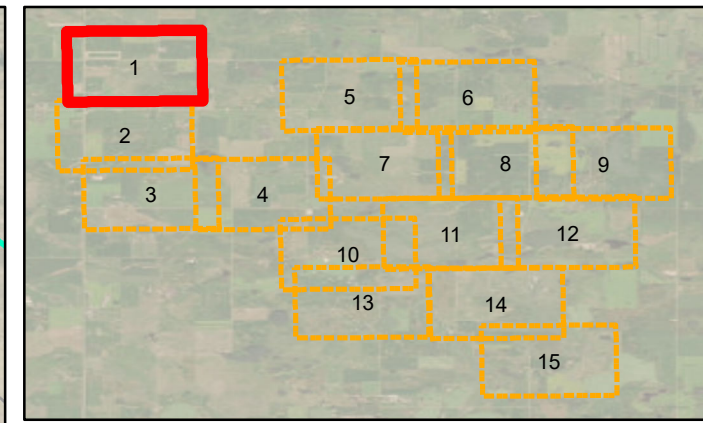
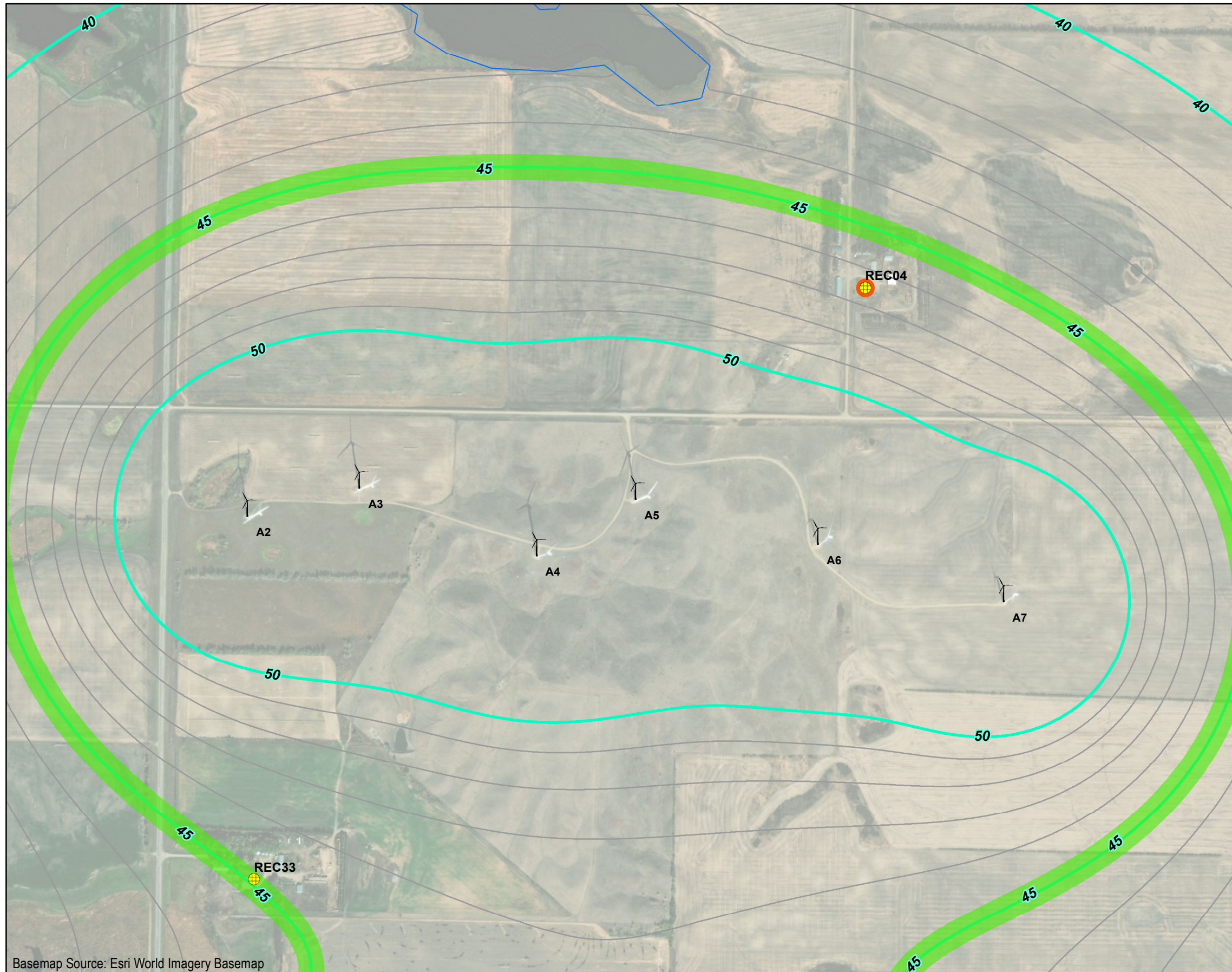
Rugby Wind Layout

Pierce County, ND



-  Turbine
-  Access Road
-  Site Boundary





LEGEND

- Rugby Wind Turbine
- Transformer (Page 10 of 15)
- Residence
- Nonparticipating Residence

Predicted Sound Pressure Level (dBA)

- 5 dBA Contour Interval
- 1 dBA Contour Interval
- 100-foot buffer from 45 dBA Sound Pressure Level

- Facility Site Boundary
- Lakes and Ponds¹
- Marshes and Swamps¹

Note:
 STE = Serrated Trailing Edge
¹High Resolution National Hydrography Dataset (USGS 2023)

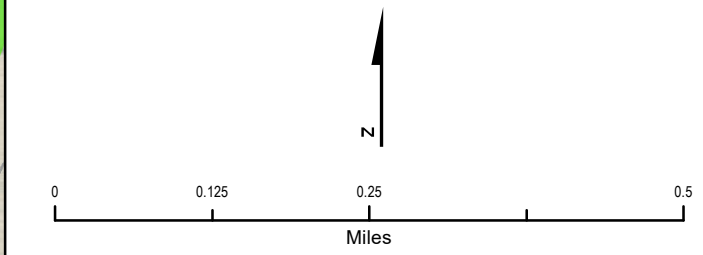
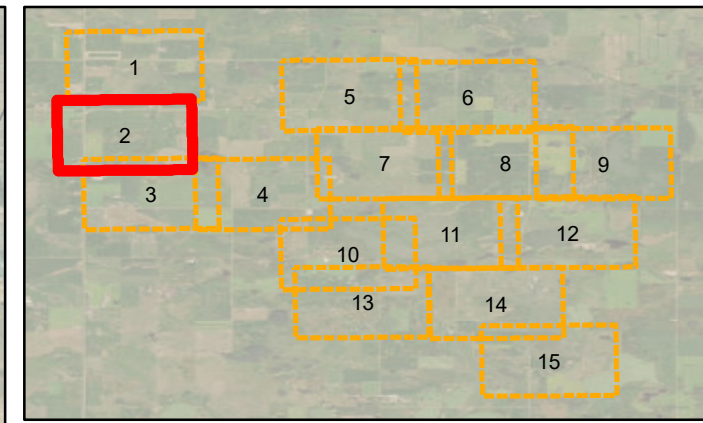
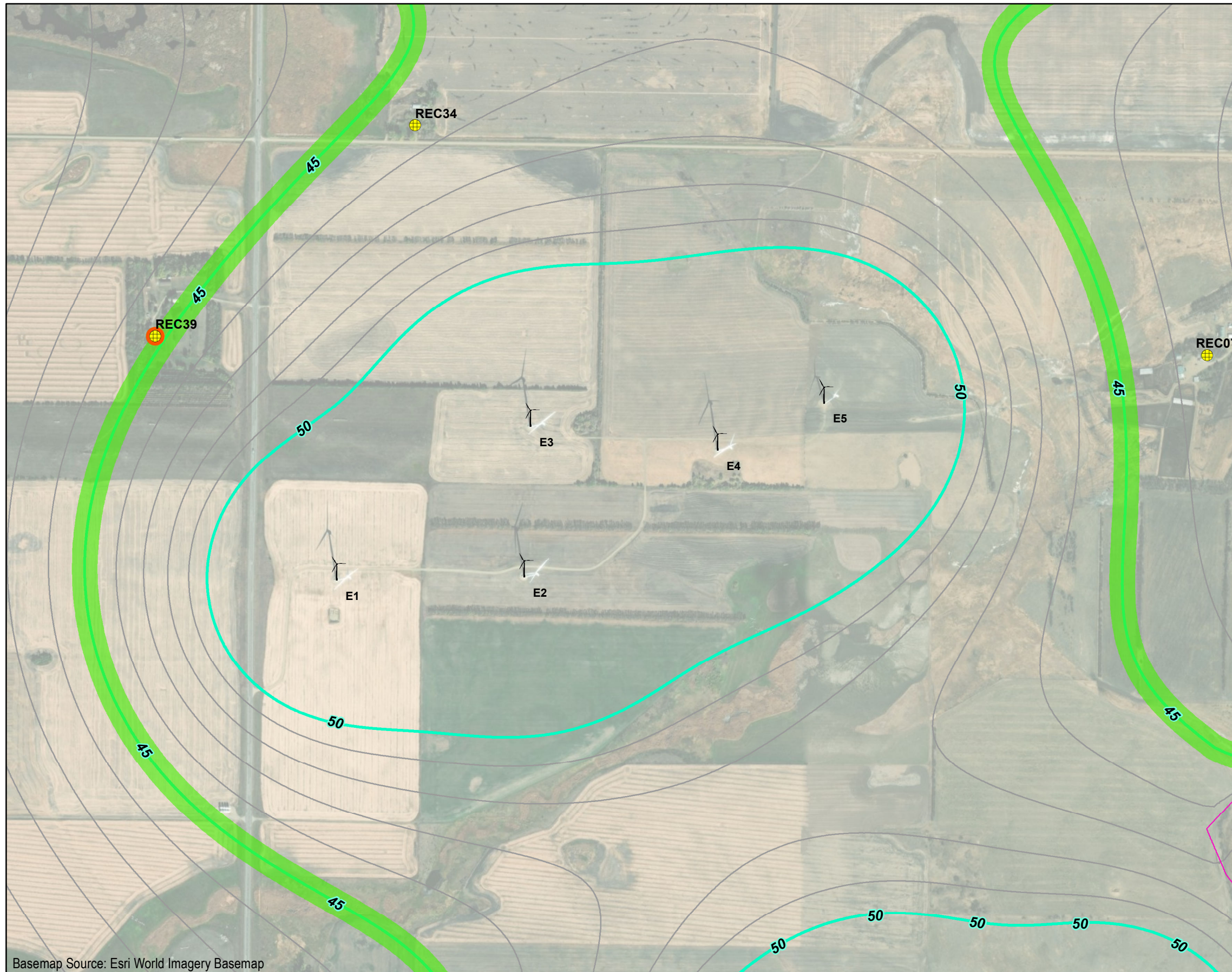


Figure 1
 Predicted Sound Pressure Level (dBA)
 Vestas V120 Repower STE Blades
 Rugby Repower Wind Project
 Page 1 of 15

Basemap Source: Esri World Imagery Basemap



LEGEND

- Rugby Wind Turbine
- Transformer (Page 10 of 15)
- Residence
- Nonparticipating Residence

Predicted Sound Pressure Level (dBA)

- 5 dBA Contour Interval
- 1 dBA Contour Interval
- 100-foot buffer from 45 dBA Sound Pressure Level

- Facility Site Boundary
- Lakes and Ponds¹
- Marshes and Swamps¹

Note:
 STE = Serrated Trailing Edge
¹High Resolution National Hydrography Dataset (USGS 2023)

