APPENDIX I
Noise Propagation & Modeling Assessment

Castle Rock Solar Project
January 2025
IP7137/GS-24-267

Castle Rock Solar Project
Pre-Construction Noise Study

Prepared for:
Castle Rock Solar LLC
3316 Highland Avenue
Wayzata, MN 55391

Prepared by:
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Project No: 193709215

September 5, 2024

Table of Contents

Abbreviations

AC	Alternating current
dB	Decibel
dBA	Decibel (A-weighted)
DC	Direct current
GA	Ground absorption
Hz	Hertz
L_{eq}	Equivalent continuous sound level
L_{10}	Sound level exceeded for 10% of the time
L_{50}	Sound level exceeded for 50% of the time
L_{90}	Sound level exceeded for 90% of the time
L_{max}	Maximum sound level
L_{min}	Minimum sound level
MPCA	Minnesota Pollution Control Agency
MVA	Megavolt-ampere
MW	Megawatt
Project	Castle Rock Solar Project
PV	Photovoltaic
PWL	Sound power level
Castle Rock Solar	Castle Rock Solar Power, LLC
SLM	Sound level meter
SPL	Sound pressure level

Executive Summary

Castle Rock Solar LLC (Castle Rock Solar), is proposing to construct and operate the Castle Rock Solar Project (Project). The Project is located within Castle Rock Township in Dakota County, Minnesota (Site) and will consist of an approximately 150-megawatt (MW) solar energy facility. Castle Rock Solar retained the services of Stantec Consulting Services Inc. (Stantec) to conduct a pre-construction noise study for the Project.

This noise assessment was completed to assess Project operational compliance with the Minnesota Pollution Control Agency (MPCA) noise regulations. Operational noise modeling was completed to estimate noise levels generated by the Project equipment. Modeled noise levels were predicted using CadnaA acoustical modelling software, configured to implement ISO 9613-2 environmental sound propagation algorithms. The modeling accounted for noise from the proposed solar array inverter stations and the Project substation transformer based on manufacturer-provided data.

Castle Rock Solar provided two potential layouts for the Project facility's equipment, referred to as "Preferred" and "Alternate", and Stantec completed a noise assessment for both layouts. The maximum Project-generated noise level at residences and other sensitive receptors was estimated to be an equivalent continuous sound level (Leq) of 57 A-weighted decibels (dBA) during daytime and 37 dBA during nighttime for the Preferred layout, and 57 dBA during daytime and 35 dBA during nighttime for the Alternate layout. The noise modeling results demonstrate that expected daytime and nighttime noise levels at the identified receptor locations are below MPCA limits and that the Project is expected to operate in compliance with the MPCA noise regulations.

1.0 Project Description

Castle Rock Solar Project, LLC (Castle Rock Solar), is proposing to construct and operate the Castle Rock Solar Project (Project). The Project site is located on 1,355 acres of rural agricultural land in The Project is located within Castle Rock Township in Dakota County, Minnesota (Site). The Project includes the development of an approximately 150-MW alternating current (AC) utility scale solar energy generation facility. In addition to photovoltaic (PV) modules, the Project will also include single-axis solar trackers, inverter stations (also referred to as "power conversion stations"), an electrical collection system, access roads, a substation with a power transformer, a generation tie-in transmission line, and perimeter security fencing.

The solar arrays will be constructed on multiple agricultural parcels roughly bounded by 225th Street West to the north, Biscayne Avenue to the west, 240th Street West to the south, and Blaine Avenue to the east. The Project site is surrounded by agricultural, industrial, and undeveloped forested areas along, with dispersed single-family residences. Figures 1 and 2 display the Project components and surrounding area.

The operational noise sources from the Project include inverter stations and a substation transformer. The solar panels produce direct current (DC) voltage which will be converted to AC voltage through a series of inverters. This study assumes that forty (40) inverter stations will be installed within the Project area. Solar energy facilities operate by converting solar radiation into electricity, meaning the Project will only produce electricity between sunrise and sunset. After sunset, the site no longer receives solar radiation, and therefore the solar array inverters will operate in stand-by mode, emitting minimal noise. The Project will include one (1) step-up power transformer located within the substation footprint. The substation transformer is generally expected to operate at full capacity during daylight hours when the solar array will be generating power and operate less frequently during nighttime hours.

2.0 Terminology

Sound is caused by vibrations that generate waves of minute pressure fluctuations in the surrounding air. Sound levels are measured using a logarithmic decibel (dB) scale. Human hearing varies in sensitivity for different sound frequencies, and the frequency sensitivity changes based on the overall sound level. The ear is most sensitive to sound at frequencies between 800 and 8,000 hertz (Hz) and is least sensitive to sound at frequencies below 400 Hz or above 12,500 Hz. Consequently, several different frequency weighting schemes have been used to approximate the way the human ear responds to various frequencies at different sound levels. The A-weighted decibel, or dBA, scale is the most widely used for regulatory requirements, as it discriminates against low frequency noise similar to the response of the human ear at the low to moderate sound levels typical of environmental sources. Sound levels without a frequency weighting applied, referred to as unweighted or linear, are generally reported as dB or dBZ. Noise is defined as unwanted sound.

The sound power level (PWL) of a noise source is the strength or intensity of noise that the source emits regardless of the environment in which it is placed. Sound power is a property of the source, and therefore is independent of distance. The radiating sound power then produces a sound pressure level (SPL) at a distance where human beings can perceive it as audible sound. The sound pressure level is

dependent on the acoustical environment (e.g., indoor, outdoor, absorption, reflections) and the distance from the noise source. Unless otherwise stated, sound levels in this report are sound pressure levels.

Broadband (overall) sound levels which are expressed as a single number in decibels, account for acoustical energy across the frequency spectrum, including energy at low, middle, and high frequencies. To assess how much acoustical energy is present in different ranges of the frequency spectrum, noise can be separated into spectral (frequency) components using octave band filters. For environmental noise assessments, octave band noise levels are often expressed in unweighted decibels (dB) at octave band center frequencies from 31.5 to 8,000 Hz.

A change in sound levels of 3 decibels is generally considered to be the threshold of perception, whereas a change of 5 decibels is clearly perceptible, and a change of 10 decibels is perceived as a doubling or halving of loudness.

3.0 Regulatory Environment

The Minnesota Pollution Control Agency (MPCA) enforces the State of Minnesota noise rules under Minnesota Administrative Rules Chapter 7030[1]. Section 7030.0040 establishes noise standards (State noise limits) that define the noise levels that may be generated by developments, including solar energy facilities. The State noise limits are expressed in dBA using both L_{10} and L_{50} noise metrics and are evaluated over a one-hour period. The limits depend on the noise area classification (NAC) of the location where a person hears the noise and whether the noise occurs during daytime (7:00 a.m. – 10:00 p.m.) or nighttime (10:00 p.m. – 7:00 a.m.) periods, as shown in Table 3.1.

[1] A review of local noise ordinances was also conducted, and Section 7.19.D of the Castle Rock Township Zoning Ordinance states the following, “No noise shall be permitted or caused to be permitted that exceed the standards and rules adopted by the Minnesota Pollution Control Agency.”

Table 3.1. State of Minnesota Noise Limits

Noise Area Classification (NAC)	Daytime (7 a.m. – 10 p.m.)		Nighttime (10 p.m. – 7 a.m.)	
	dBA L_{10}	dBA L_{50}	dBA L_{10}	dBA L_{50}
NAC 1 Residences, religious uses, camping and picnicking, health services, hotels, educational services.	65	60	55	50
NAC 2 Retail, business and government services, recreational activities, transit terminals	70	65	70	65
NAC 3 Manufacturing, fairgrounds and amusement parks, agricultural and forestry activities	80	75	80	75

When inverters and substation transformers are in operation, the noise generated by the equipment is generally continuous and the noise level does not fluctuate significantly over time. Thus, the noise levels generated by the equipment are expected to be similar when measured using the Leq, L_{10}, or L_{50} metrics. For this analysis, the estimated Project Leq noise level has been compared to the most stringent noise limits of 60 dBA L_{50} during daytime and 50 dBA L_{50} during nighttime to evaluate compliance at NAC 1 residential receptors.

4.0 Sensitive Receptor Locations

Publicly available aerial imagery and on-site field verification of residence occupancy were utilized to identify noise-sensitive receptors (also referred to as sensitive receptors), based on the land uses listed in Table 3.1, in the vicinity of the solar facility. A total of 154 residential receptors (NAC 1) were identified within one-half mile of the Project limits. Locations of sensitive receptors are shown on Figures 1-6. A tabulated summary of sensitive receptors is provided in Appendix C.

5.0 Noise Modeling Methodology

The Project, as currently proposed, includes forty (40) inverter stations within the solar generation arrays and one (1) substation transformer, as shown on Figures 1-6. These are the primary operational noise sources associated with the Project.

TMEIC PVU-0840GR solar array inverter stations are expected to be used for the Project. Each inverter station will include five inverter modules and a medium voltage transformer. This analysis assumed a sound power level of 113 dBA for each inverter station based on manufacturer sound testing data for the specified unit. The inverter octave band noise spectrum from the manufacturer noise testing report was utilized.

The Project substation is expected to include one 158 megavolt-ampere (MVA) step-up power transformer. The NEMA TR-1 standard[2] was used to estimate a transformer NEMA noise rating of 81.4 dBA for the forced air cooling (ONAF2) condition with fans operating. Methods from the Electric Power Plant Environmental Noise Guide[3] were then used to estimate the overall sound power level of 101.3 dBA and the octave band spectra.

The equipment sound power levels used for the noise assessment are presented in Table 5.1.

Table 5.1. Equipment Sound Power Levels

Equipment	Octave Band Sound Power Level (dB)									Broadband Sound Power Level, dBA
	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	
Inverter Station	111	111	113	112	111	107	104	103	97	113
Substation transformer	98	104	106	101	101	95	90	85	78	101

Sound attenuates between a source and receptor location due to a variety of factors, including but not limited to, distance between source and receptor, atmospheric absorption, ground type, topography, shielding from solid structures, vegetation, and meteorological conditions. Operational noise levels from the proposed Project equipment were estimated using the CadnaA model by Datakustik, which utilizes the ISO 9613-2 standard[4] algorithms for outdoor sound propagation.

A CadnaA Project base model was first developed by importing topographic data from the U.S. Geological Survey National Elevation Dataset and aerial imagery. The inverter and substation transformer noise sources were then modeled as point sources within CadnaA based on the current Project layout. Receptor points were added for the identified sensitive receptor locations at five feet above ground. Additional assumptions that were used to estimate worst-case operational noise levels included the following:

- A ground absorption value of 0.5 (on a scale of 0.0 representing hard ground or water bodies to 1.0 representing porous ground) was used.
- No sound attenuation from vegetation (foliage) to simulate a worst-case condition when leaves have fallen off trees.
- Meteorological conditions are conducive to sound propagation with all receptors located downwind of all noise sources.

6.0 Predicted Operational Noise Results

An operational noise analysis was completed for the Project inverter stations and substation transformer for both daytime and nighttime conditions. The modeled daytime operational condition includes noise from

[2] National Electrical Manufacturers Association (NEMA) Standards Publication TR 1-2013 (R2019). Transformers, Step Voltage Regulators and Reactors.

[3] Edison Electric Institute. Electric Power Plant Environmental Noise Guide. Volume 1 2nd Edition.

