

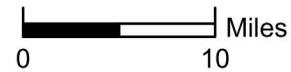
Data Source(s): Westwood (2016); ESRI (2012); MNDNR (2010).

Legend

- Current Project Boundary
- Existing Turbine (Determined with Built Date)
- State Boundary

Turbines By County

	0		36 - 76
	1 - 11		77 - 190
	12 - 35		191 - 299



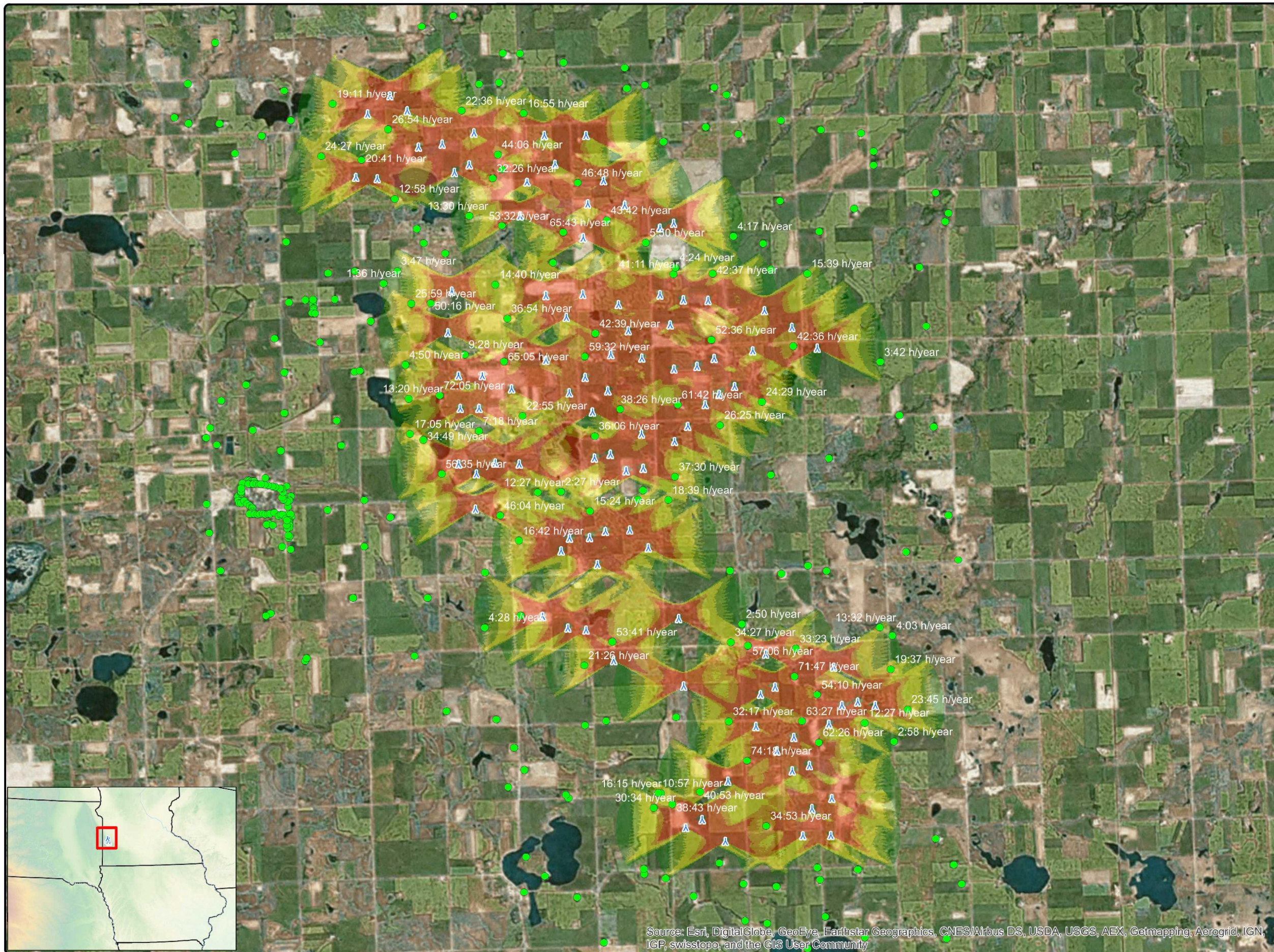
Red Pine Wind Project

Lincoln County, Minnesota

Existing Wind Turbine Locations

Westwood

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**Red Pine Shadow Analysis
V100- 2.0 80 m HH
Worst Case**

Client
Westwood

Project Description
Shadow flicker analysis on nearby residences from V100-2.0 80 m HH WTG's (v26). Assumes turbines always operating, facing the sun and no cloudy days.