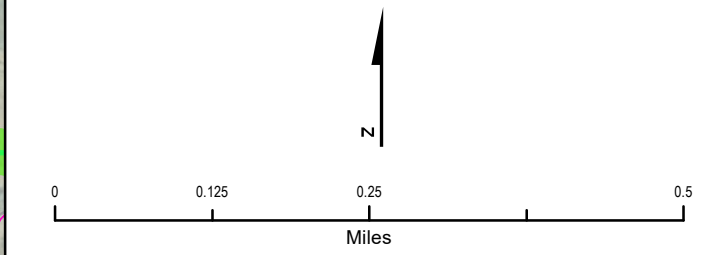
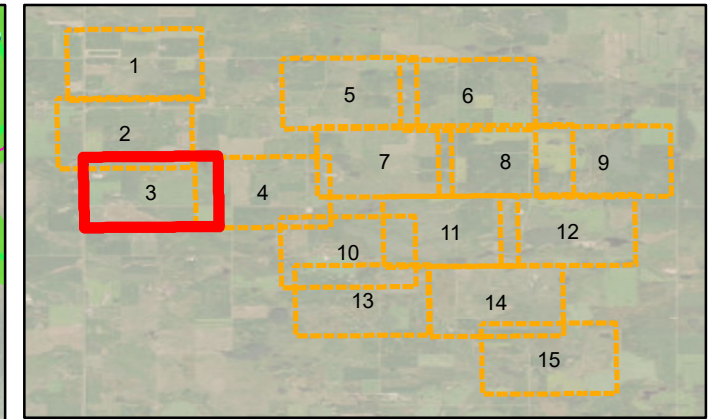
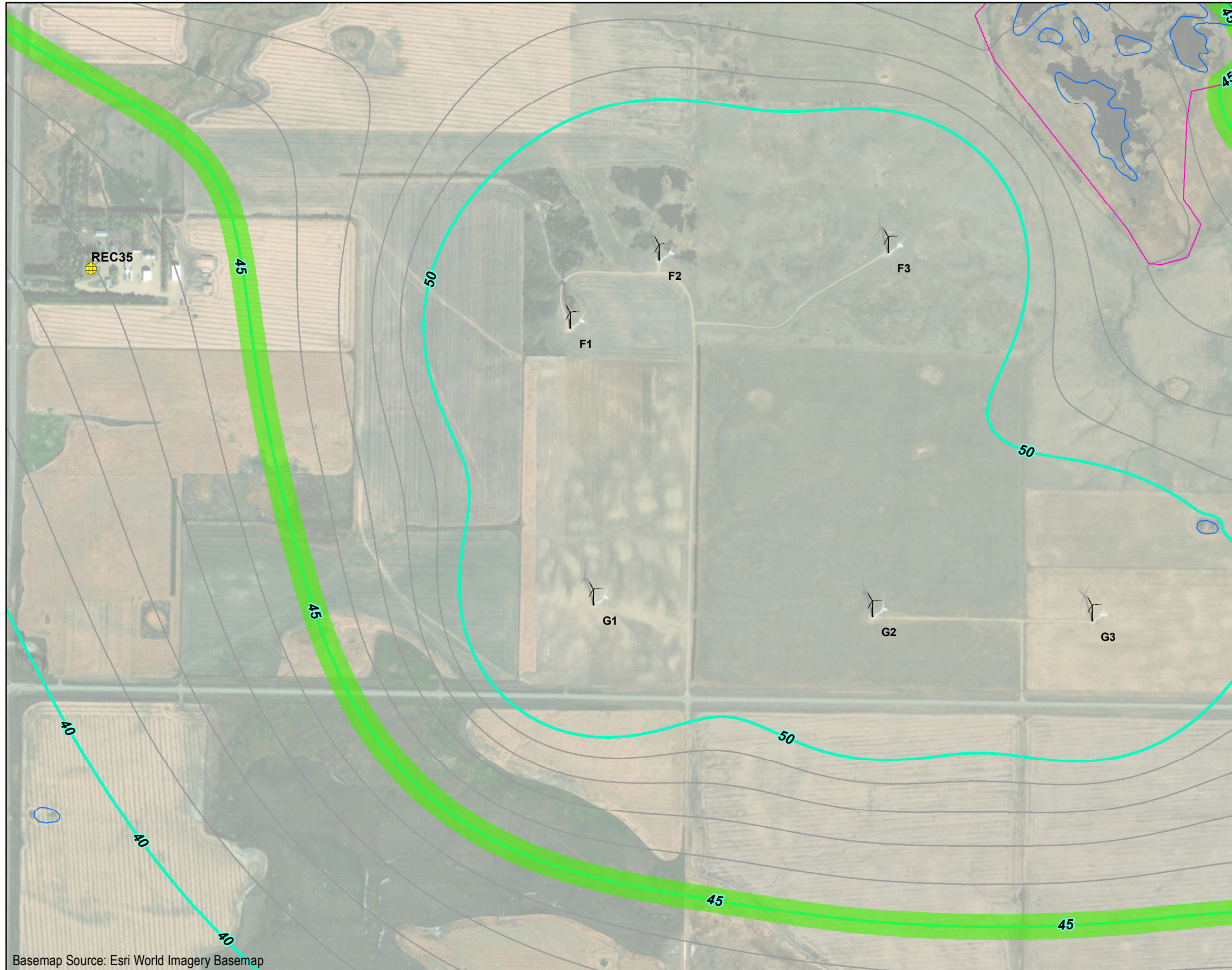












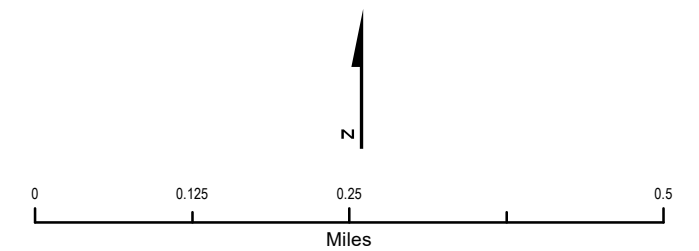
Figure 1
 Predicted Sound Pressure Level (dBA)
 Vestas V120 Repower STE Blades
 Rugby Repower Wind Project
 Page 2 of 15



LEGEND

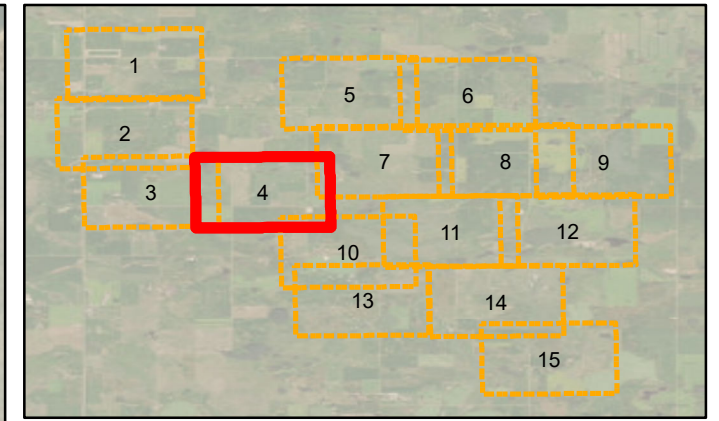
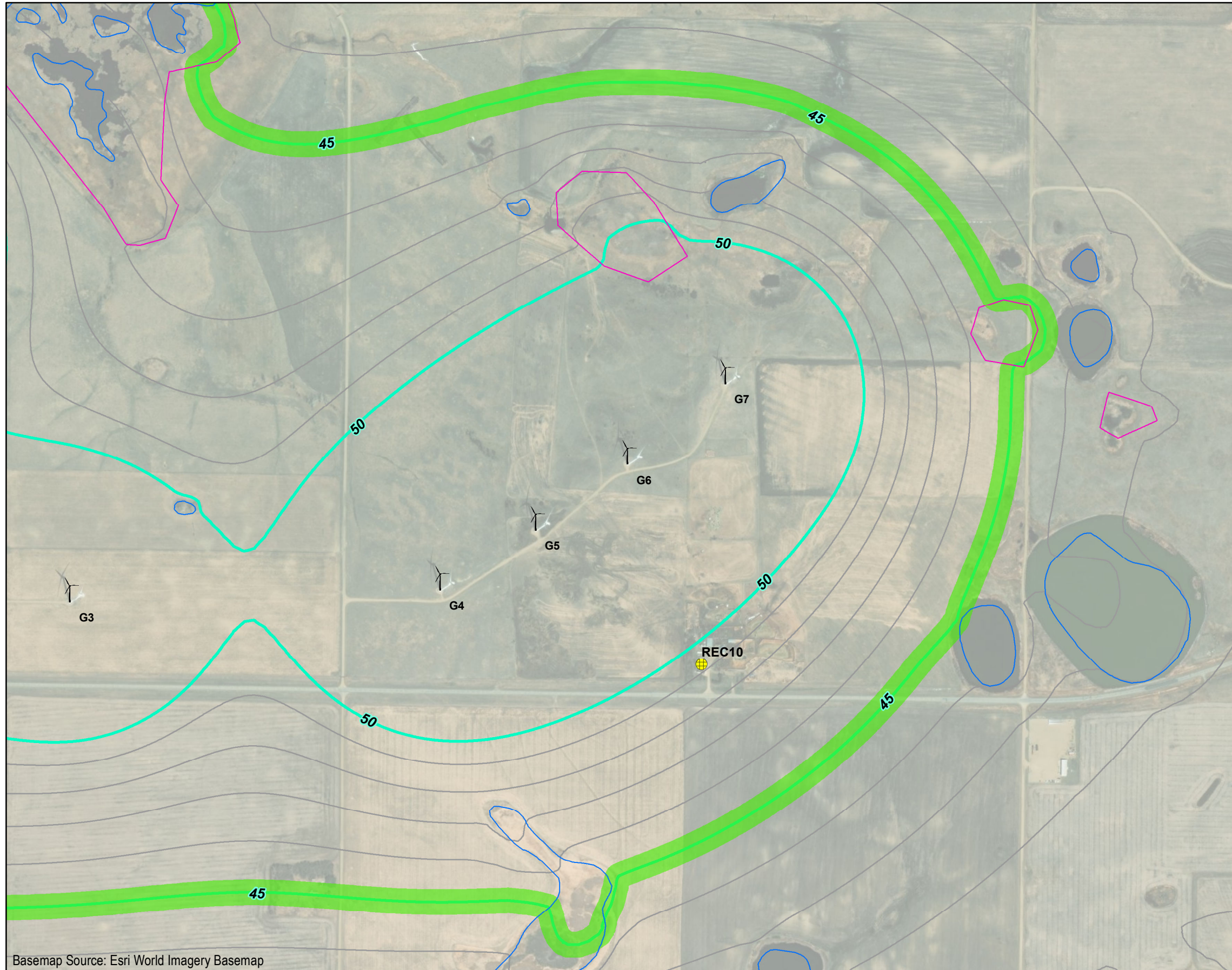
-  Rugby Wind Turbine
-  Transformer (Page 10 of 15)
-  Residence
-  Nonparticipating Residence
- Predicted Sound Pressure Level (dBA)**
-  5 dBA Contour Interval
-  1 dBA Contour Interval
-  100-foot buffer from 45 dBA Sound Pressure Level
-  Facility Site Boundary
-  Lakes and Ponds¹
-  Marshes and Swamps¹

Note:
 STE = Serrated Trailing Edge
¹High Resolution National Hydrography Dataset (USGS 2023)



Basemap Source: Esri World Imagery Basemap

Figure 1
 Predicted Sound Pressure Level (dBA)
 Vestas V120 Repower STE Blades
 Rugby Repower Wind Project
 Page 3 of 15