[4] ISO 9613-2: 1996. Acoustics – Attenuation of sound during propagation outdoors. Part 2: General method of calculation.

solar array inverter stations and the substation transformer. The modeled nighttime operational condition includes noise from the substation transformer.

Estimated noise levels at each sensitive receptor location are provided in tabular format in Appendix C for the daytime and nighttime conditions. Noise contours, which illustrate areas of equal sound level, are displayed on Figures 2 and 3. The figures present the expected broadband A-weighted noise levels due to the operation of the Project noise sources. The noise contours do not include the contribution of ambient sound levels.

6.1 PREFERRED

For the Preferred layout, the results show that Leq noise levels generated by the Project are not expected to exceed 57 dBA during daytime and 37 dBA during nighttime at residences and other noise-sensitive uses, which are below the most stringent MPCA noise limits of 60 dBA L_{50} during daytime and 50 dBA L_{50} during nighttime. The highest estimated daytime noise level was at receptor R-016, and the highest estimated nighttime noise level was at receptor R-025.

The Appendix C results table and noise contour lines shown in Figures 3 and 5 further demonstrate that the expected daytime and nighttime noise levels at the identified receptor locations comply with the MPCA noise limits. Therefore, the results of this pre-construction noise study demonstrate that the Project is expected to operate in compliance with the MPCA noise regulations with the Preferred layout.

6.2 ALTERNATE OPTION

For the Alternate layout, the results show that Leq noise levels generated by the Project are not expected to exceed 57 dBA during daytime and 35 dBA during nighttime at residences and other noise-sensitive uses, which are below the most stringent MPCA noise limits of 60 dBA L_{50} during daytime and 50 dBA L_{50} during nighttime. The highest estimated daytime noise level was at receptor R-016, and the highest estimated nighttime noise level was at receptor R-018.

The Appendix C results table and noise contour lines shown in Figures 4 and 6 further demonstrate that the expected daytime and nighttime noise levels at the identified receptor locations comply with the MPCA noise limits. Therefore, the results of this pre-construction noise study demonstrate that the Project is expected to operate in compliance with the MPCA noise regulations with the Alternate layout.

7.0 Conclusion

This noise assessment was completed to evaluate operational compliance of the Castle Rock Solar project with the Minnesota Pollution Control Agency noise regulations. An operational noise model was developed and utilized to estimate the noise levels generated by Project equipment, including noise from the proposed solar array inverter stations and the Project substation transformer, for both the “Preferred” and “Alternate” layouts. The maximum Project-generated noise level at residences and other sensitive receptors was estimated to be an equivalent continuous sound level (Leq) of 57 A-weighted decibels (dBA) during daytime and 37 dBA during nighttime for the Preferred layout, and 57 dBA during daytime and 35 dBA during nighttime for the Alternate layout. The noise modeling results demonstrate that expected daytime and nighttime noise levels at the identified receptor locations are below MPCA limits and that the Project is expected to operate in compliance with the MPCA noise regulations.

Figures

Figure 1

Project Site Layout – Preferred

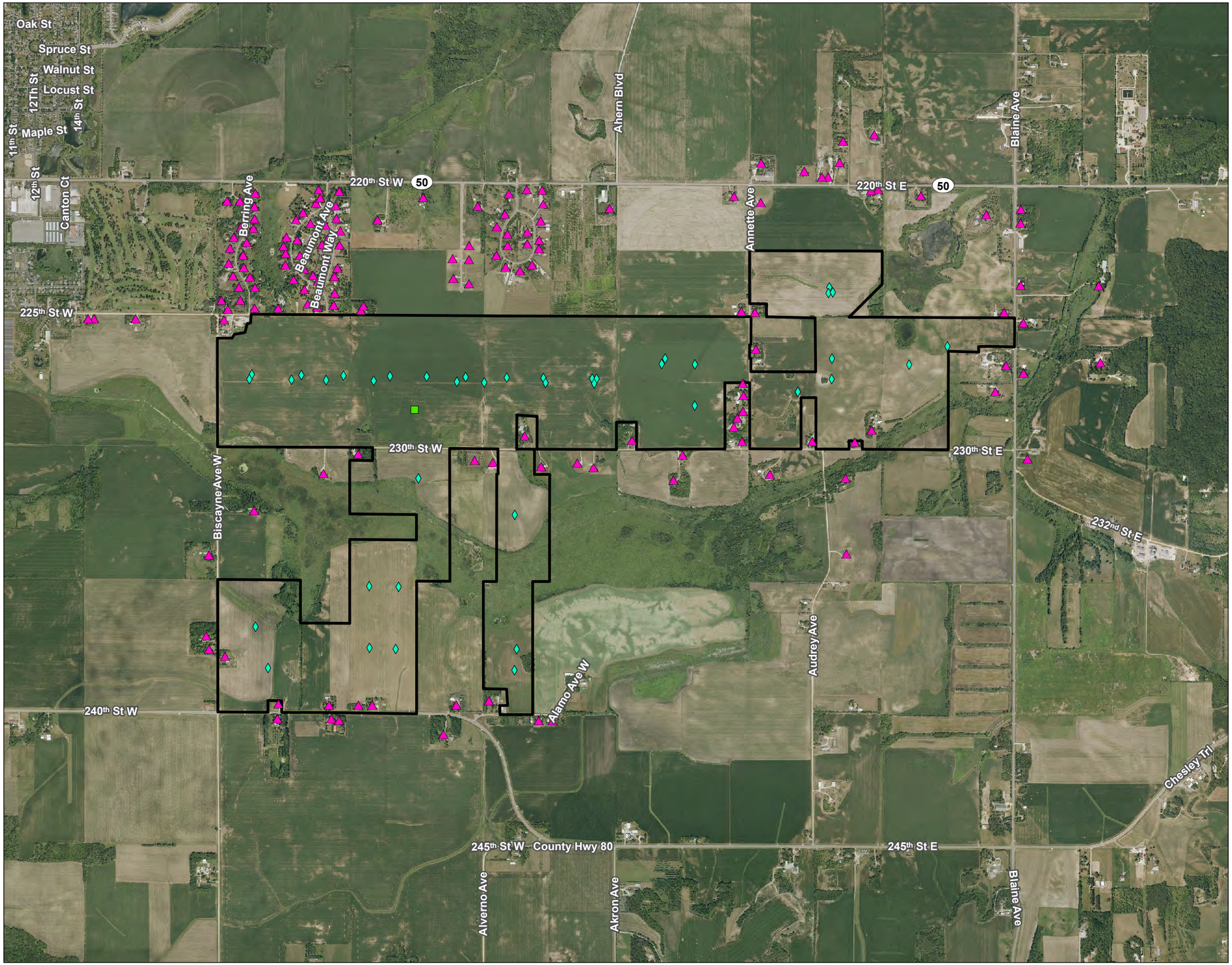

Figure No.

1

Title

Project Site Layout (Preferred)

Client/Project

Matrix Renewables USA LLC
Castle Rock

193709215

Project Location
T. of Castle Rock
Dakota Co., MN

Prepared by JM on 2024-08-26
TR by ML on 2024-08-27
IR by XX on 2024-XX-XX

N

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(At original document size of 11x17)
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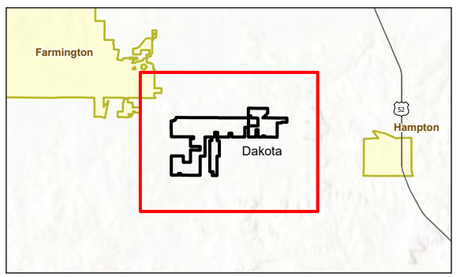
Legend

- Project Boundary
- Sensitive Receptor
- Inverter
- Substation



Notes

1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: Stantec, Matrix Renewables USA, NADS, Dakota Co., USGS
3. Background: NAIP 2023

Stantec

Figure 2

Project Site Layout – Alternate Option

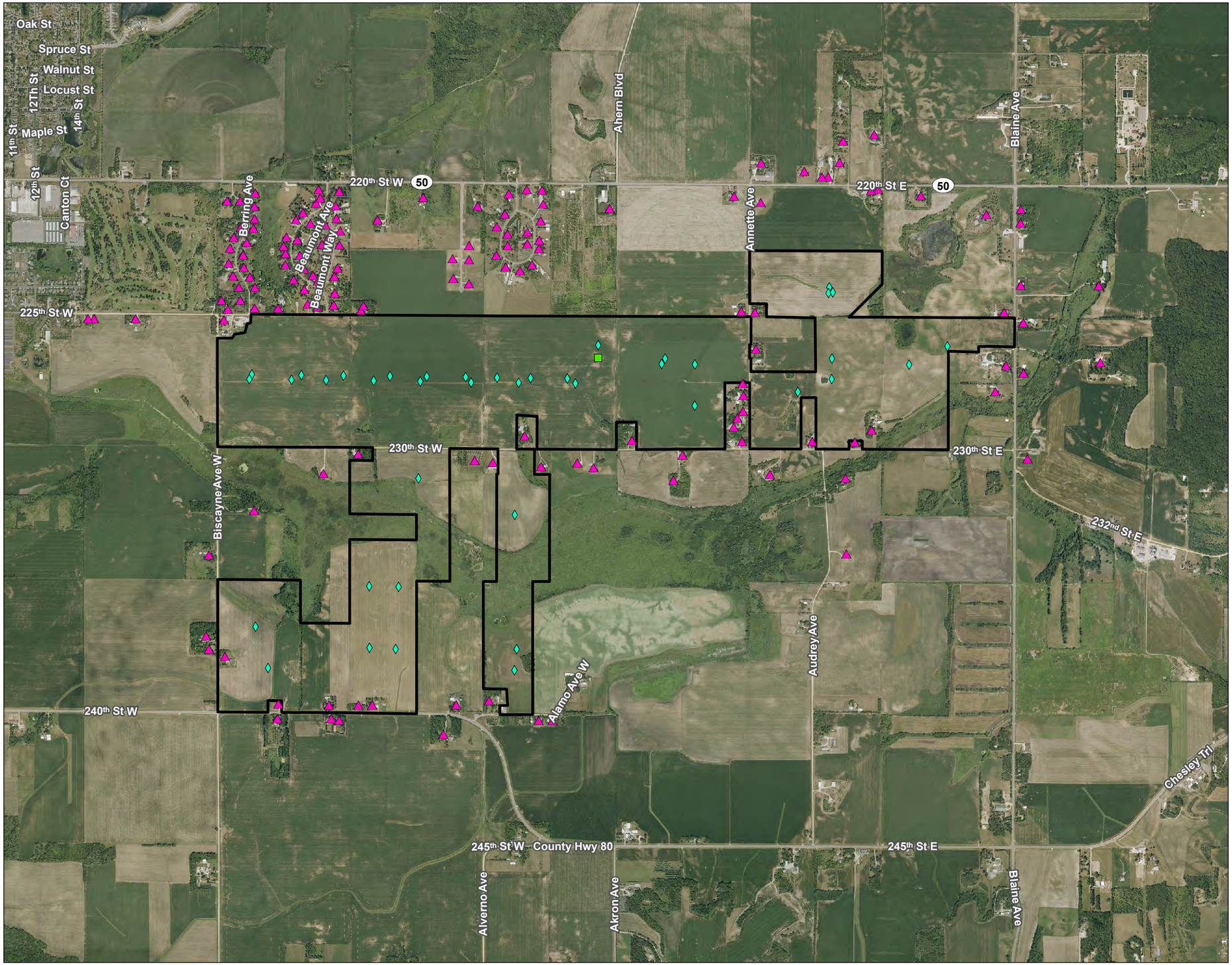


Figure No.