Location: Ivanhoe, MN
Project #: 20162030

Issue Dates






1	Original	2016.06.30
#	Description	Date

Drawn By: JH Checked By: JH

Legend


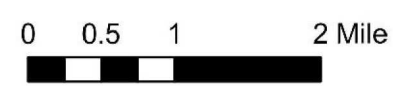
-  V100_80m HH v26
-  Occupied Residences (hrs/yr)

Shadow Flicker (hrs/yr)

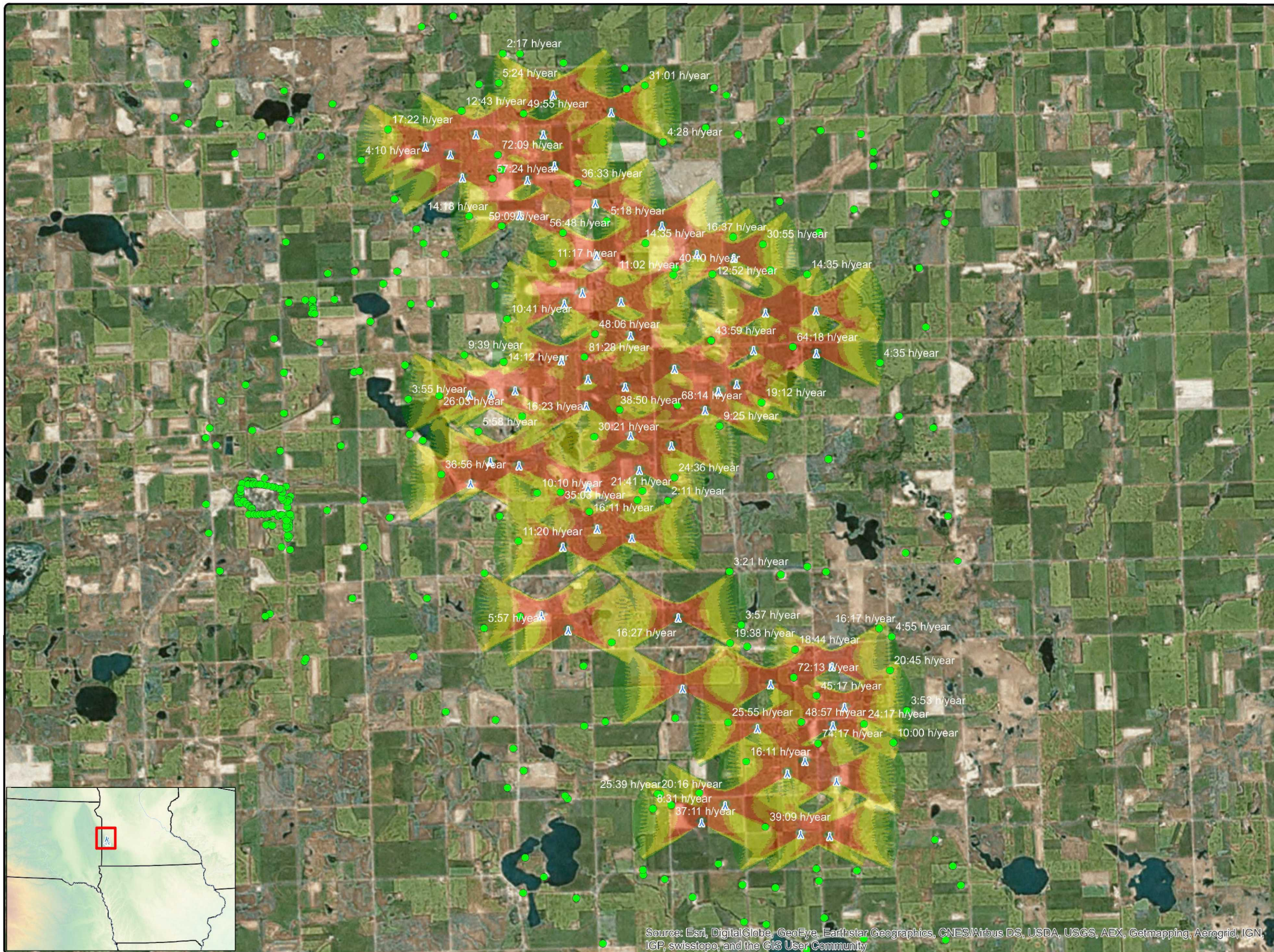
-  0 - 5
-  5 - 10
-  10 - 30
-  30 - 50
-  > 50