LEGEND

- Rugby Wind Turbine
- Transformer (Page 10 of 15)
- Residence
- Nonparticipating Residence

Predicted Sound Pressure Level (dBA)

- 5 dBA Contour Interval
- 1 dBA Contour Interval
- 100-foot buffer from 45 dBA Sound Pressure Level

- Facility Site Boundary
- Lakes and Ponds¹
- Marshes and Swamps¹

Note:
 STE = Serrated Trailing Edge
¹High Resolution National Hydrography Dataset (USGS 2023)

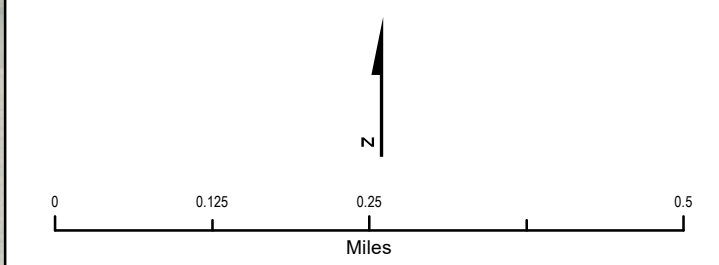
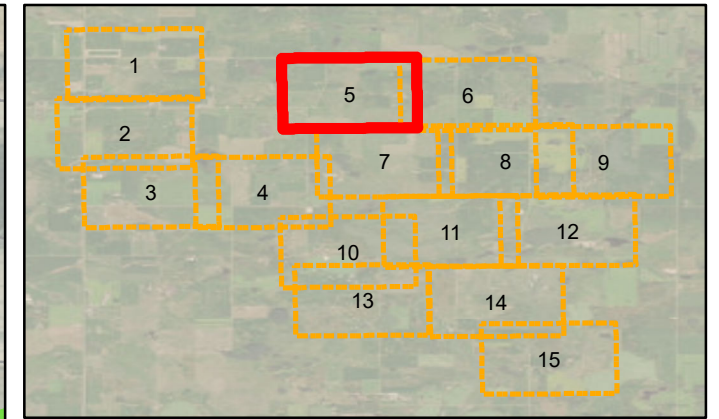
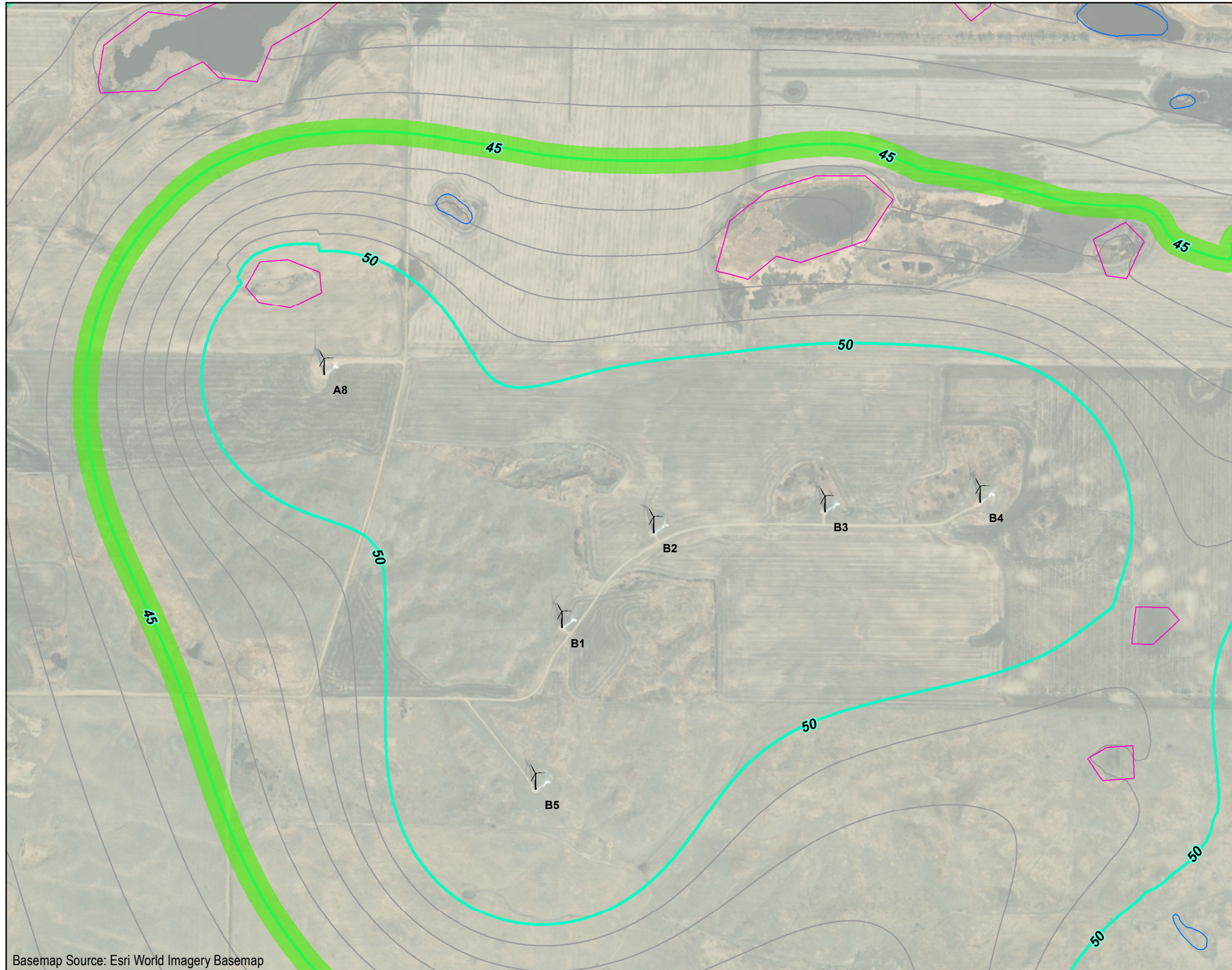


Figure 1
 Predicted Sound Pressure Level (dBA)
 Vestas V120 Repower STE Blades
 Rugby Repower Wind Project
 Page 4 of 15

Basemap Source: Esri World Imagery Basemap



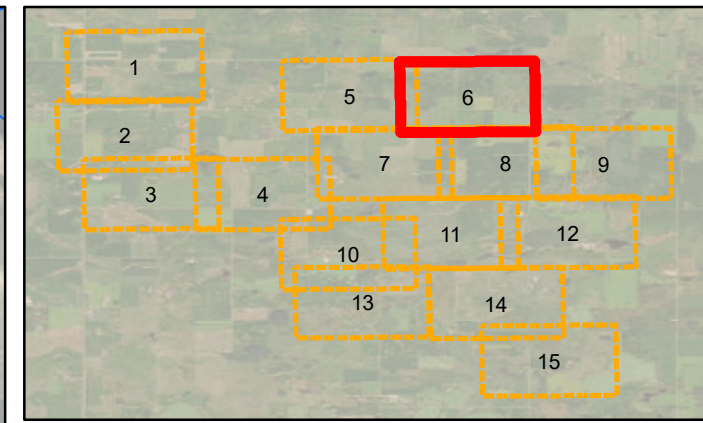
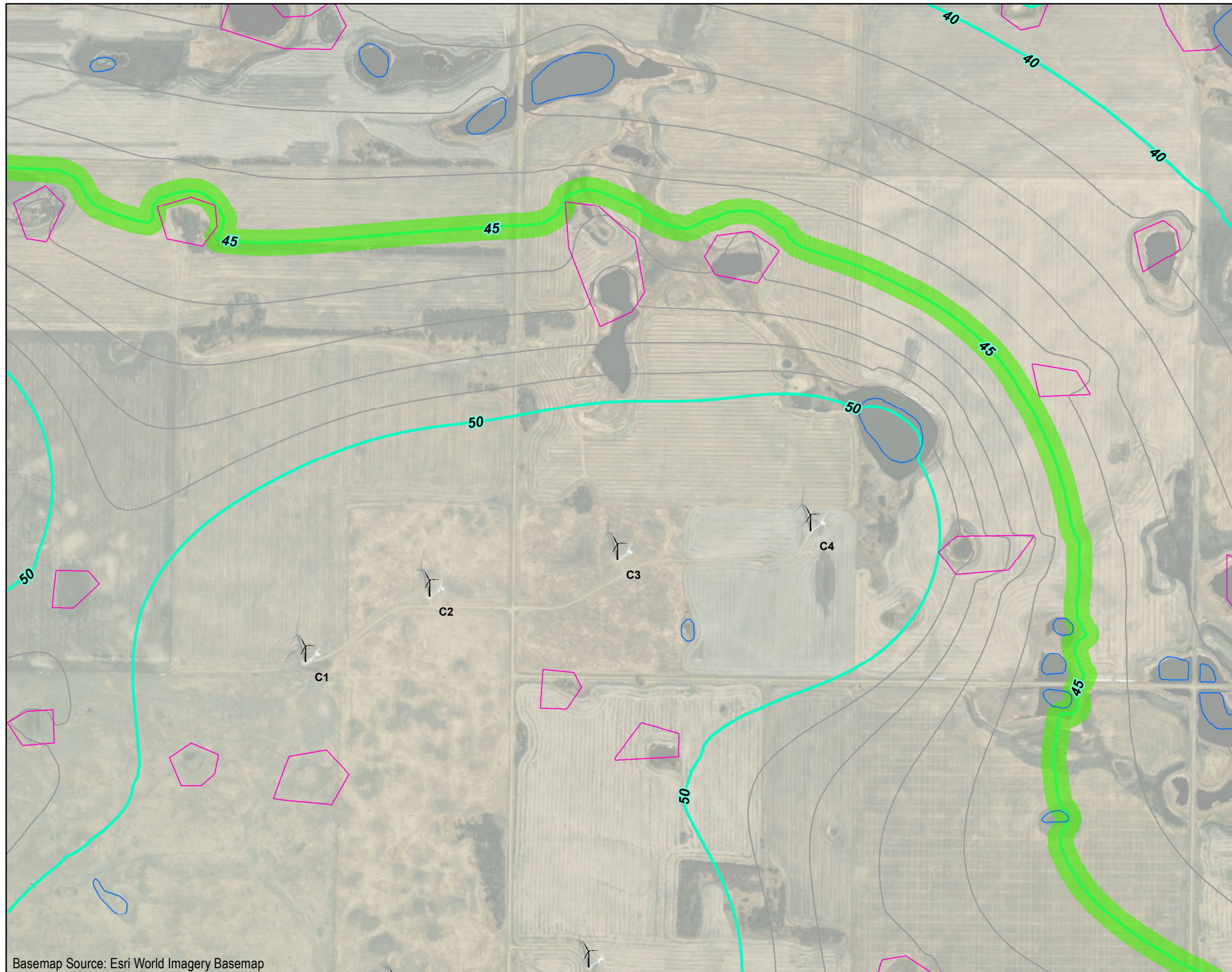
- LEGEND**
- Rugby Wind Turbine
 - Transformer (Page 10 of 15)
 - Residence
 - Nonparticipating Residence
- Predicted Sound Pressure Level (dBA)**
- 5 dBA Contour Interval
 - 1 dBA Contour Interval
 - 100-foot buffer from 45 dBA Sound Pressure Level
- Facility Site Boundary
 - Lakes and Ponds¹
 - Marshes and Swamps¹
- Note:
 STE = Serrated Trailing Edge
¹High Resolution National Hydrography Dataset (USGS 2023)



Basemap Source: Esri World Imagery Basemap

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Figure 1
 Predicted Sound Pressure Level (dBA)
 Vestas V120 Repower STE Blades
 Rugby Repower Wind Project
 Page 5 of 15