2

Title

Project Site Layout (Alternate)

Client/Project 193709215

Matrix Renewables USA LLC
Castle Rock

Project Location
T. of Castle Rock
Dakota Co., MN

Prepared by JM on 2024-08-26
TR by ML on 2024-08-27
IR by XX on 2024-XX-XX

N

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(At original document size of 11x17)
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Legend

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- Inverter
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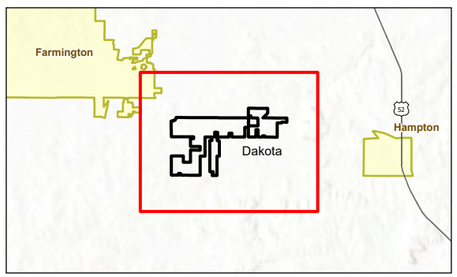

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Stantec

Figure 3

Daytime Operational Noise Results – Preferred

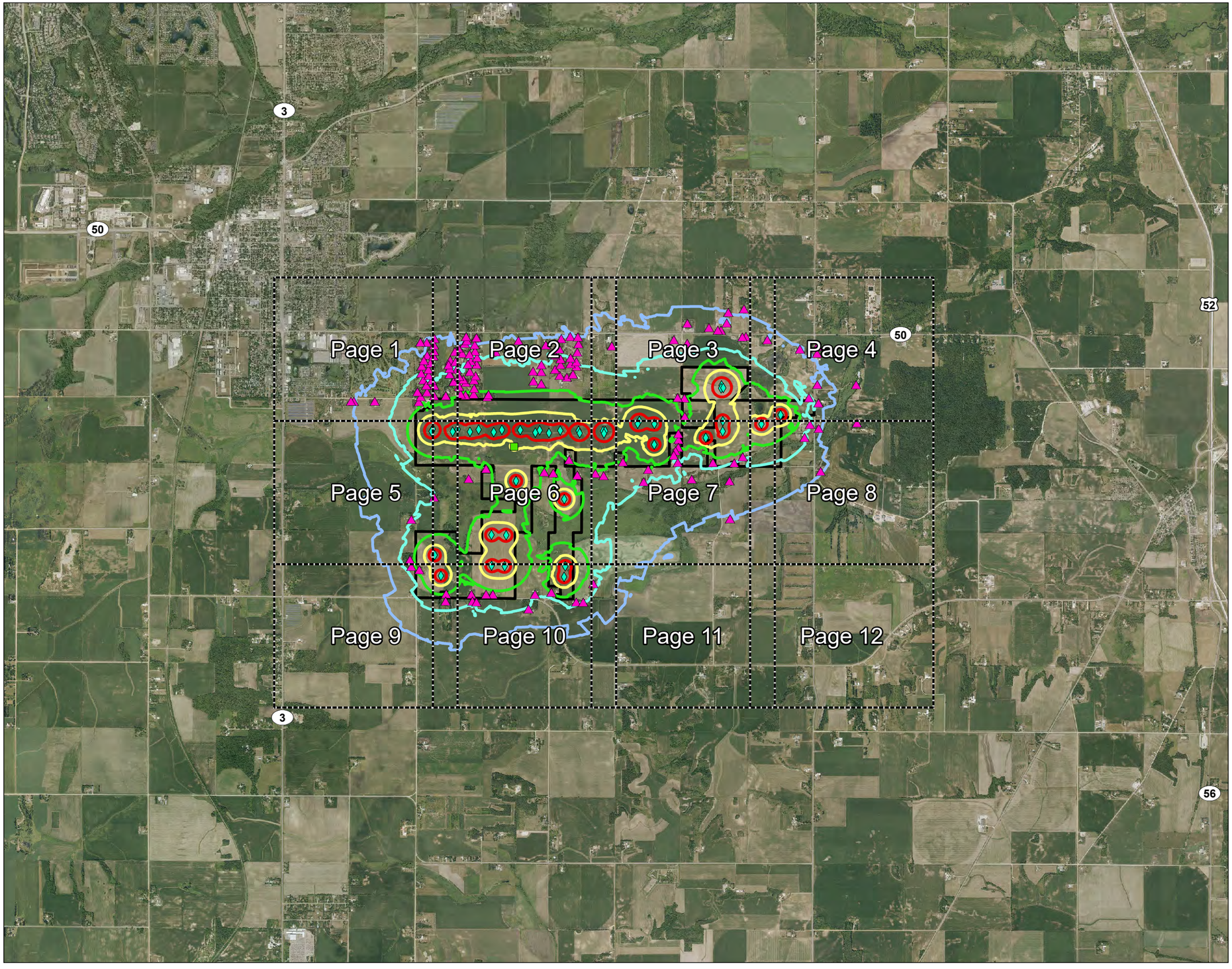

Figure No.

3

Title

Operational Noise Results (Preferred - Daytime)

Client/Project 193709215

Matrix Renewables USA LLC
Castle Rock

Project Location
T. of Castle Rock
Dakota Co., MN

Prepared by JM on 2024-08-26
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IR by XX on 2024-XX-XX

N

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(At original document size of 11x17)
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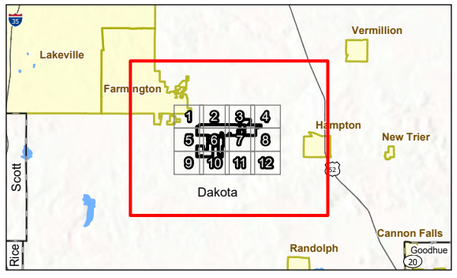
Legend

- Project Boundary
- Sensitive Receptor
- Inverter
- Substation

Noise Contour (dBA)

- 45
- 50
- 55
- 60
- 65



Index Map

Notes

1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: Stantec, Matrix Renewables USA, NADS, Dakota Co., USGS
3. Background: NAIP 2023

Stantec

Figure No.

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N

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Legend
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Noise Contour (dBA)
- 45
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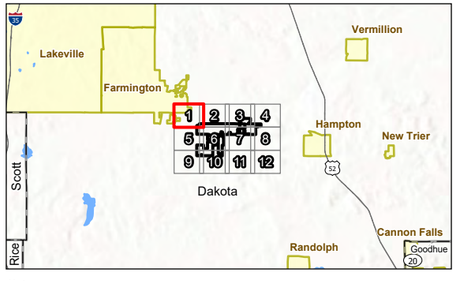

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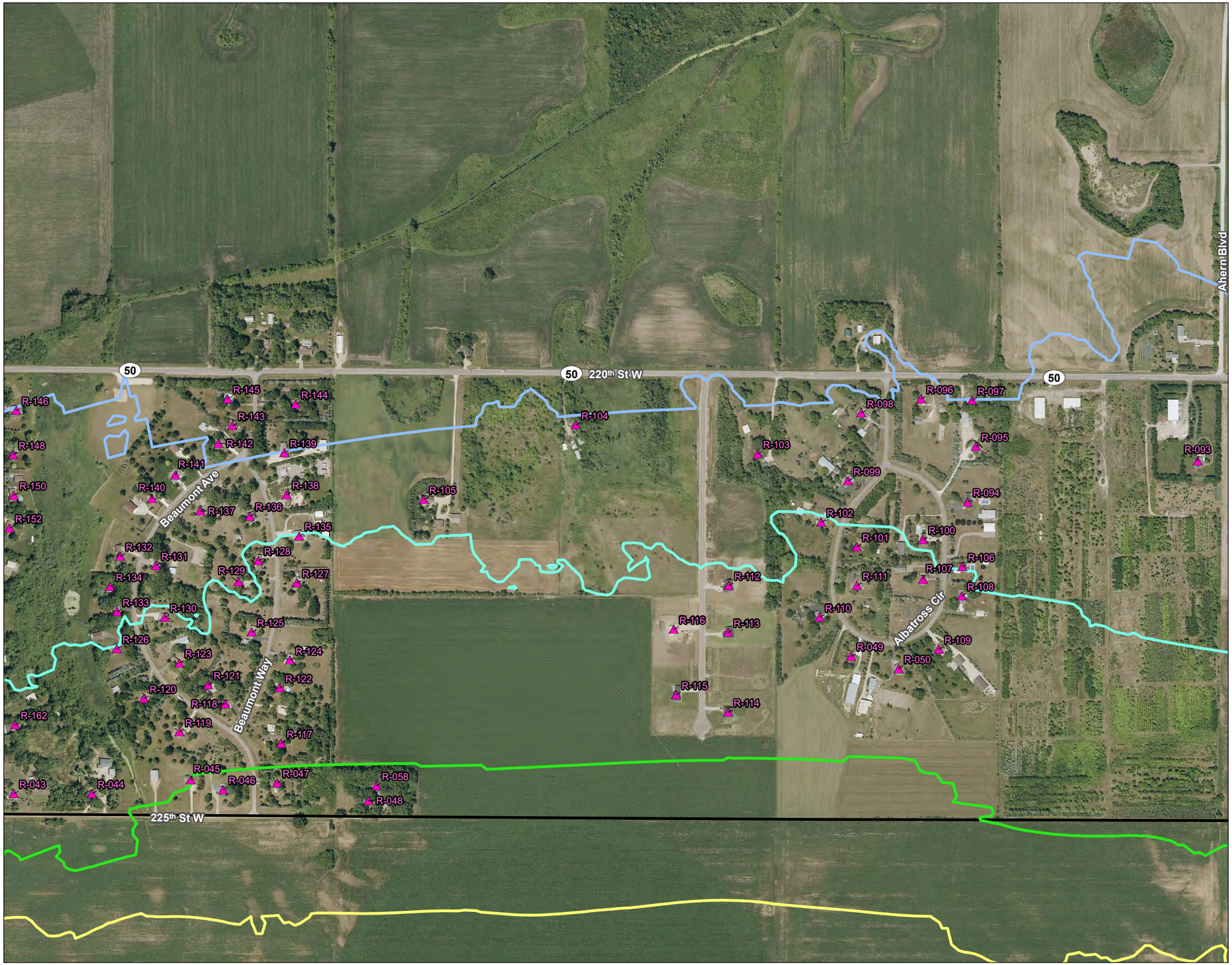

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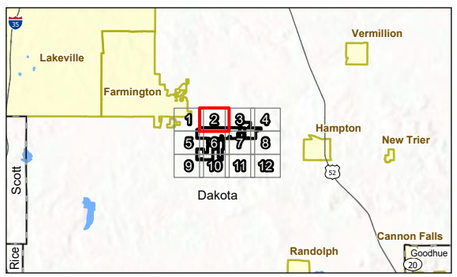