Map 8a

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**Red Pine Shadow Analysis
V117- 3.3 80 m HH
Worst Case**

Client
Westwood

Project Description
Shadow flicker analysis on nearby residences from V117-3.3 80 m HH WTG's (v24). Assumes turbines always operating, facing the sun and no cloudy days.

Location: Ivanhoe, MN
Project #: 20162030

Issue Dates

#	Description	Date
1	Original	2016.06.30

Drawn By: JH Checked By: JH

Legend

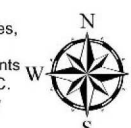
- ▲ V117 80m HH v24
- Occupied Residences (hrs/yr)

Shadow Flicker (hrs/yr)

- 0 - 5
- 5 - 10
- 10 - 30
- 30 - 50
- > 50


Map 8b

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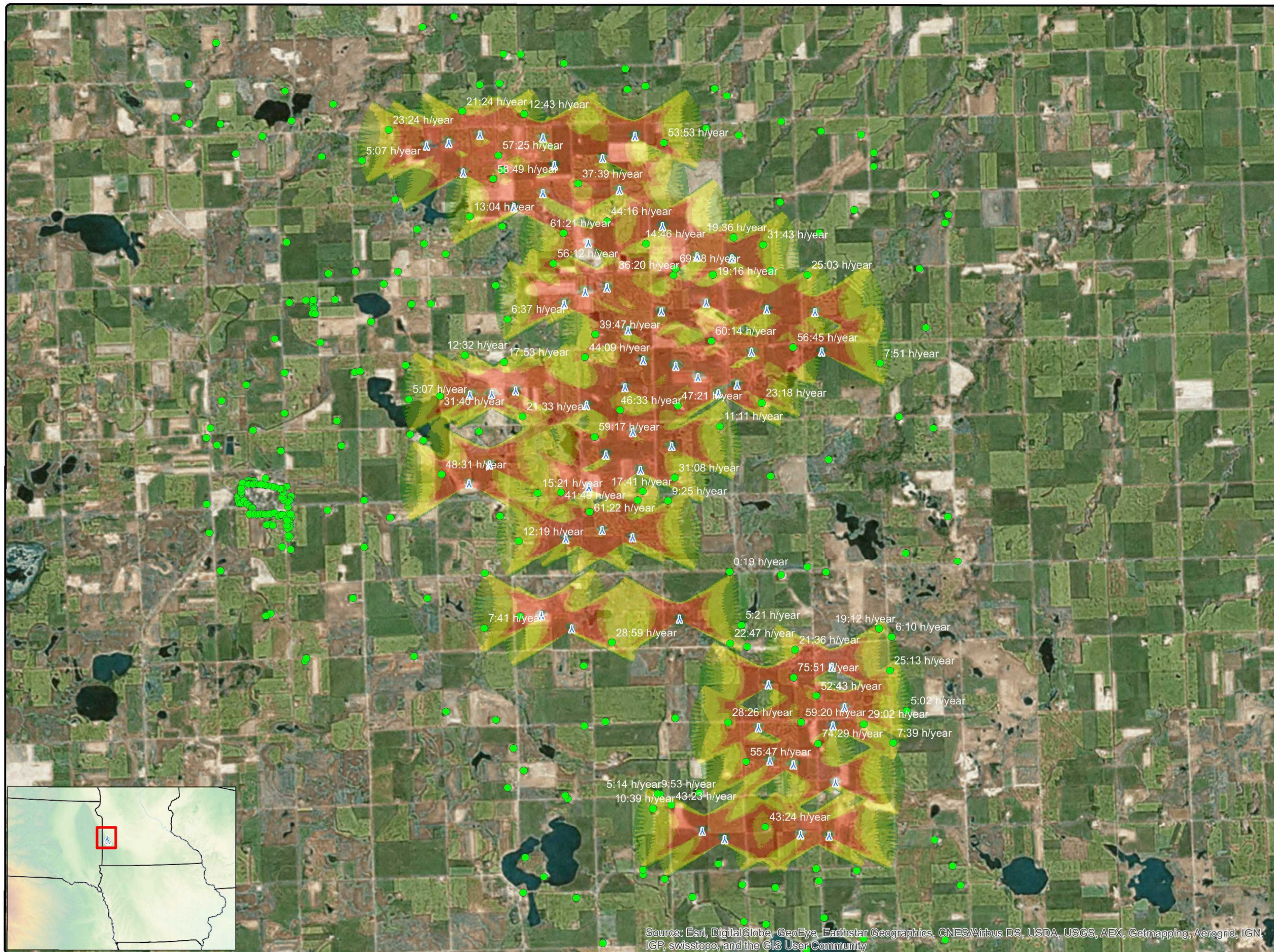


Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

0 0.5 1 2 Mile



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**Red Pine Shadow Analysis
V126- 3.3 87 m HH
Worst Case**

Client
Westwood

Project Description
Shadow flicker analysis on nearby residences from V126-3.3 87 m HH WTG's (v25). Assumes turbines always operating, facing the sun and no cloudy days.

Location: Ivanhoe, MN
Project #: 20162030

Issue Dates

#	Description	Date
1	Original	2016.06.30

Drawn By: JH Checked By: JH

Legend


- ▲ V126 87m HH v25
- Occupied Residences (hrs/yr)

Shadow Flicker (hrs/yr)

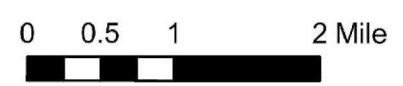
- 0 - 5
- 5 - 10
- 10 - 30
- 30 - 50
- > 50

Map 8c

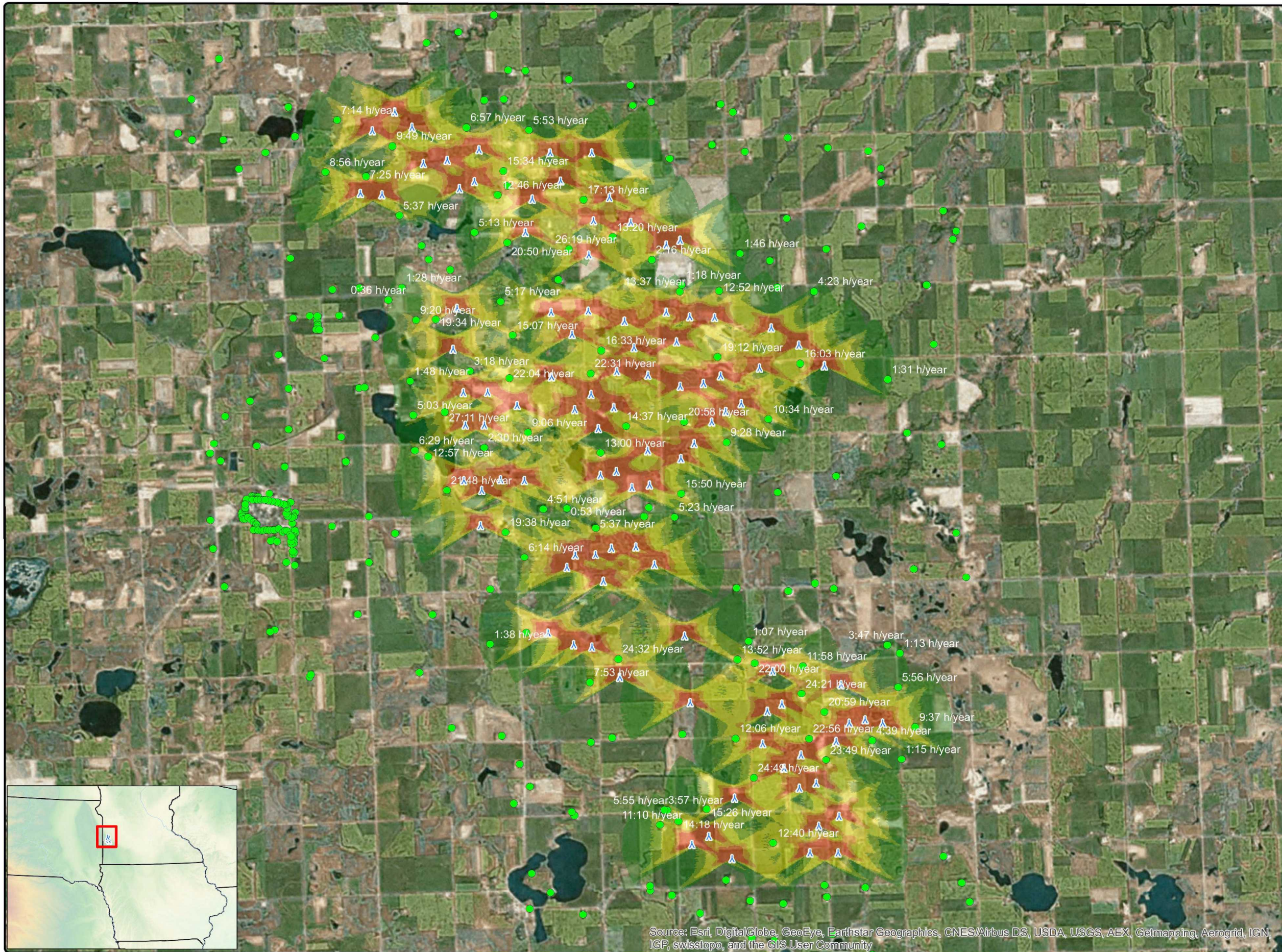
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**Red Pine Shadow Analysis
V100- 2.0 80 m HH
Realistic Case**

Client

Westwood

Project Description

Shadow flicker analysis on nearby residences from V100-2.0 80 m HH WTG's (v26). Accounts for operational time, sunshine probabilities and wind speed and direction data.

Location: Ivanhoe, MN

Project #: 20162030

Issue Dates

#	Description	Date
1	Original	2016.06.30

Drawn By: JH Checked By: JH

Legend

- ▲ V100_80m HH v26
 - Occupied Residences (hrs/yr)
- Shadow Flicker (hrs/yr)**
- 0 - 5
 - 5 - 10
 - 10 - 30
 - 30 - 50
 - > 50