LEGEND

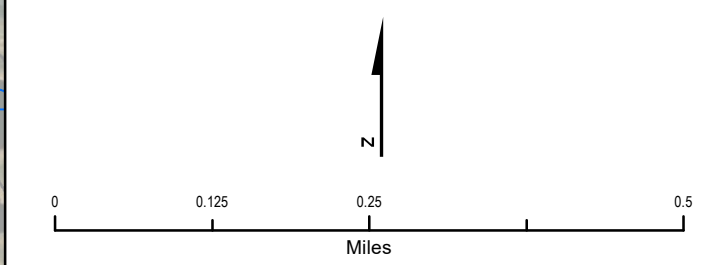
- Rugby Wind Turbine
- Transformer (Page 10 of 15)
- Residence
- Nonparticipating Residence

Predicted Sound Pressure Level (dBA)

- 5 dBA Contour Interval
- 1 dBA Contour Interval
- 100-foot buffer from 45 dBA Sound Pressure Level

- Facility Site Boundary
- Lakes and Ponds¹
- Marshes and Swamps¹

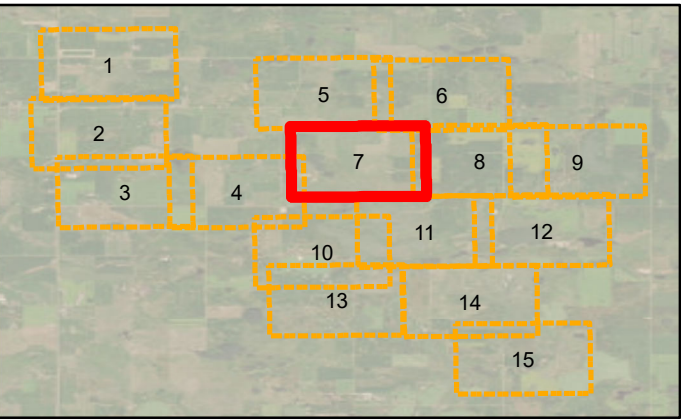
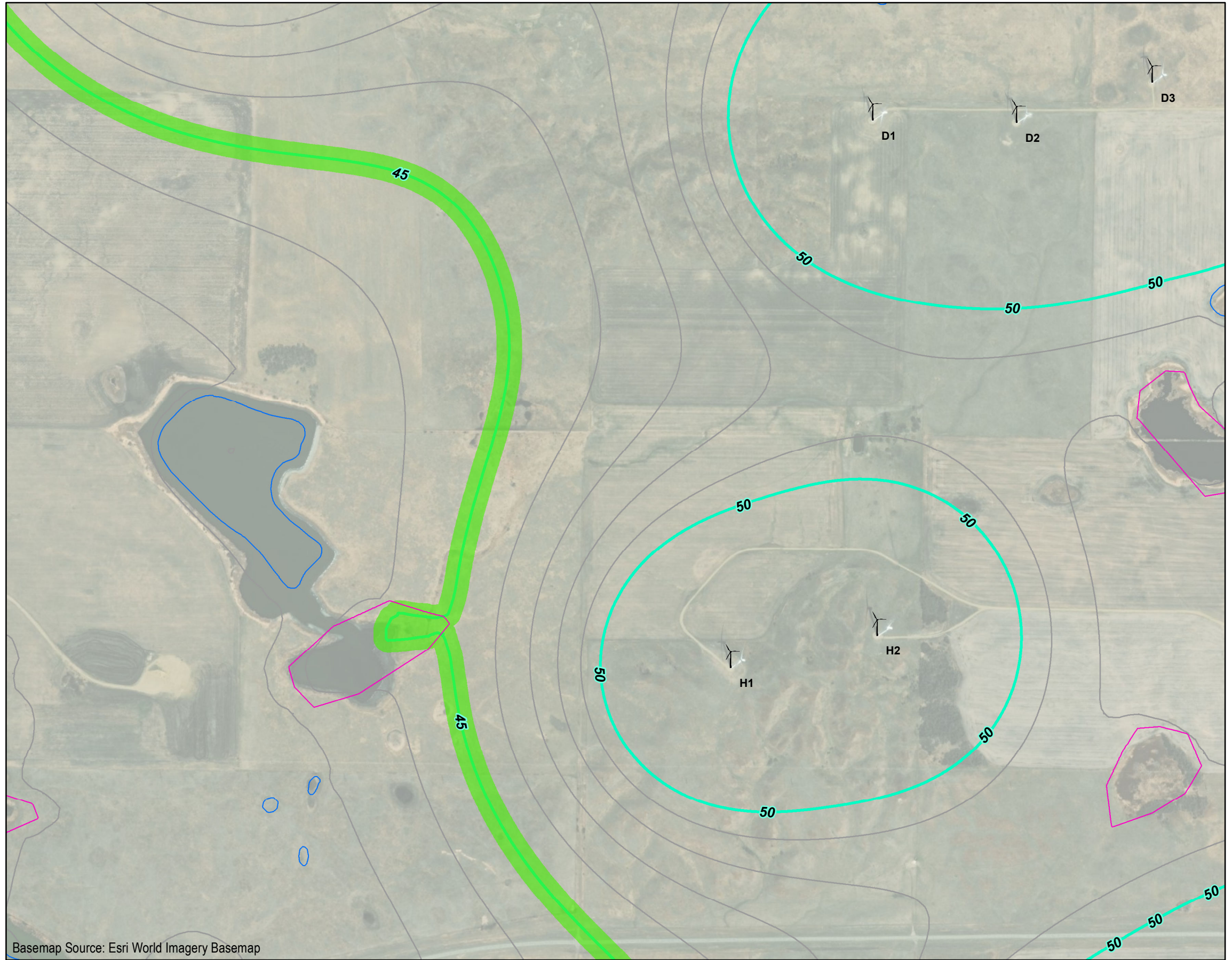
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Basemap Source: Esri World Imagery Basemap

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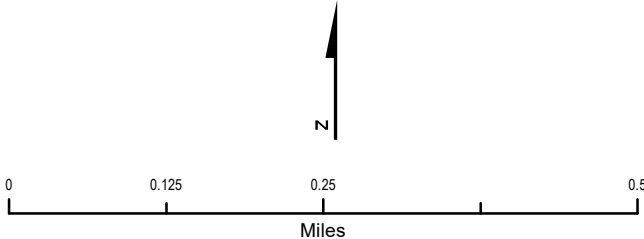
Figure 1
 Predicted Sound Pressure Level (dBA)
 Vestas V120 Repower STE Blades
 Rugby Repower Wind Project
 Page 6 of 15



LEGEND

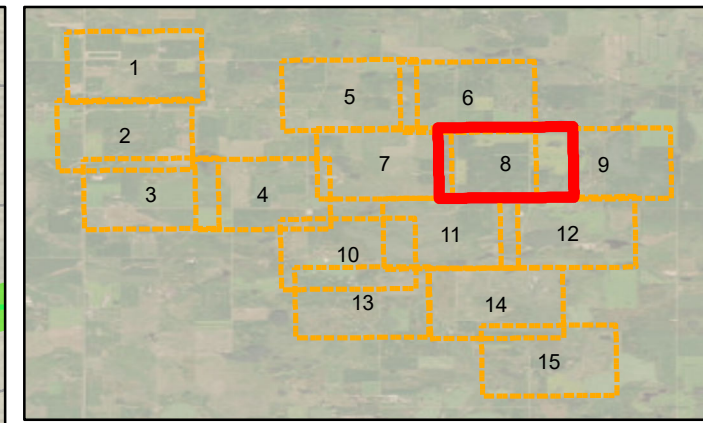
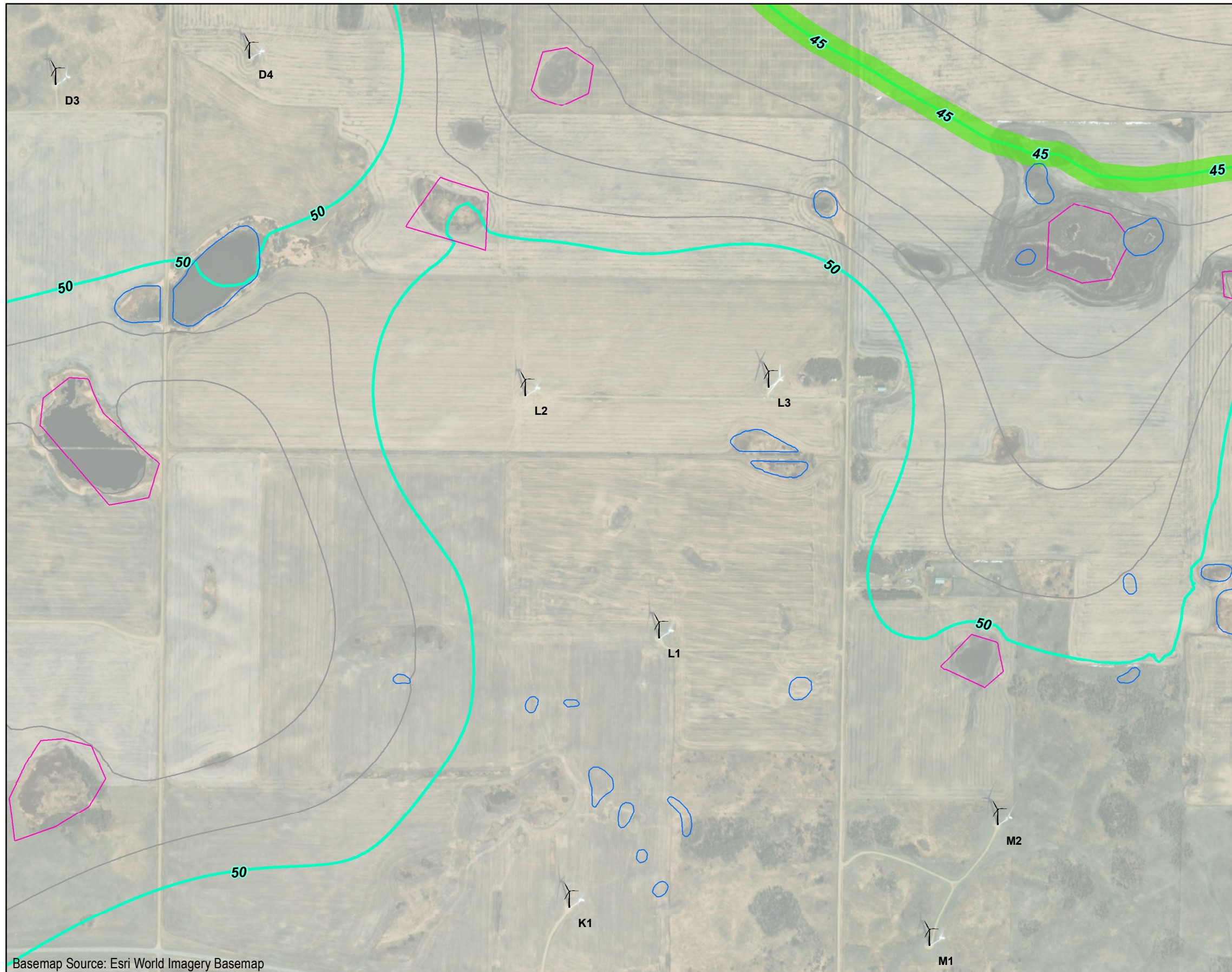
- Rugby Wind Turbine
- Transformer (Page 10 of 15)
- Residence
- Nonparticipating Residence
- Predicted Sound Pressure Level (dBA)**
- 5 dBA Contour Interval
- 1 dBA Contour Interval
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- Lakes and Ponds¹
- Marshes and Swamps¹