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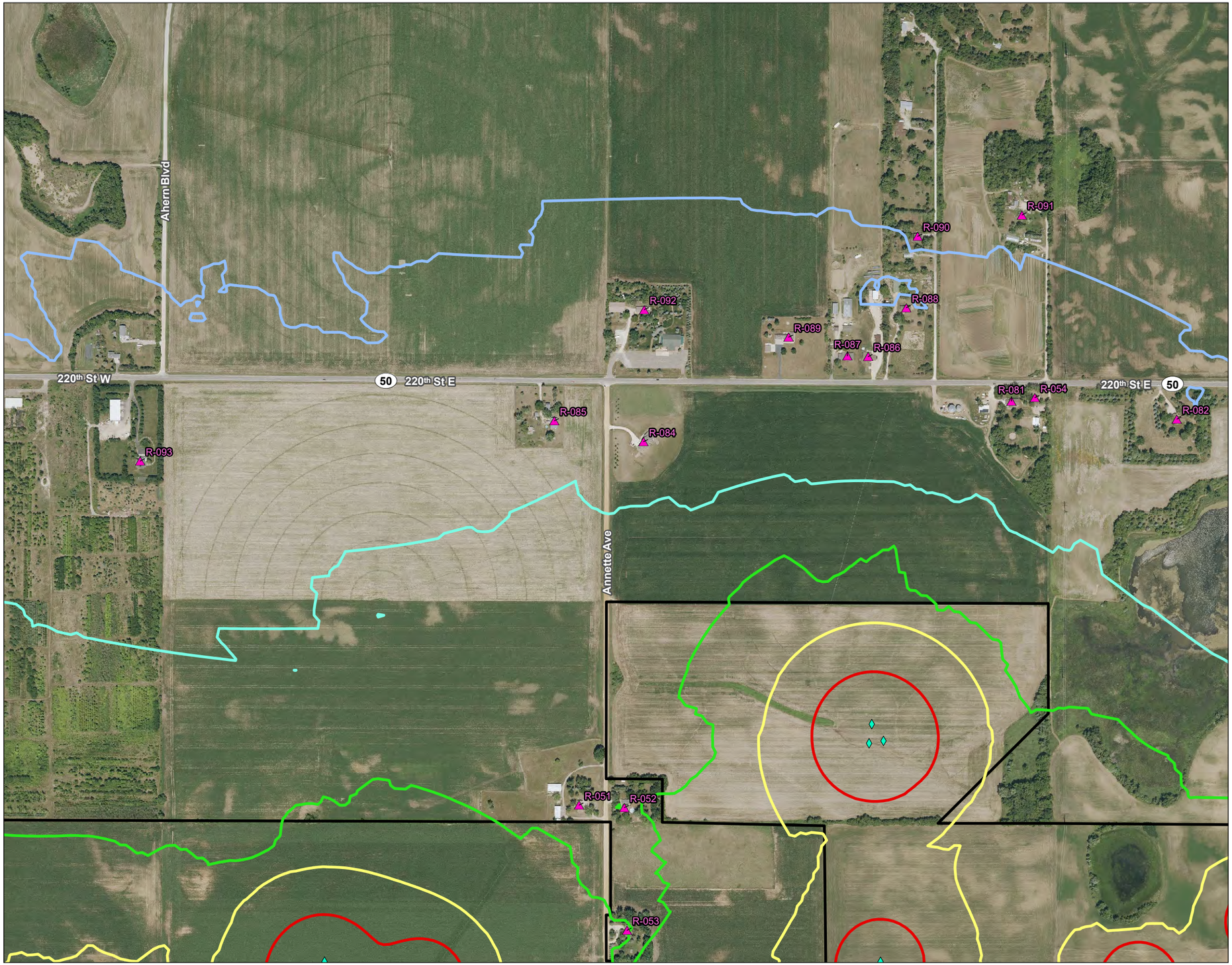

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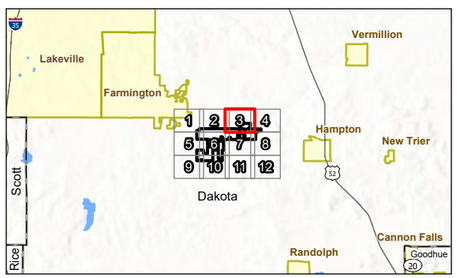

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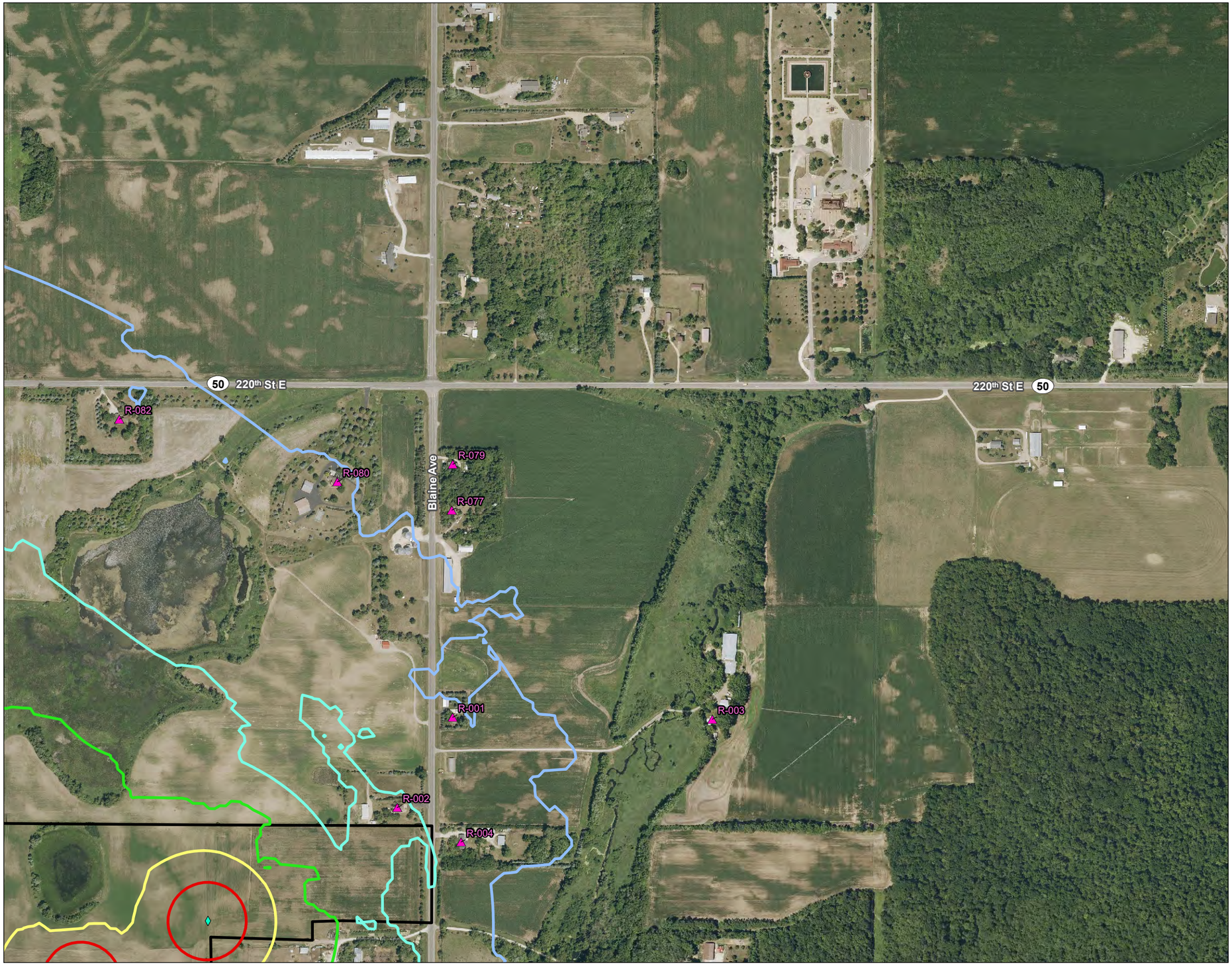

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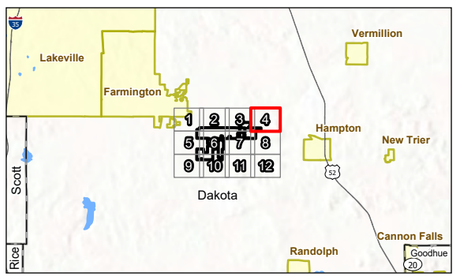

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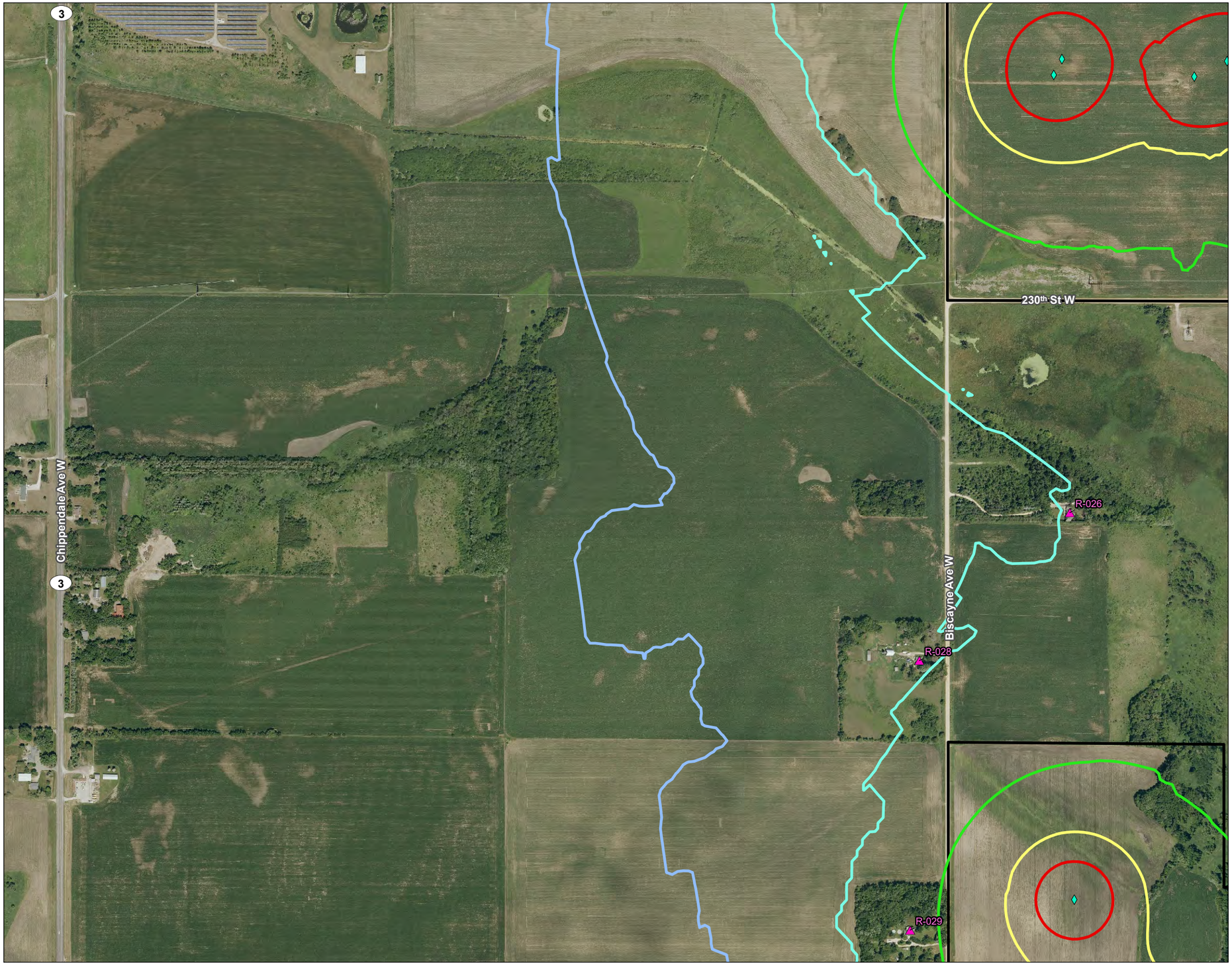