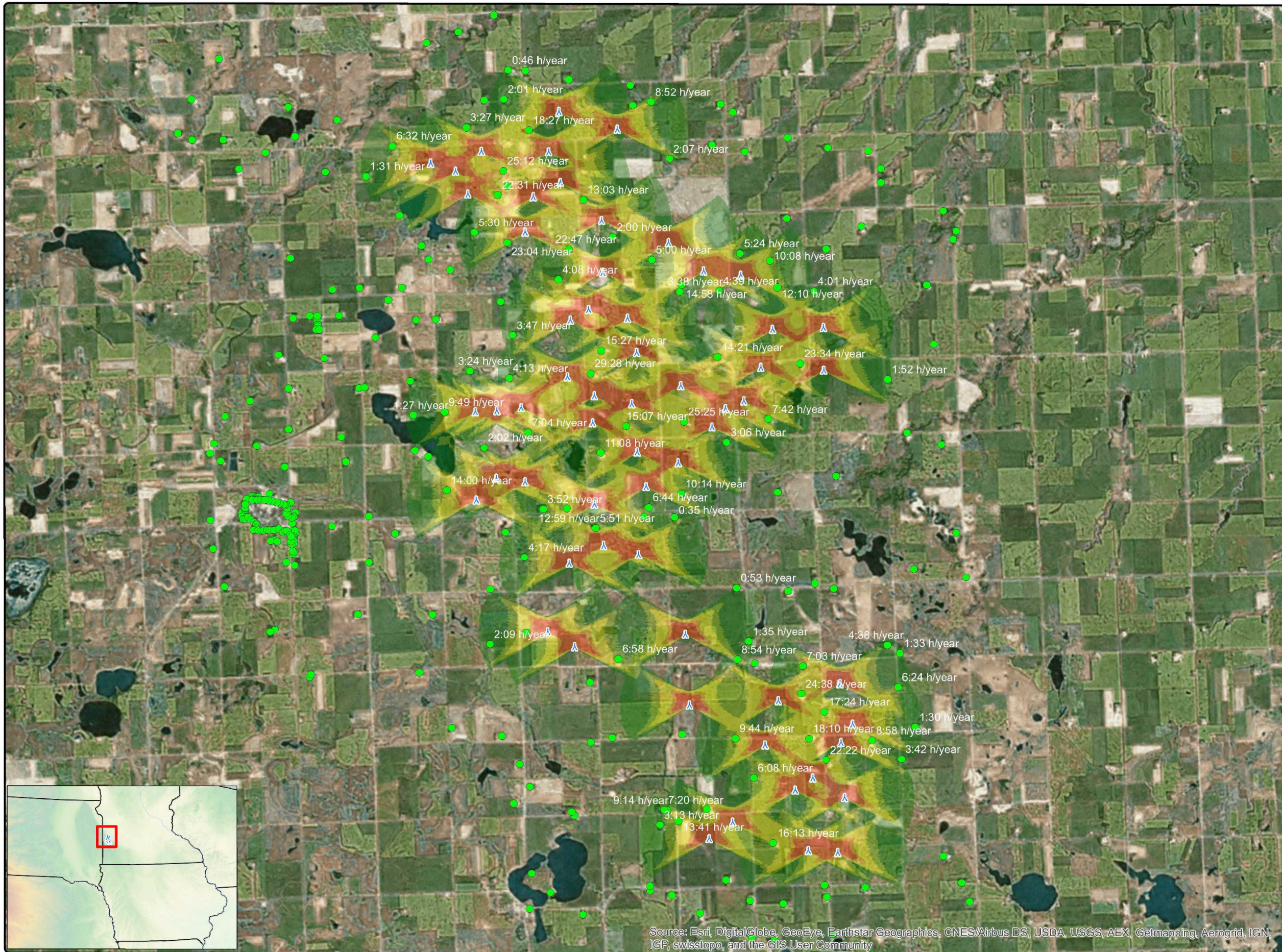
Map 8d

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**Red Pine Shadow Analysis
V117- 3.3 80 m HH
Realistic Case**

Client
Westwood

Project Description
Shadow flicker analysis on nearby residences from V117-3.3 80 m HH WTG's (v24). Accounts for operational time, sunshine probabilities and wind speed and direction data.

Location: Ivanhoe, MN
Project #: 20162030

Issue Dates

#	Description	Date
1	Original	2016.06.30

Drawn By: JH Checked By: JH

Legend


- ▲ V117 80m HH v24
- Occupied Residences

Shadow Flicker (hrs/yr)

- 0 - 5
- 5 - 10
- 10 - 30
- 30 - 50
- > 50

Map 8e

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**Red Pine Shadow Analysis
V126- 3.3 87 m HH
Realistic Case**

Client

Westwood

Project Description

Shadow flicker analysis on nearby residences from V125-3.3 87 m HH WTG's (v25). Accounts for operational time, sunshine probabilities and wind speed and direction data.