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Basemap Source: Esri World Imagery Basemap

Figure 1
 Predicted Sound Pressure Level (dBA)
 Vestas V120 Repower STE Blades
 Rugby Repower Wind Project
 Page 7 of 15



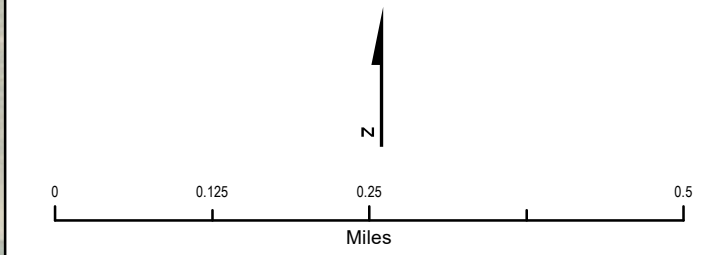
LEGEND

- Rugby Wind Turbine
- Transformer (Page 10 of 15)
- Residence
- Nonparticipating Residence

Predicted Sound Pressure Level (dBA)

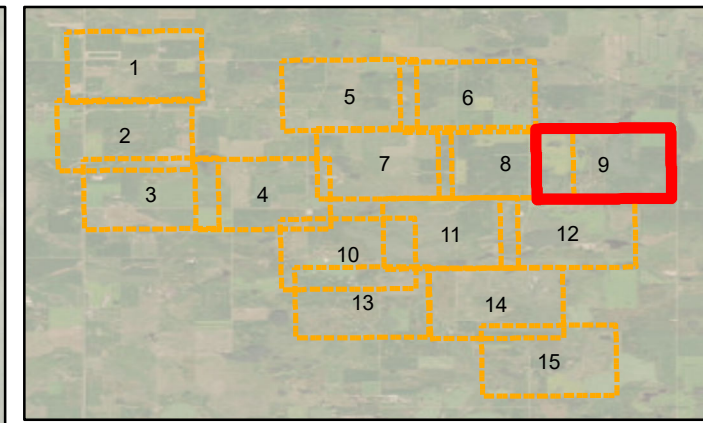
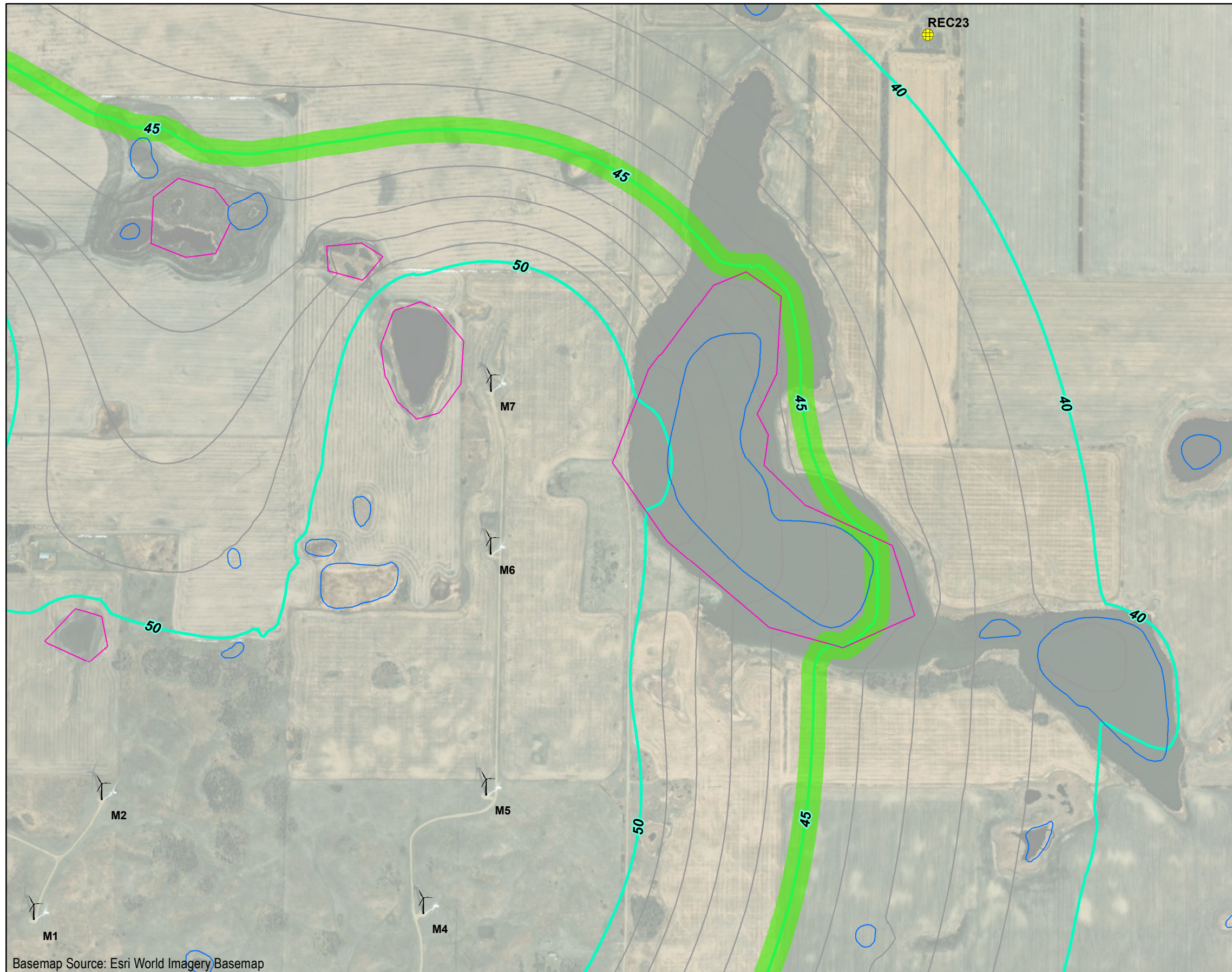
- 5 dBA Contour Interval
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Basemap Source: Esri World Imagery Basemap

Figure 1
 Predicted Sound Pressure Level (dBA)
 Vestas V120 Repower STE Blades
 Rugby Repower Wind Project
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LEGEND

- Rugby Wind Turbine
- Transformer (Page 10 of 15)
- Residence
- Nonparticipating Residence

Predicted Sound Pressure Level (dBA)

- 5 dBA Contour Interval
- 1 dBA Contour Interval
- 100-foot buffer from 45 dBA Sound Pressure Level

- Facility Site Boundary
- Lakes and Ponds¹
- Marshes and Swamps¹

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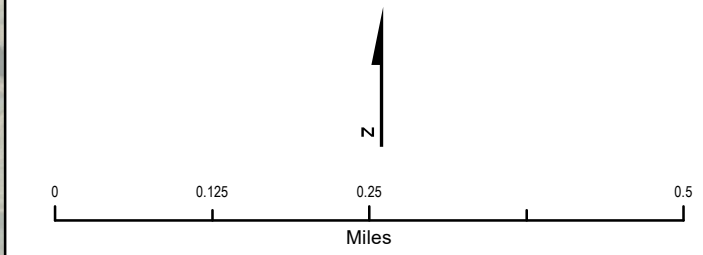
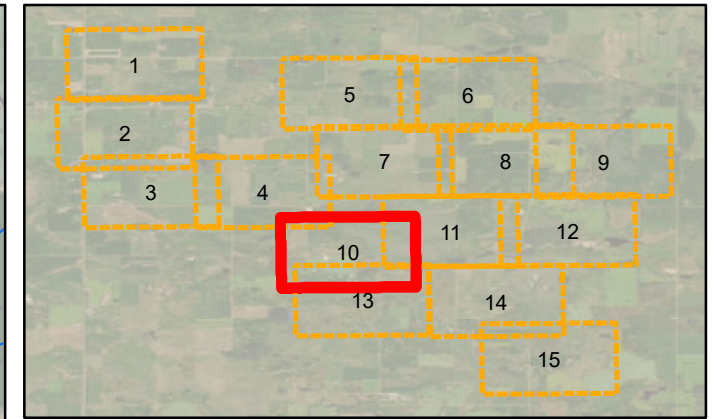
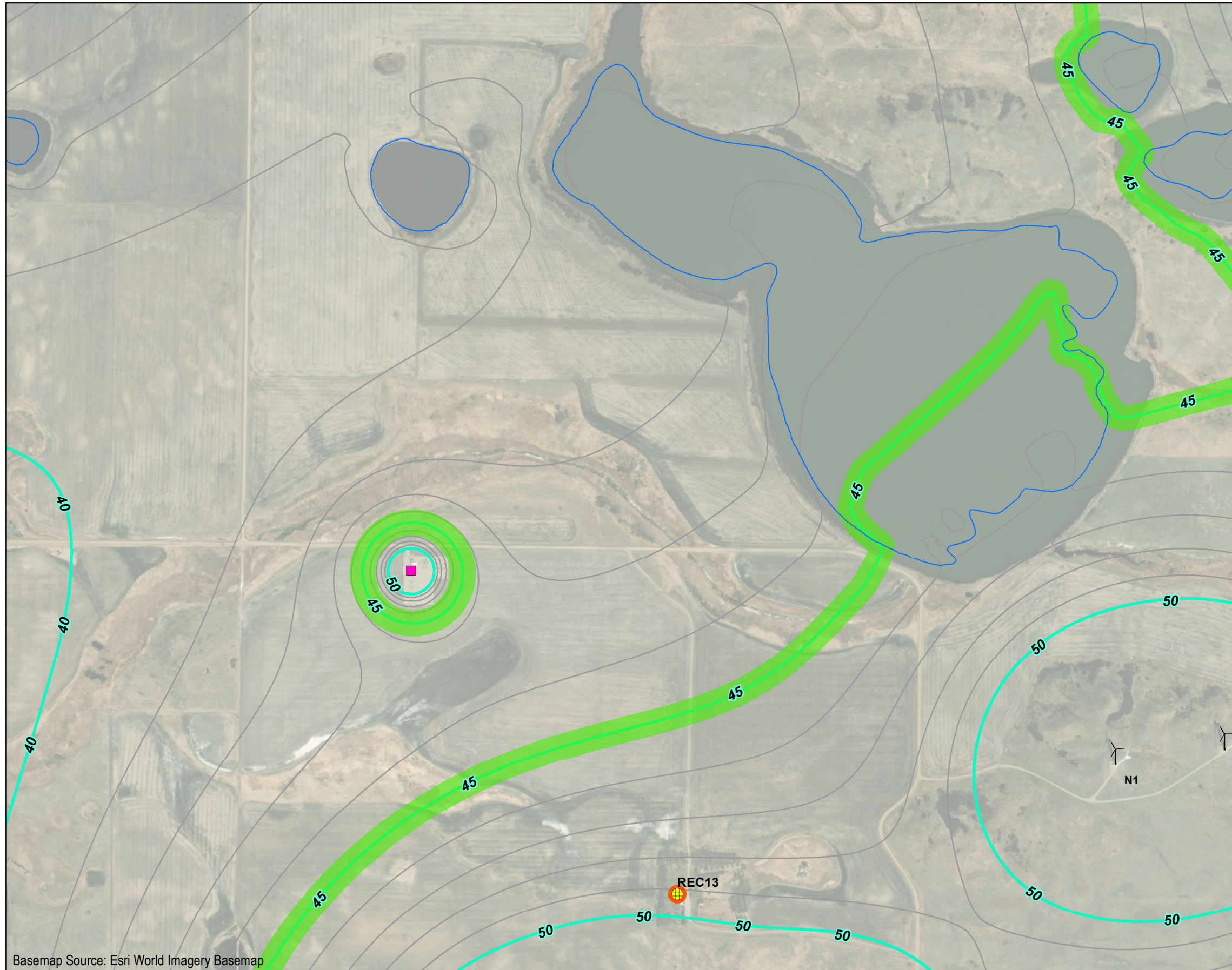