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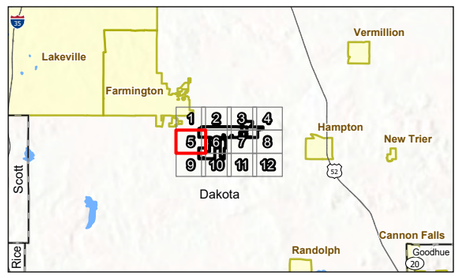

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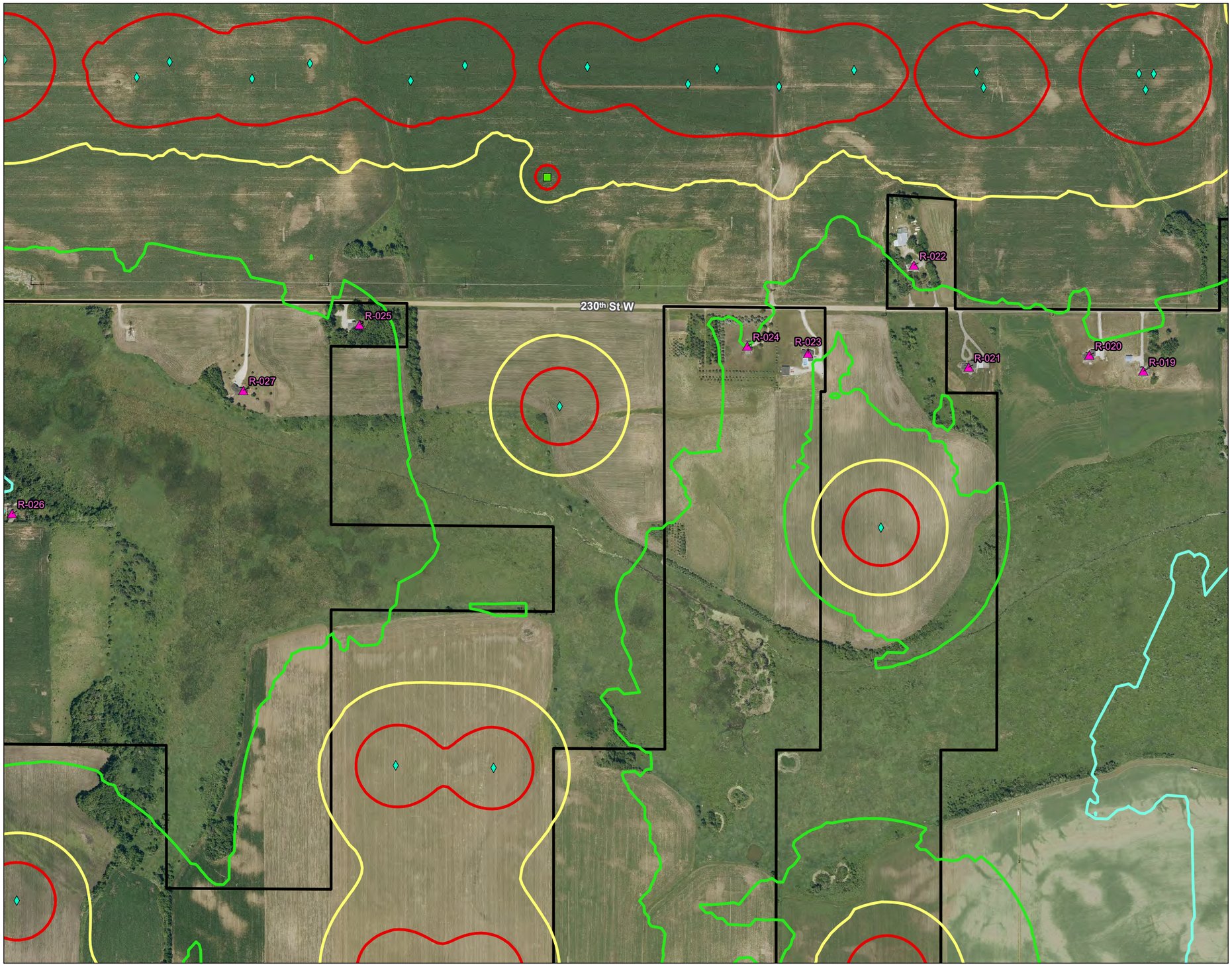

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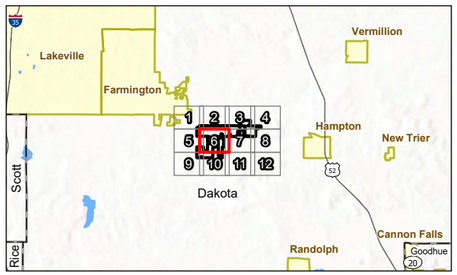

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3. Background: NAIP 2023

Stantec

V:\1937\Active\193709215\03_data\gis_cad\gis\mxds\Noise\193709215_CastleRock_Noise\193709215_CastleRock_Noise.aprx Revised: 2024-08-28 By: jmarty

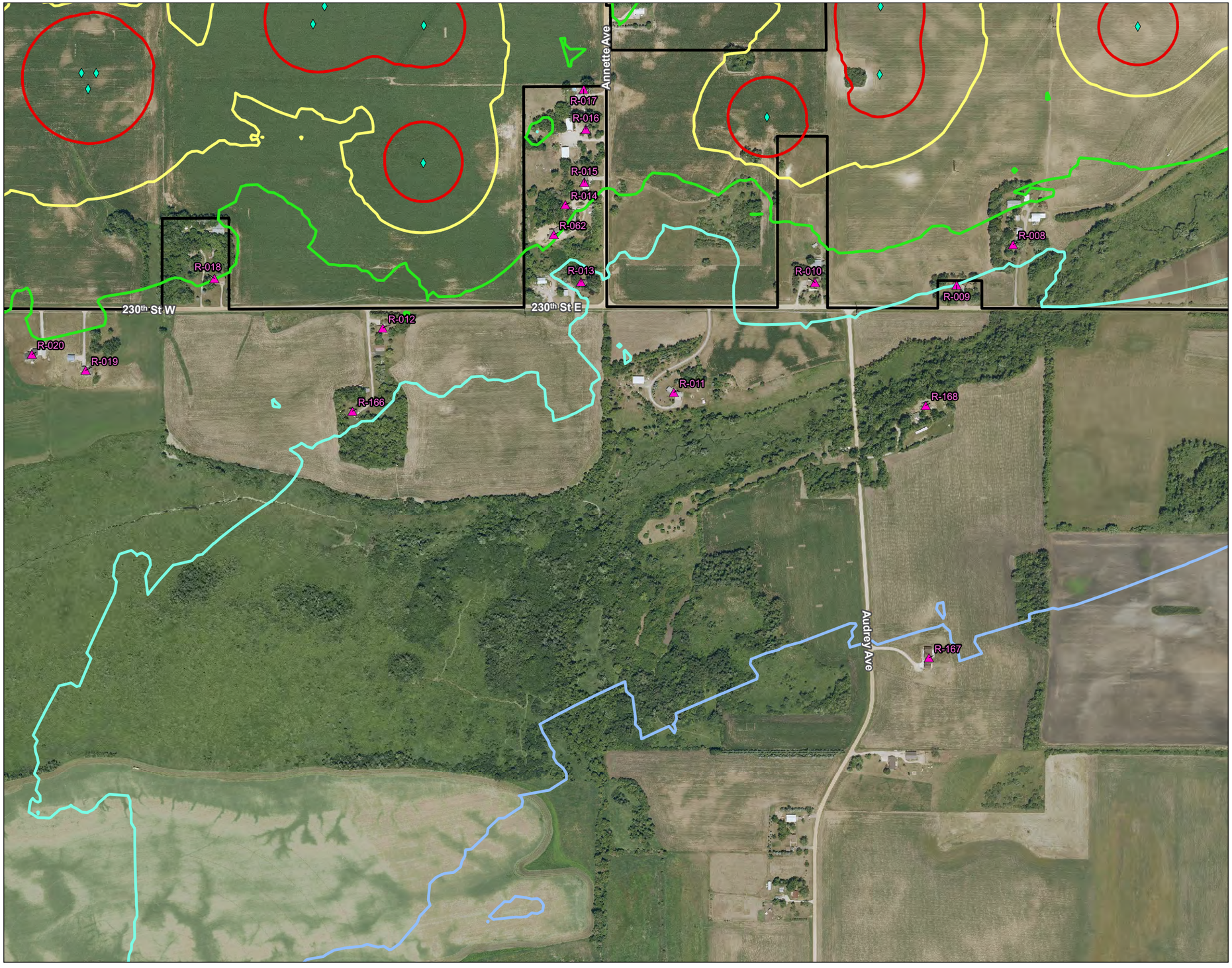


Figure No.

3

Title

Operational Noise Results (Preferred - Daytime)

Client/Project 193709215

Matrix Renewables USA LLC
Castle Rock

Project Location
T. of Castle Rock
Dakota Co., MN

Prepared by JM on 2024-08-26
TR by ML on 2024-08-27
IR by XX on 2024-XX-XX

N

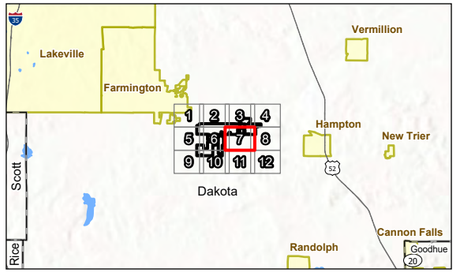
0 300 600 Feet
(At original document size of 11x17)
1:7,200

Legend

- Project Boundary
- Sensitive Receptor
- Inverter
- Substation

Noise Contour (dBA)

- 45
- 50
- 55
- 60
- 65



Notes

1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: Stantec, Matrix Renewables USA, NADS, Dakota Co., USGS
3. Background: NAIP 2023

Stantec

V:\1937\Active\193709215\03_data\gis_cad\gismxds\Noise\193709215_CastleRock_Noise\193709215_CastleRock_Noise.aprx Revised: 2024-08-28 By: jmarty

Figure No.

3

Title

Operational Noise Results (Preferred - Daytime)

Client/Project 193709215

Matrix Renewables USA LLC
Castle Rock

Project Location
T. of Castle Rock
Dakota Co., MN

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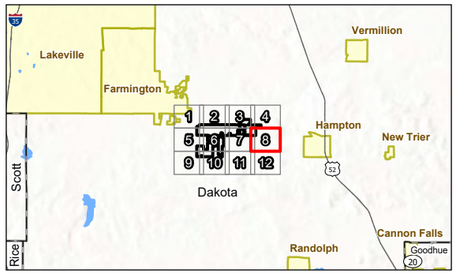
1:7,200

Legend

- Project Boundary
- Sensitive Receptor
- Inverter
- Substation

Noise Contour (dBA)

- 45
- 50
- 55
- 60
- 65



Notes

1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: Stantec, Matrix Renewables USA, NADS, Dakota Co., USGS
3. Background: NAIP 2023

Stantec

Figure No.