Location: Ivanhoe, MN

Project #: 20162030

Issue Dates

#	Description	Date
1	Original	2016.06.30

Drawn By: JH Checked By: JH

Legend

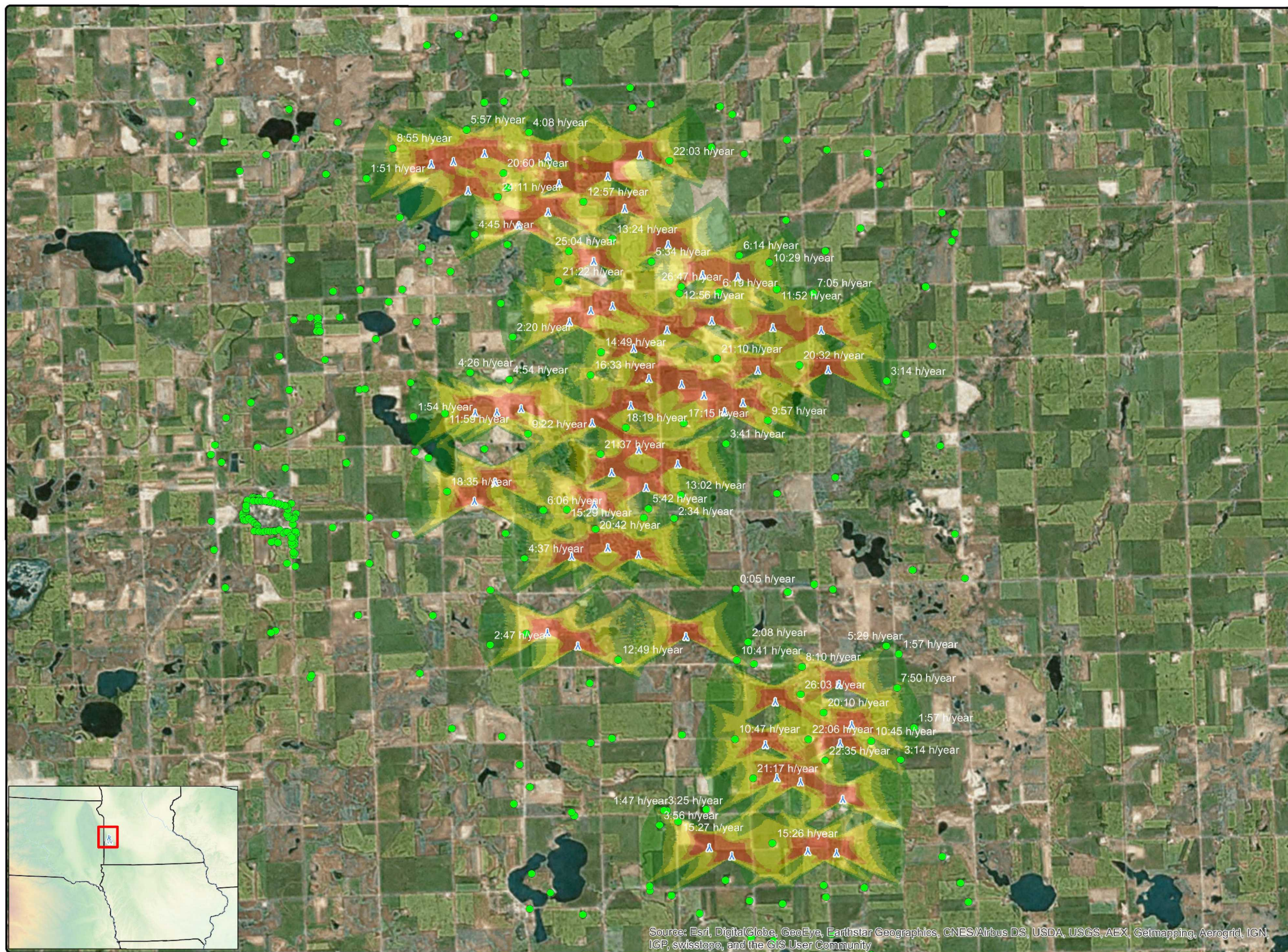
- ▲ V126 87m HH v25
- Occupied Residences (hrs/yr)

Shadow Flicker (hrs/yr)