Figure 1
 Predicted Sound Pressure Level (dBA)
 Vestas V120 Repower STE Blades
 Rugby Repower Wind Project
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Basemap Source: Esri World Imagery Basemap



LEGEND

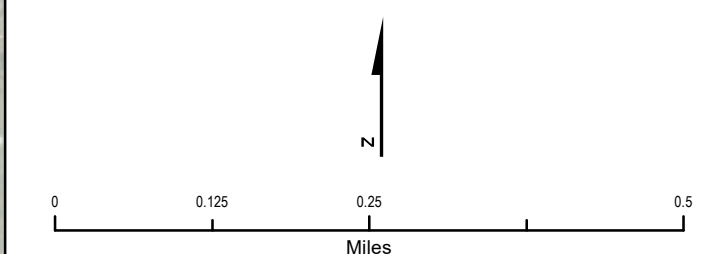
- Rugby Wind Turbine
- Transformer (Page 10 of 15)
- Residence
- Nonparticipating Residence

Predicted Sound Pressure Level (dBA)

- 5 dBA Contour Interval
- 1 dBA Contour Interval
- 100-foot buffer from 45 dBA Sound Pressure Level

- Facility Site Boundary
- Lakes and Ponds¹
- Marshes and Swamps¹

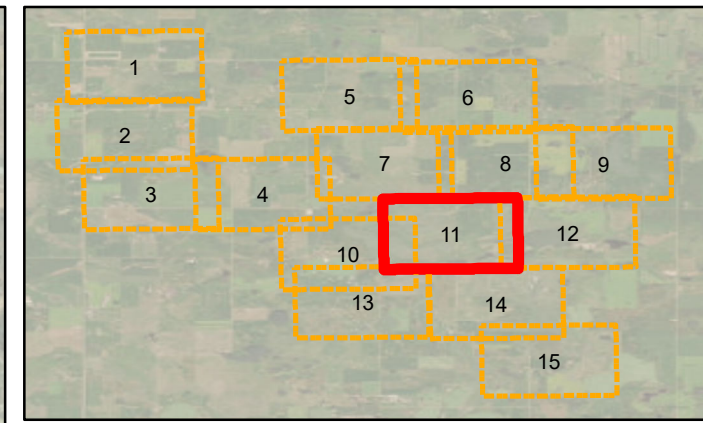
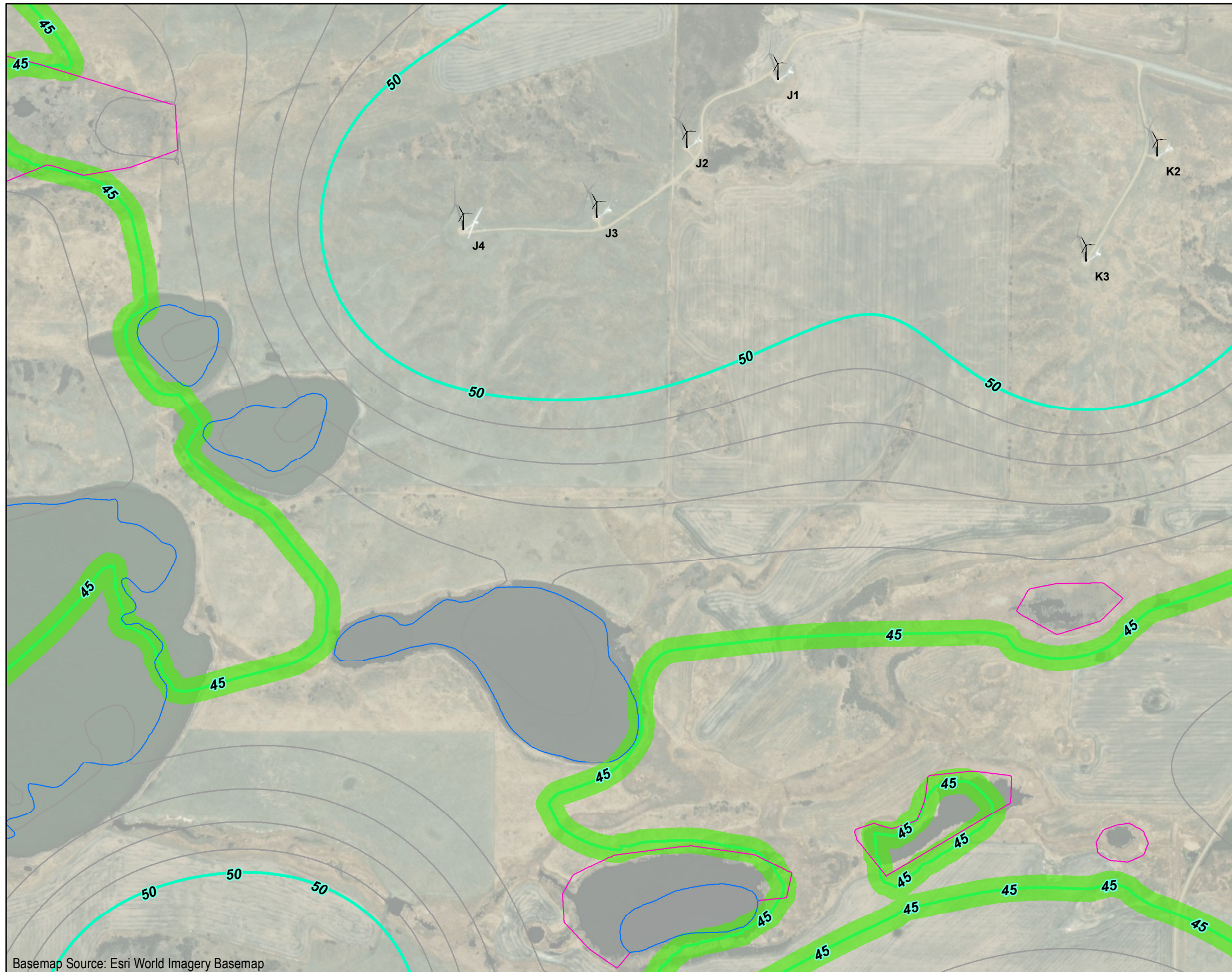
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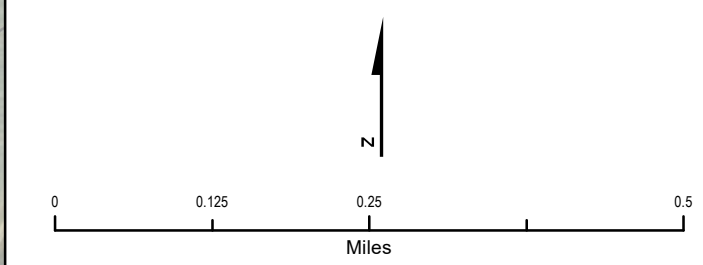
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Figure 1
 Predicted Sound Pressure Level (dBA)
 Vestas V120 Repower STE Blades
 Rugby Repower Wind Project
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- LEGEND**
- Rugby Wind Turbine
 - Transformer (Page 10 of 15)
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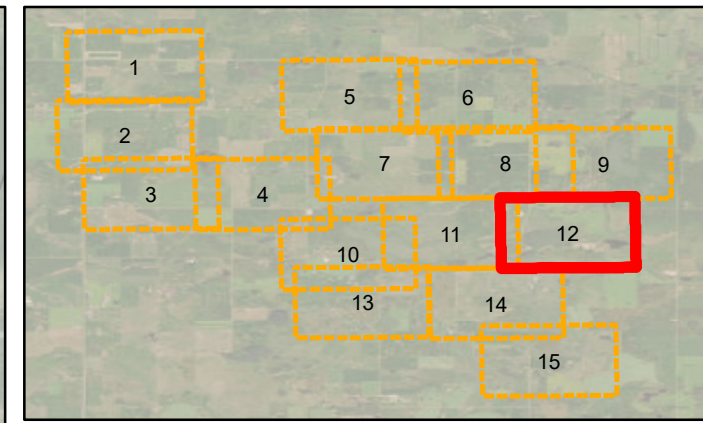
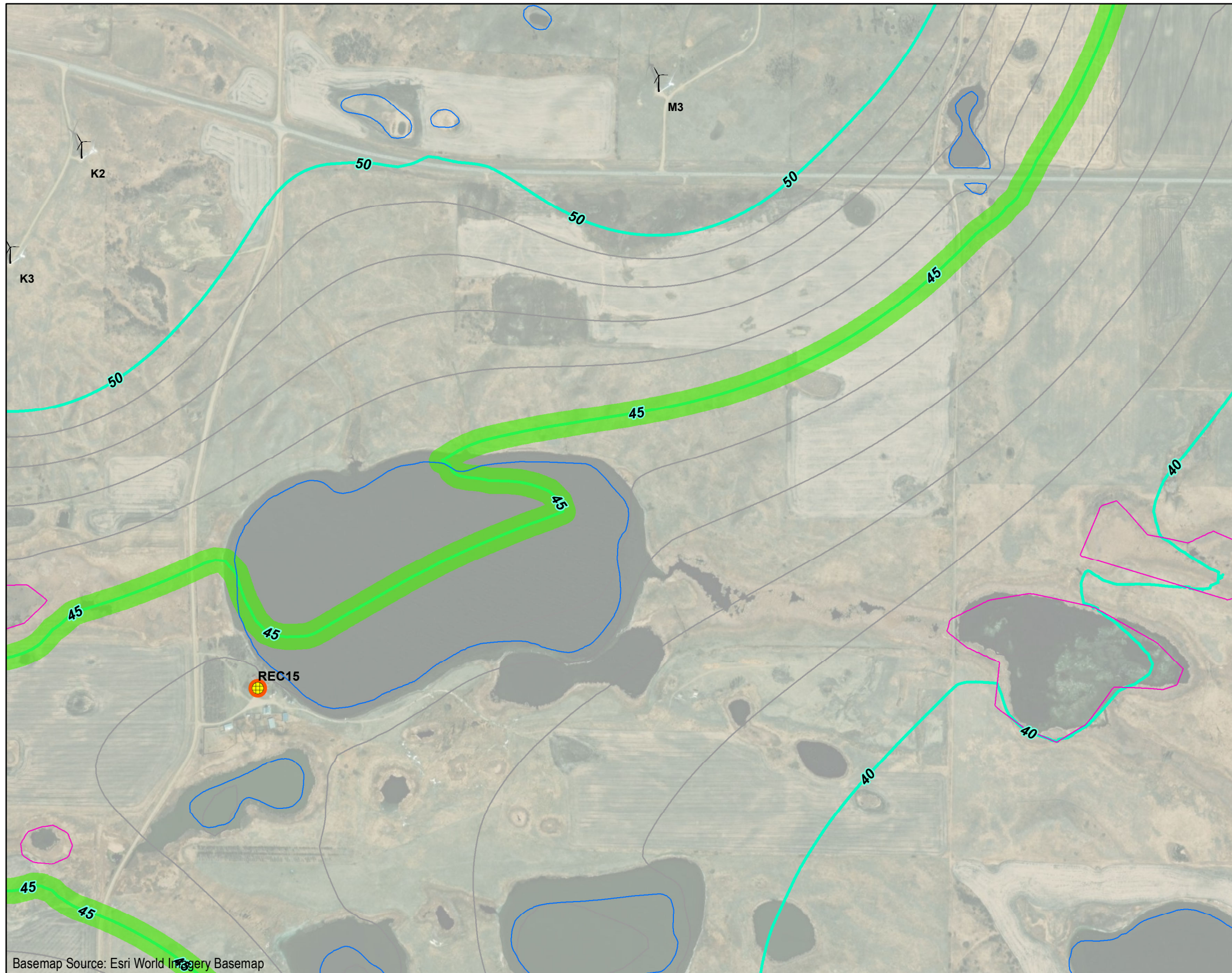