3

Title

Operational Noise Results (Preferred - Daytime)

Client/Project 193709215

Matrix Renewables USA LLC
Castle Rock

Project Location
T. of Castle Rock
Dakota Co., MN

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0 300 600 Feet
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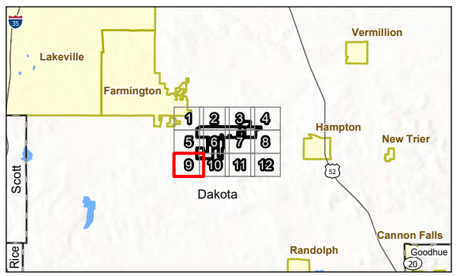
Legend

- Project Boundary
- Sensitive Receptor
- Inverter
- Substation

Noise Contour (dBA)

- 45
- 50
- 55
- 60
- 65



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1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: Stantec, Matrix Renewables USA, NADS, Dakota Co., USGS
3. Background: NAIP 2023

Stantec

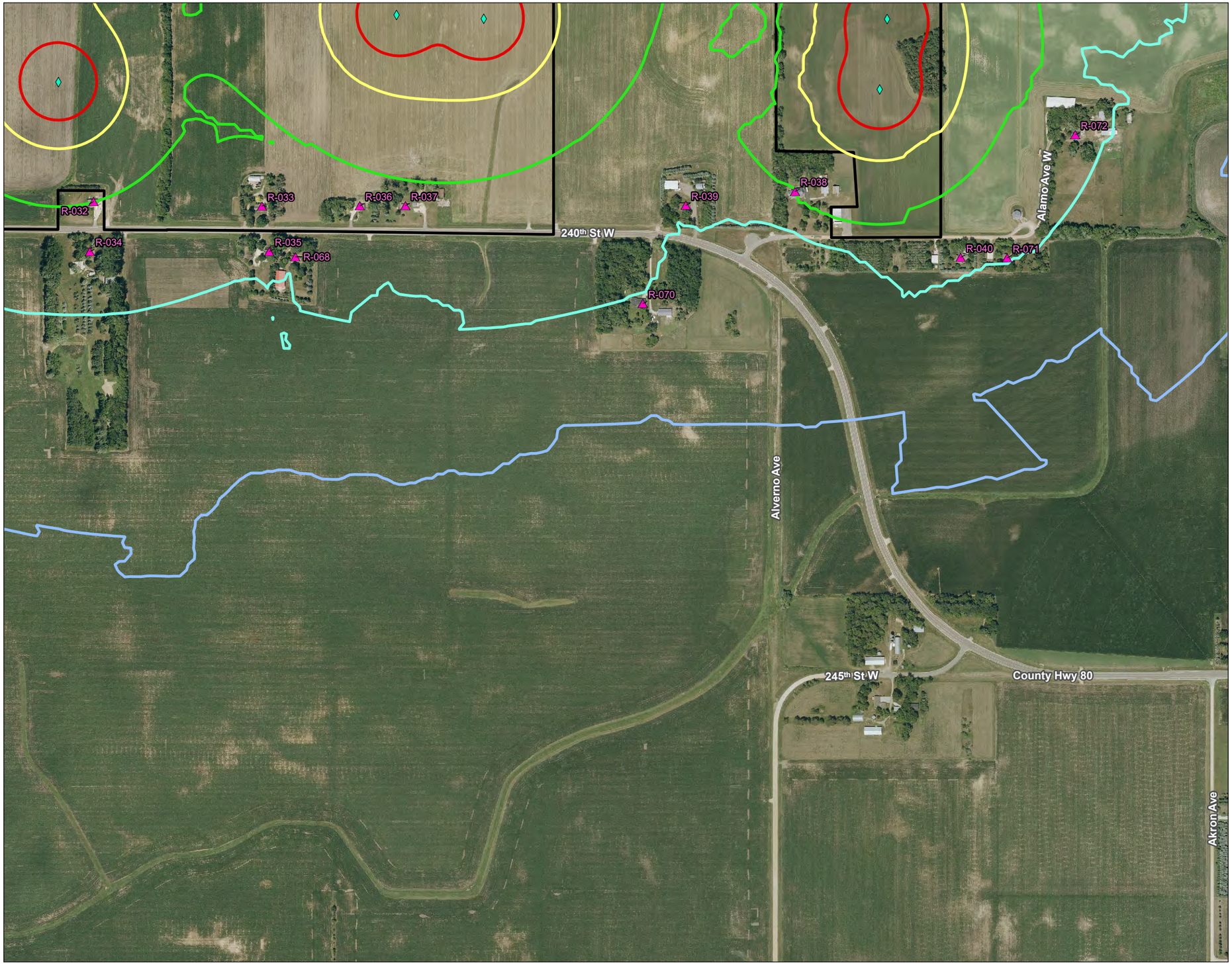

Figure No.

3

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Operational Noise Results (Preferred - Daytime)

Client/Project 193709215

Matrix Renewables USA LLC
Castle Rock

Project Location
T. of Castle Rock
Dakota Co., MN

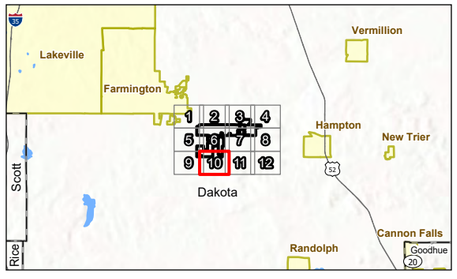
Prepared by JM on 2024-08-26
TR by ML on 2024-08-27
IR by XX on 2024-XX-XX

N

0 300 600 Feet
(At original document size of 11x17)
1:7,200

Legend
- Project Boundary
- Sensitive Receptor
- Inverter
- Substation

Noise Contour (dBA)
- 45
- 50
- 55
- 60
- 65



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1. Coordinate System: NAD 1983 UTM Zone 15N
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3. Background: NAIP 2023

Stantec

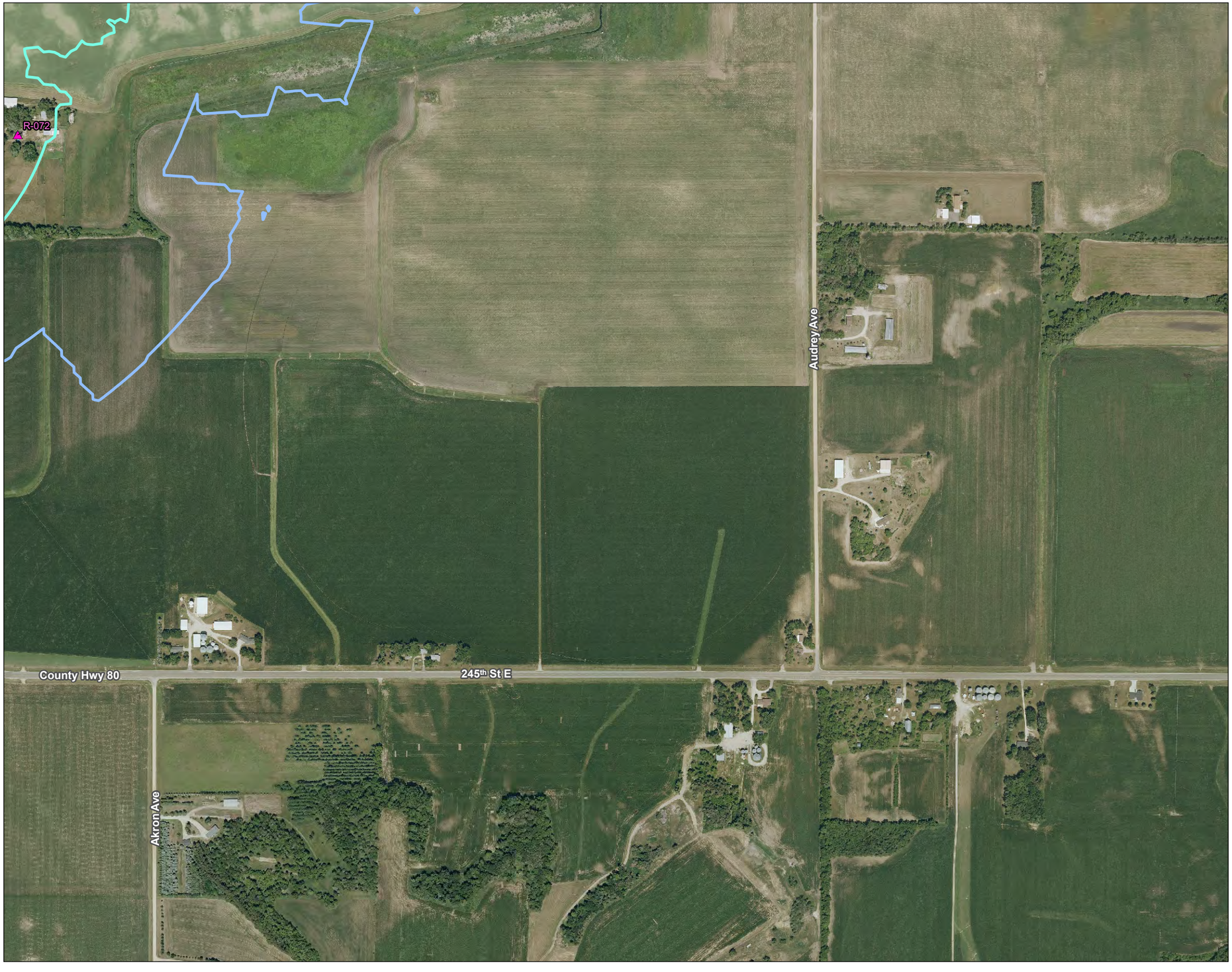

Figure No.

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Title

Operational Noise Results (Preferred - Daytime)

Client/Project 193709215

Matrix Renewables USA LLC
Castle Rock

Project Location
T. of Castle Rock
Dakota Co., MN

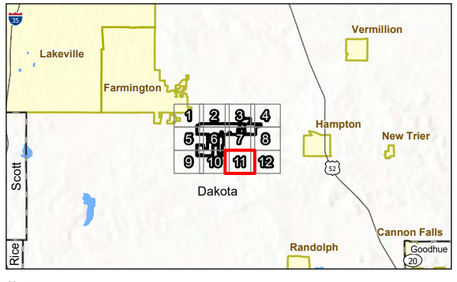
Prepared by JM on 2024-08-26
TR by ML on 2024-08-27
IR by XX on 2024-XX-XX

N

0 300 600 Feet
(At original document size of 11x17)
1:7,200

Legend
- Project Boundary
- Sensitive Receptor
- Inverter
- Substation

Noise Contour (dBA)
- 45
- 50
- 55
- 60
- 65



Notes
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3. Background: NAIP 2023

Stantec

Figure No.

3

Title

Operational Noise Results (Preferred - Daytime)

Client/Project 193709215

Matrix Renewables USA LLC
Castle Rock

Project Location
T. of Castle Rock
Dakota Co., MN

Prepared by JM on 2024-08-26
TR by ML on 2024-08-27
IR by XX on 2024-XX-XX

N

0 300 600 Feet

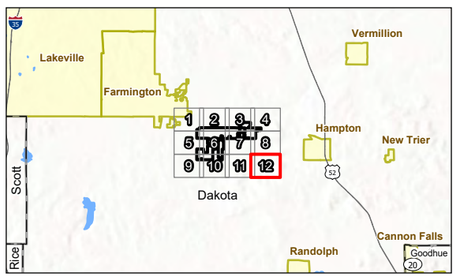
(At original document size of 11x17)
1:7,200

Legend

- Project Boundary
- Sensitive Receptor
- Inverter
- Substation

Noise Contour (dBA)

- 45
- 50
- 55
- 60
- 65



Notes

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2. Data Sources: Stantec, Matrix Renewables USA, NADS, Dakota Co., USGS
3. Background: NAIP 2023

Stantec

Figure 4

Nighttime Operational Noise Results – Preferred

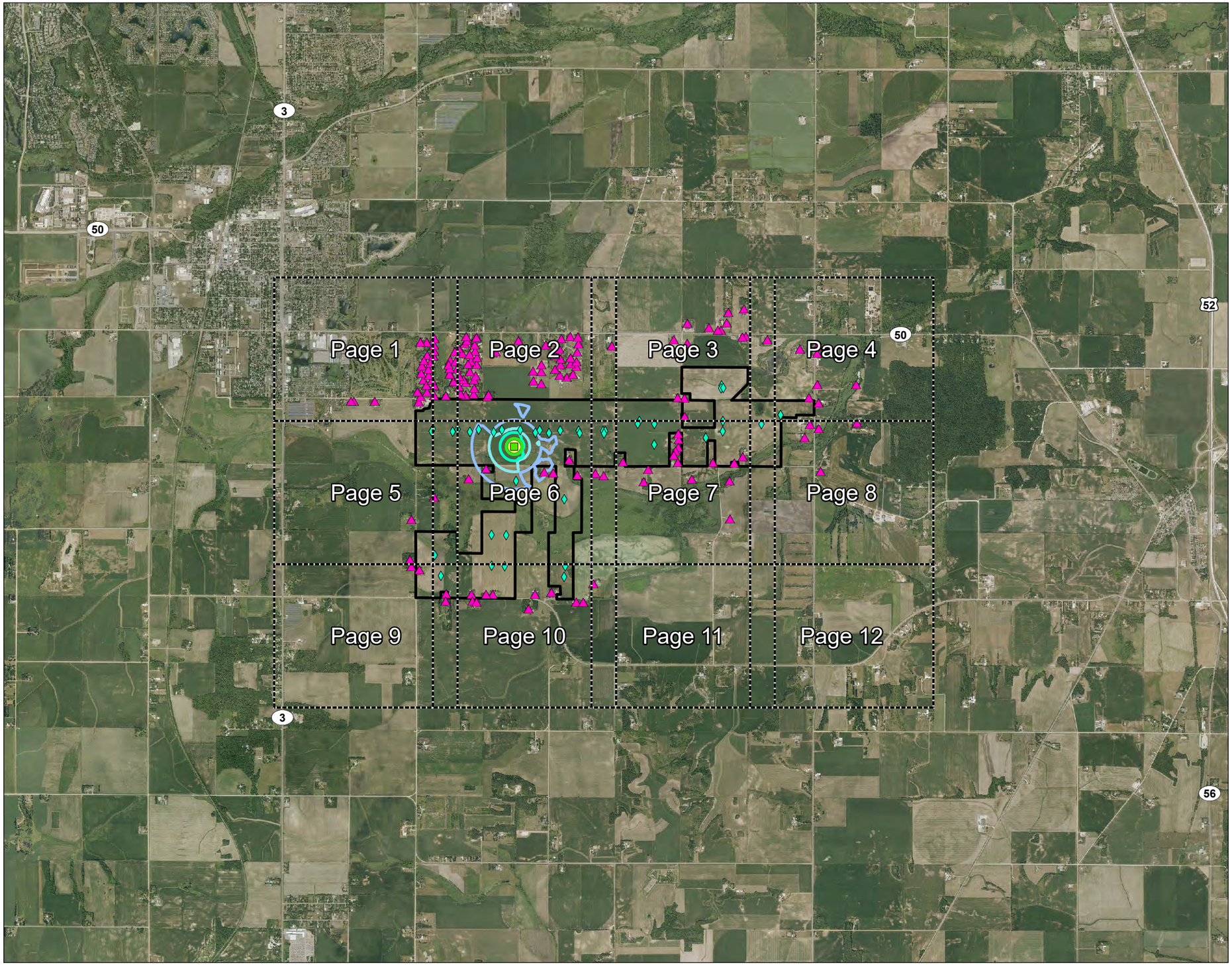


Figure No.

4

Title

Operational Noise Results (Preferred- Nighttime)

Client/Project

193709215

Matrix Renewables USA LLC
Castle Rock

Project Location
T. of Castle Rock
Dakota Co., MN

Prepared by JM on 2024-08-26
TR by ML on 2024-08-27
IR by XX on 2024-XX-XX

N

0 2,000 4,000 Feet

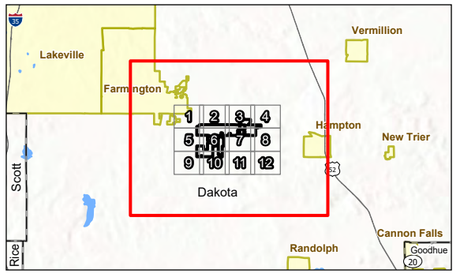
(At original document size of 11x17)
1:48,000

Legend

- Project Boundary
- Sensitive Receptor
- Inverter
- Substation

Noise Contour (dBA)

- 35
- 40
- 45
- 50
- 55
- 60
- 65



Index Map

Notes

1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: Stantec, Matrix Renewables USA, NADS, Dakota Co., USGS
3. Background: NAIP 2023

Stantec

Figure No.

4

Title

Operational Noise Results (Preferred - Nighttime)

Client/Project 193709215

Matrix Renewables USA LLC
Castle Rock

Project Location
T. of Castle Rock
Dakota Co., MN

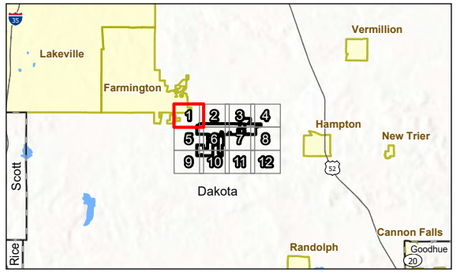
Prepared by JM on 2024-08-26
TR by ML on 2024-08-27
IR by XX on 2024-XX-XX

N

0 300 600 Feet
(At original document size of 11x17)
1:7,200

Legend
- Project Boundary
- Sensitive Receptor
- Inverter
- Substation

Noise Contour (dBA)
- 35
- 40
- 45
- 50
- 55
- 60
- 65



Notes
1. Coordinate System: NAD 1983 UTM Zone 15N
2. Data Sources: Stantec, Matrix Renewables USA, NADS, Dakota Co., USGS
3. Background: NAIP 2023

Stantec

Figure No.

4

Title

Operational Noise Results (Preferred - Nighttime)

Client/Project

193709215

Matrix Renewables USA LLC
Castle Rock

Project Location
T. of Castle Rock
Dakota Co., MN

Prepared by JM on 2024-08-26
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IR by XX on 2024-XX-XX

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(At original document size of 11x17)
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Legend

- Project Boundary
- Sensitive Receptor
- Inverter
- Substation

Noise Contour (dBA)

- 35
- 40
- 45
- 50
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- 60
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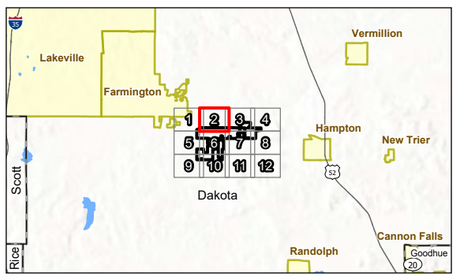

Notes

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3. Background: NAIP 2023

Stantec

Figure No.

4

Title

Operational Noise Results (Preferred - Nighttime)

Client/Project

193709215

Matrix Renewables USA LLC
Castle Rock

Project Location
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Legend

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- Inverter
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Noise Contour (dBA)

- 35
- 40
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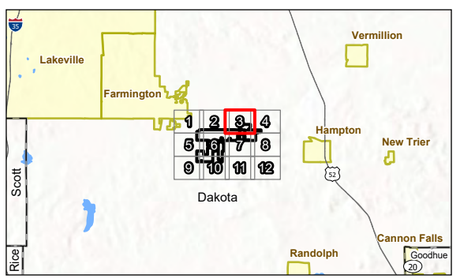

Notes

1. Coordinate System: NAD 1983 UTM Zone 15N
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3. Background: NAIP 2023

Stantec

Figure No.
4

Title
Operational Noise Results (Preferred - Nighttime)

Client/Project 193709215
Matrix Renewables USA LLC
Castle Rock

Project Location
T. of Castle Rock
Dakota Co., MN

Prepared by JM on 2024-08-26
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Legend
- Project Boundary
- Sensitive Receptor
- Inverter
- Substation

Noise Contour (dBA)
- 35
- 40
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- 50
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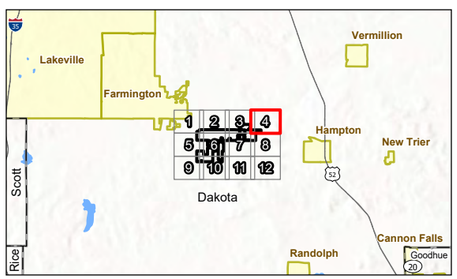
- 65



Notes
1. Coordinate System: NAD 1983 UTM Zone 15N
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3. Background: NAIP 2023

Stantec

Figure No.