Basemap Source: Esri World Imagery Basemap

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Figure 1
 Predicted Sound Pressure Level (dBA)
 Vestas V120 Repower STE Blades
 Rugby Repower Wind Project
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LEGEND

- Rugby Wind Turbine
- Transformer (Page 10 of 15)
- Residence
- Nonparticipating Residence

Predicted Sound Pressure Level (dBA)

- 5 dBA Contour Interval
- 1 dBA Contour Interval
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- Facility Site Boundary
- Lakes and Ponds¹
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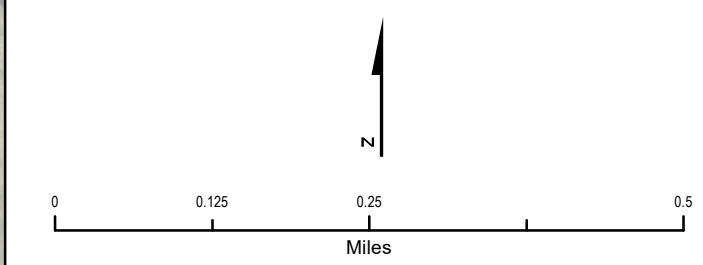
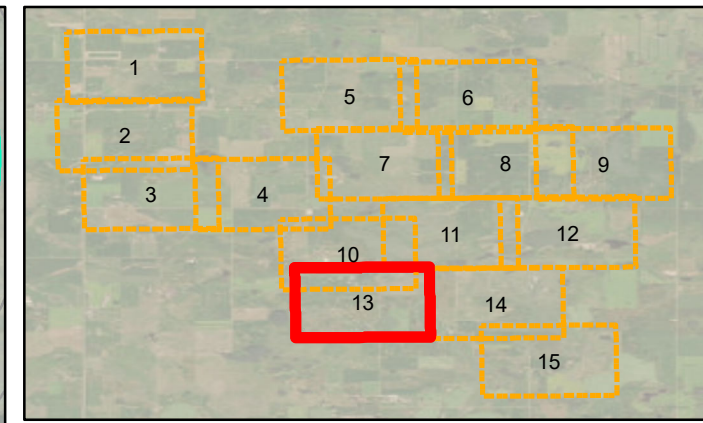
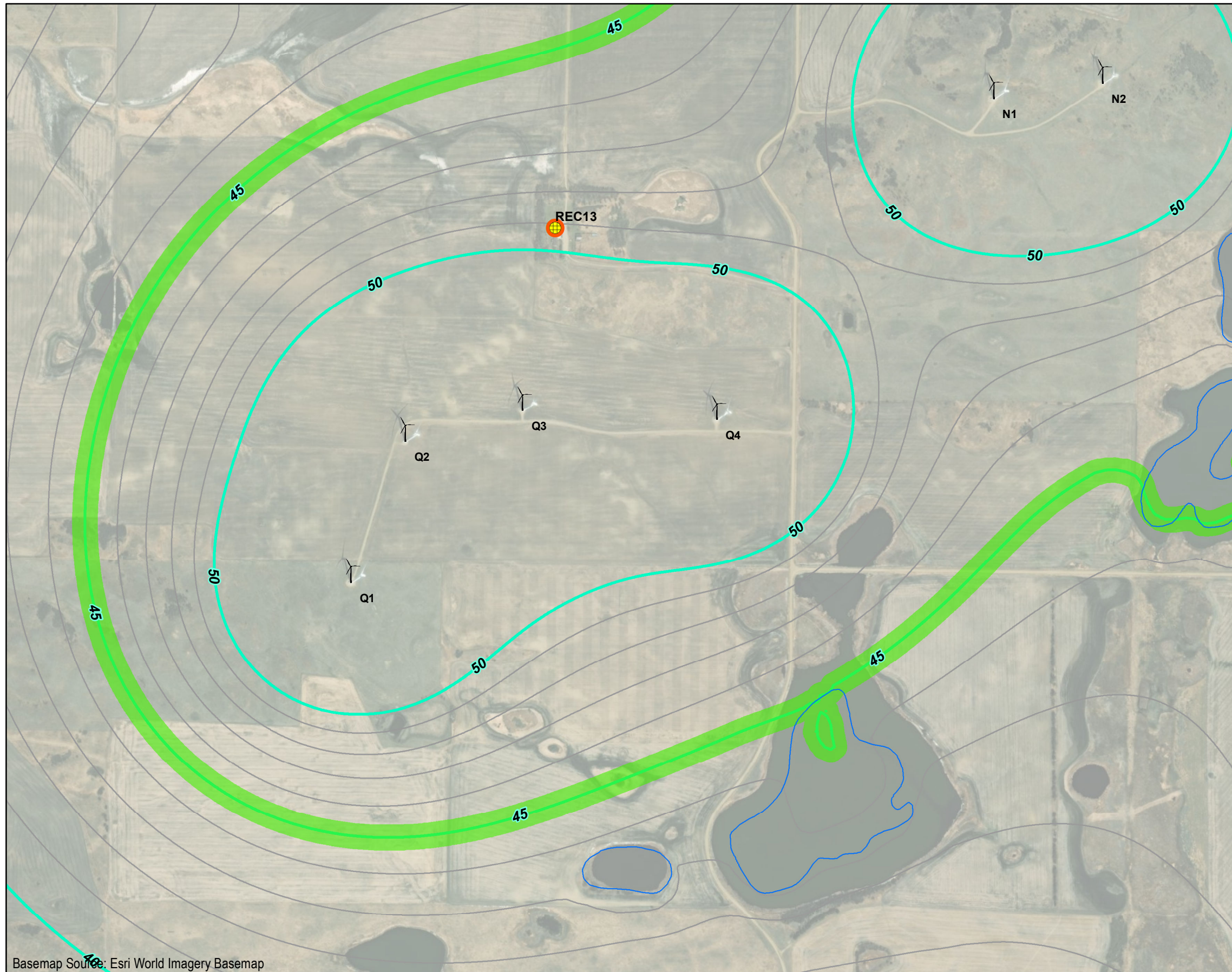


Figure 1
 Predicted Sound Pressure Level (dBA)
 Vestas V120 Repower STE Blades
 Rugby Repower Wind Project
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LEGEND

- Rugby Wind Turbine
- Transformer (Page 10 of 15)
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Predicted Sound Pressure Level (dBA)

- 5 dBA Contour Interval
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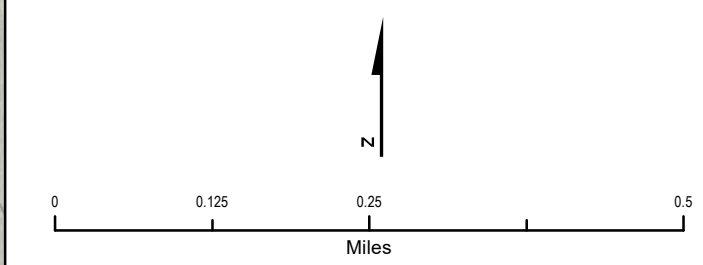
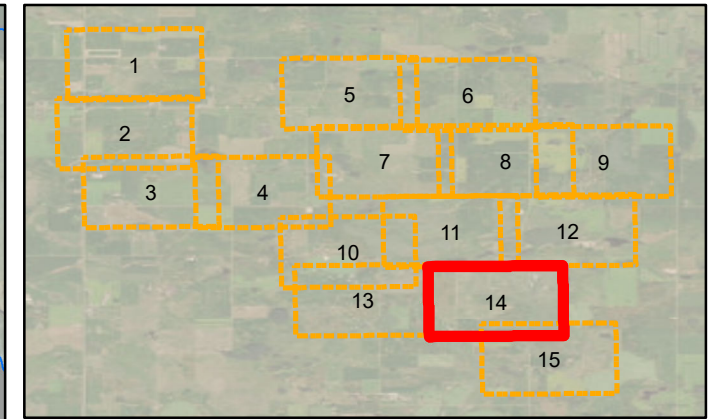
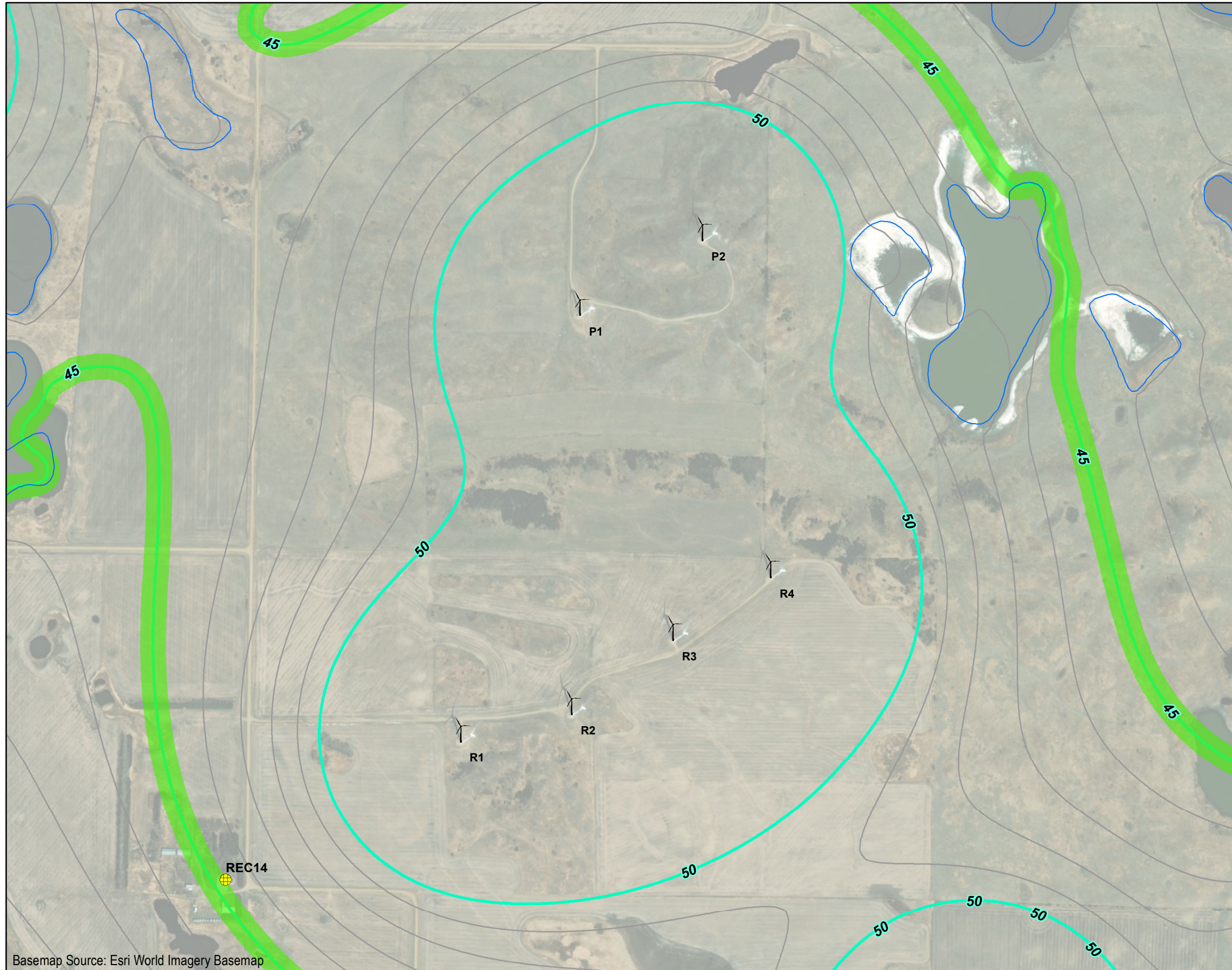


Figure 1
 Predicted Sound Pressure Level (dBA)
 Vestas V120 Repower STE Blades
 Rugby Repower Wind Project
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Basemap Source: Esri World Imagery Basemap



LEGEND

- Rugby Wind Turbine
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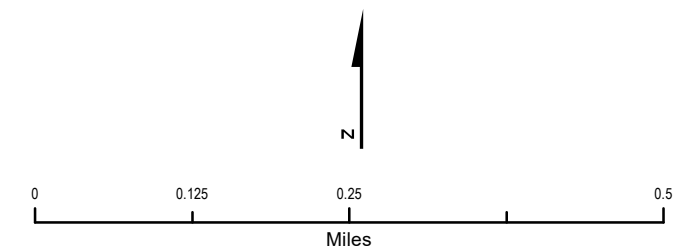
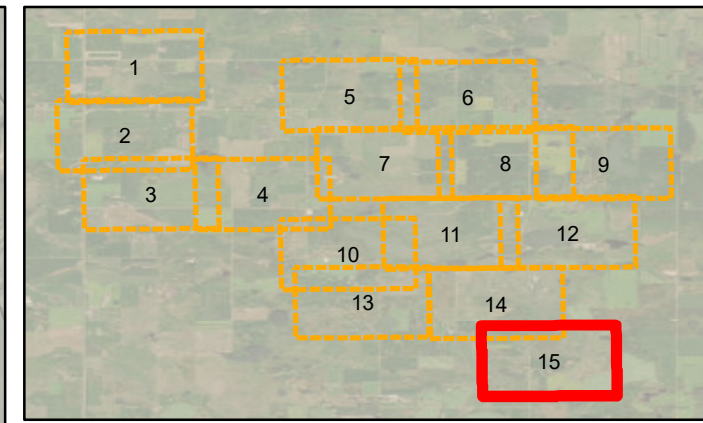
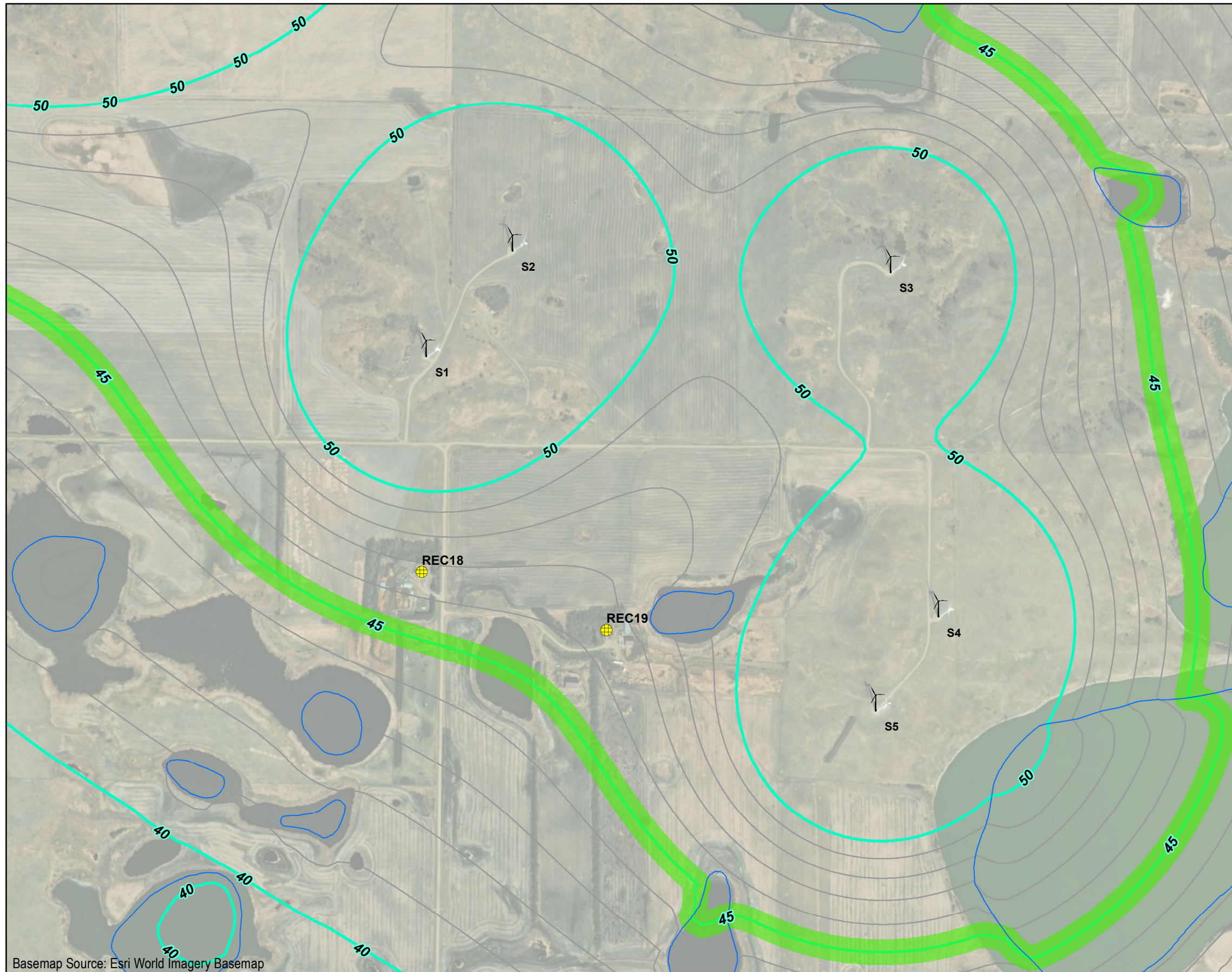


Figure 1
 Predicted Sound Pressure Level (dBA)
 Vestas V120 Repower STE Blades
 Rugby Repower Wind Project
 Page 14 of 15



LEGEND

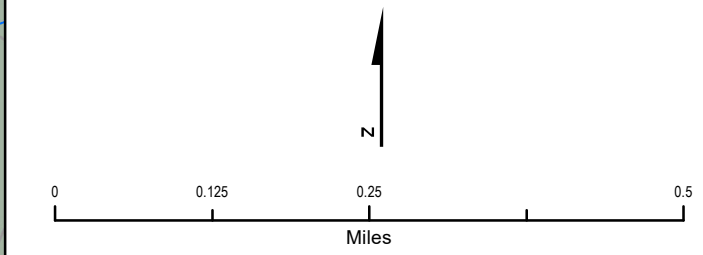
- Rugby Wind Turbine
- Transformer (Page 10 of 15)
- Residence
- Nonparticipating Residence

Predicted Sound Pressure Level (dBA)

- 5 dBA Contour Interval
- 1 dBA Contour Interval
- 100-foot buffer from 45 dBA Sound Pressure Level

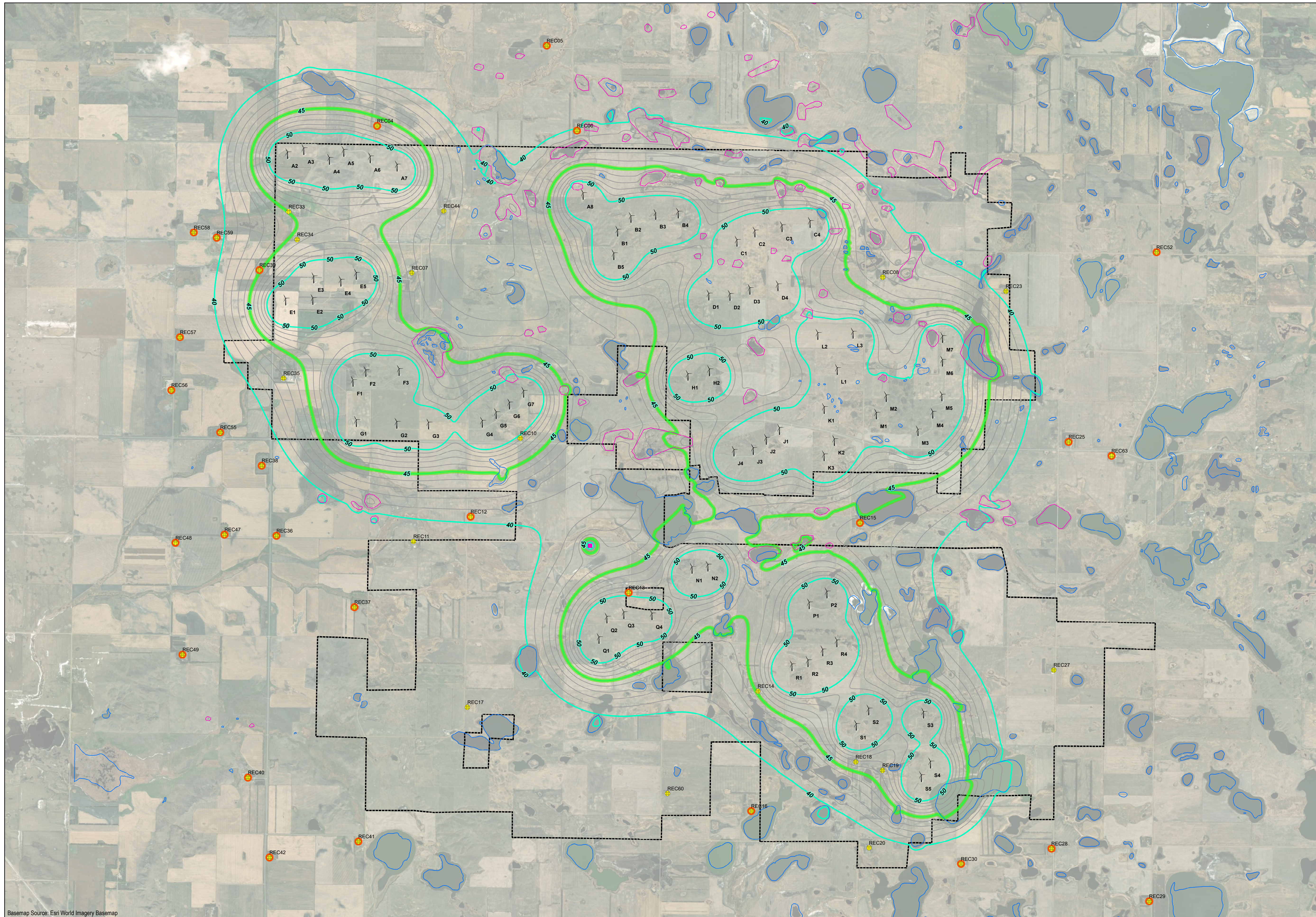
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Figure 1
 Predicted Sound Pressure Level (dBA)
 Vestas V120 Repower STE Blades
 Rugby Repower Wind Project
 Page 15 of 15



- LEGEND**
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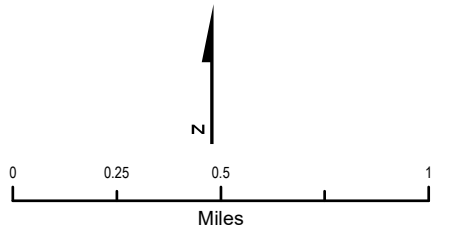


Figure 1
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 Rugby Repower Wind Project