4

Title

Operational Noise Results (Preferred - Nighttime)

Client/Project

Matrix Renewables USA LLC
Castle Rock

193709215

Project Location
T. of Castle Rock
Dakota Co., MN

Prepared by JM on 2024-08-26
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Legend

- Project Boundary
- Sensitive Receptor
- Inverter
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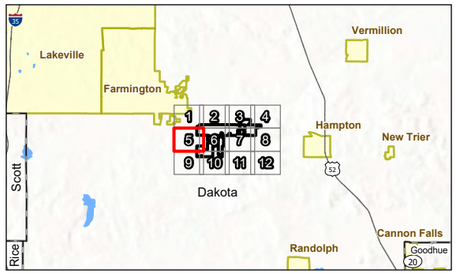
Noise Contour (dBA)

- 35
- 40
- 45
- 50
- 55
- 60
- 65



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3. Background: NAIP 2023

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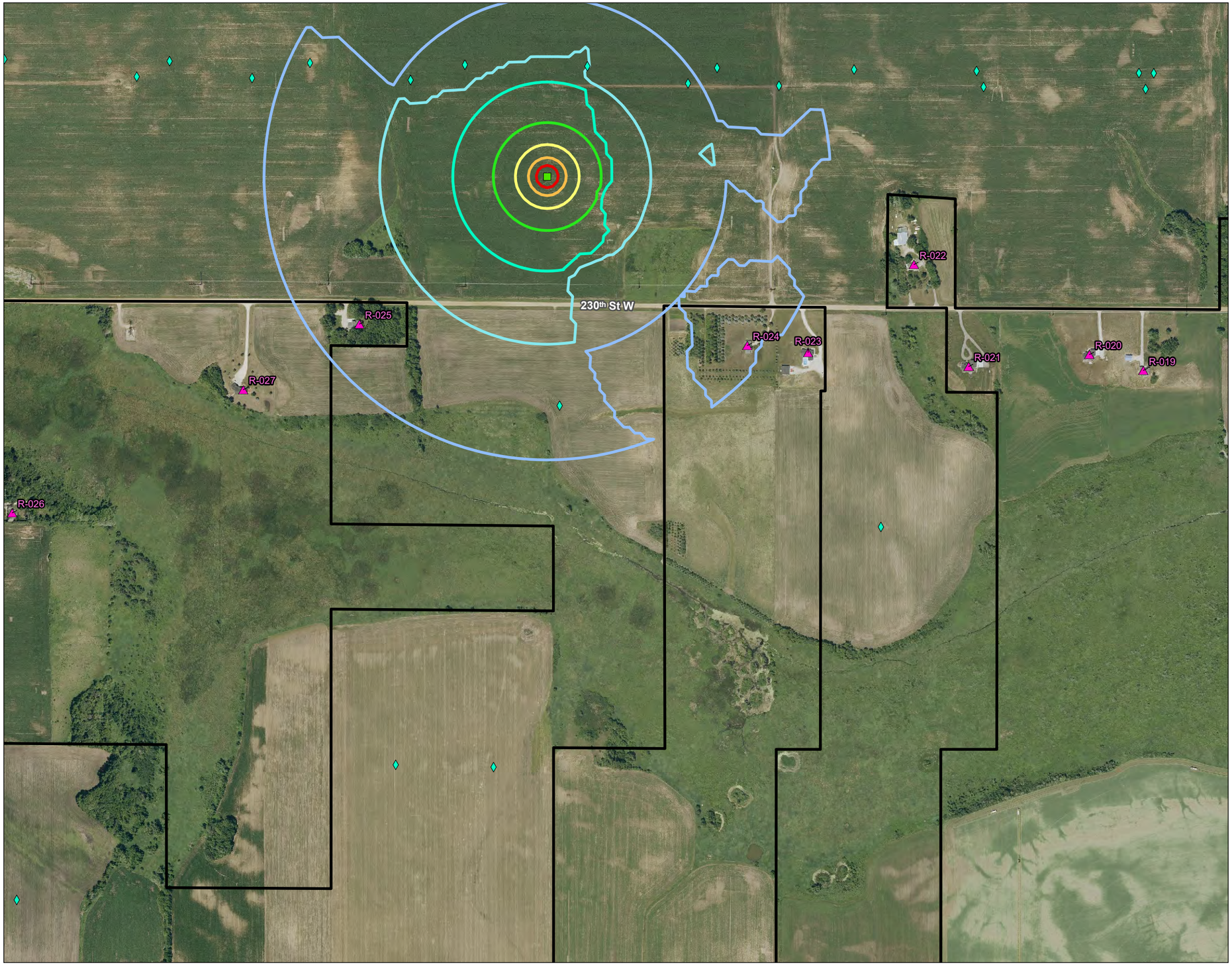

Figure No.
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Title
Operational Noise Results (Preferred - Nighttime)

Client/Project
Matrix Renewables USA LLC
Castle Rock

193709215

Project Location
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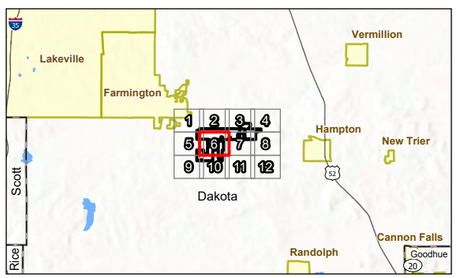

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Operational Noise Results (Preferred - Nighttime)

Client/Project

193709215

Matrix Renewables USA LLC
Castle Rock

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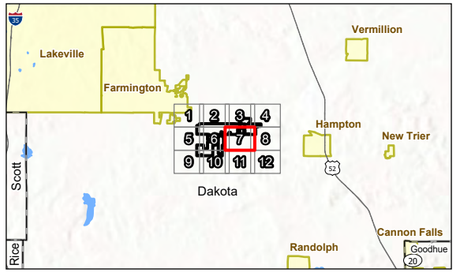

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Operational Noise Results (Preferred - Nighttime)

Client/Project 193709215

Matrix Renewables USA LLC
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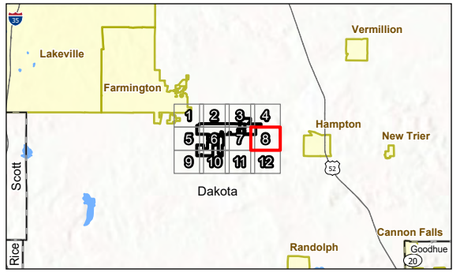

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Figure No.

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Operational Noise Results (Preferred - Nighttime)

Client/Project 193709215

Matrix Renewables USA LLC
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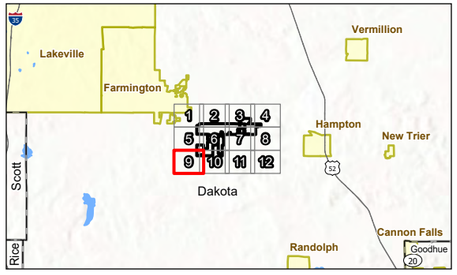

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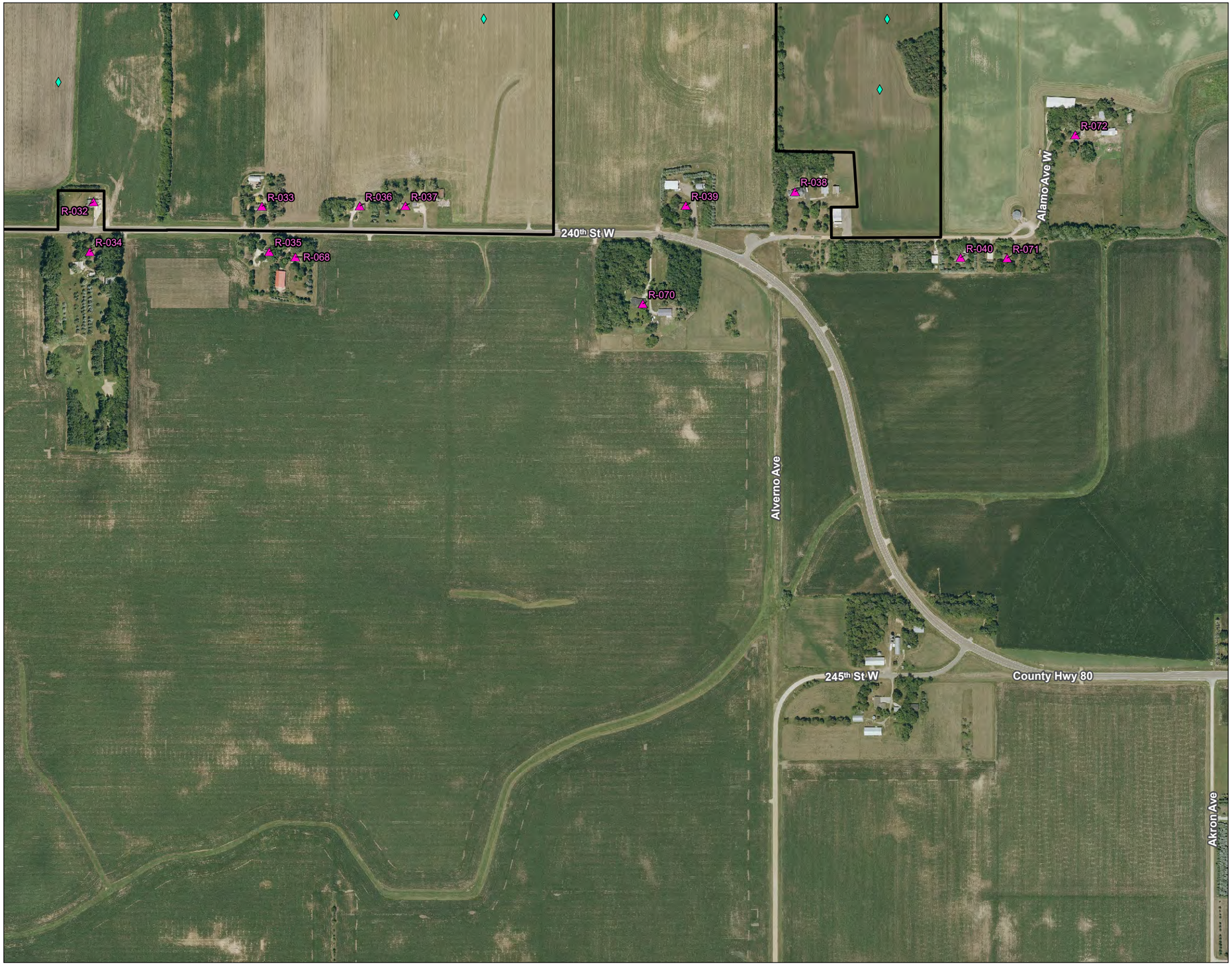

Figure No.

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Operational Noise Results (Preferred - Nighttime)

Client/Project 193709215

Matrix Renewables USA LLC
Castle Rock

Project Location
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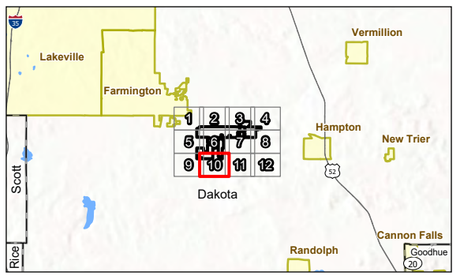

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Stantec

Figure No.

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Operational Noise Results (Preferred - Nighttime)

Client/Project 193709215

Matrix Renewables USA LLC
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Project Location
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Noise Contour (dBA)

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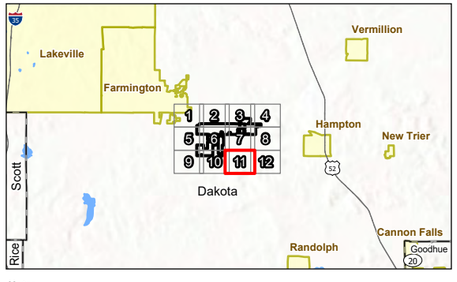

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3. Background: NAIP 2023

Stantec

Figure No.

4

Title

Operational Noise Results (Preferred - Nighttime)

Client/Project 193709215

Matrix Renewables USA LLC
Castle Rock

Project Location
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0 300 600 Feet

(At original document size of 11x17)
1:7,200

Legend

- Project Boundary
- Sensitive Receptor
- Inverter
- Substation

Noise Contour (dBA)

- 35
- 40
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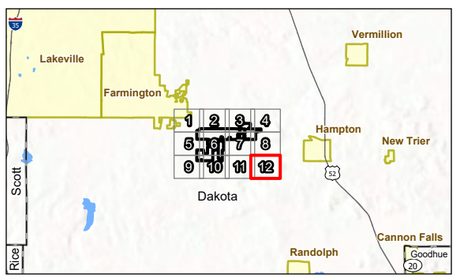

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2. Data Sources: Stantec, Matrix Renewables USA, NADS, Dakota Co., USGS
3. Background: NAIP 2023

Stantec