- 0 - 5
- 5 - 10
- 10 - 30
- 30 - 50
- > 50

Map 8f

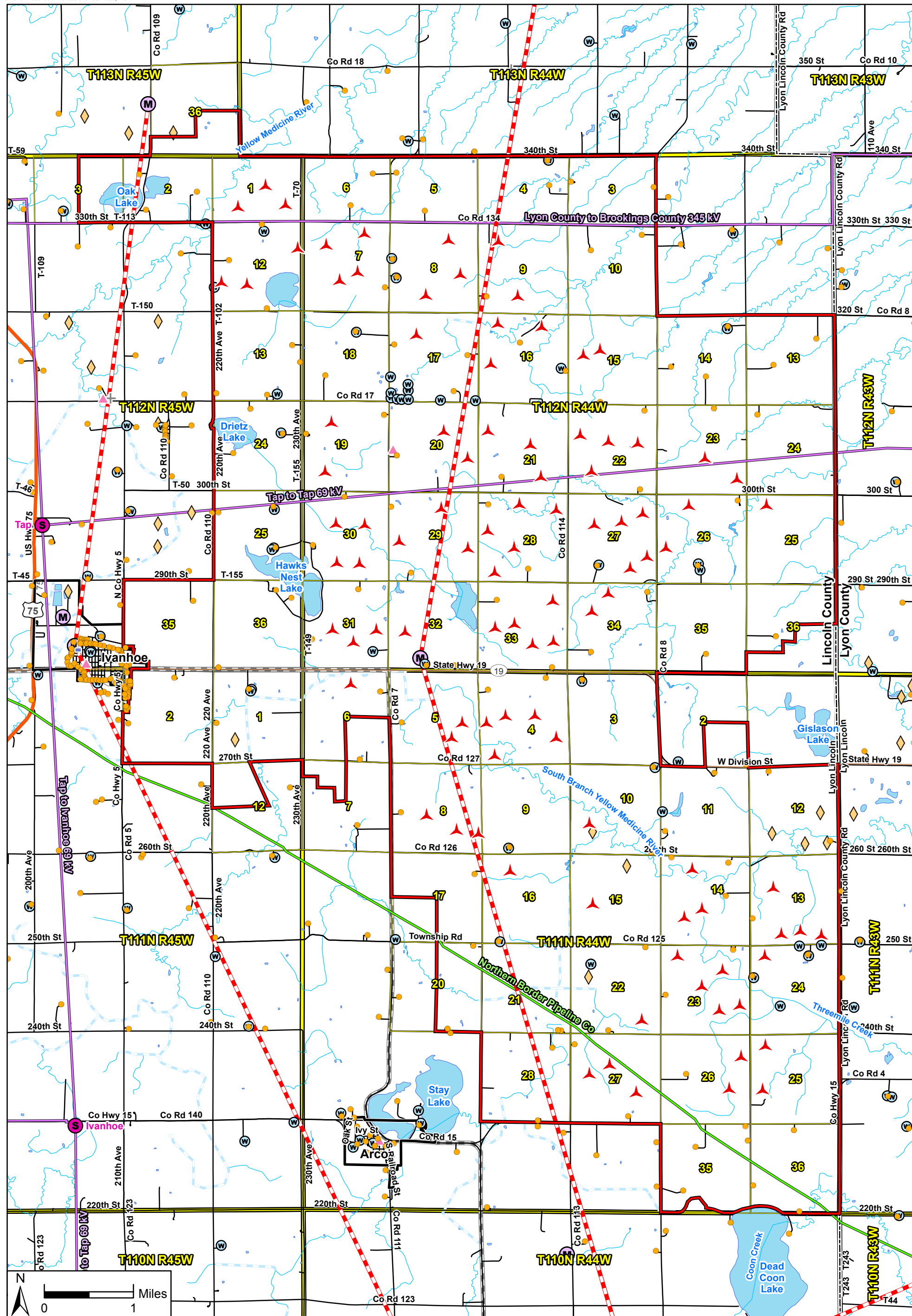
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Data Source(s): Westwood (2016); ESRI (2012); Ventyx Velocity Suite, Ventyx Energy LLC (2015); MNDNR (2010); U.S. Geographic Names Information System Schools (2014); Minnesota Geological Survey (2011); U.S. Geographic Names Information System Cemeteries (2005); Census Bureau (2015).

- | | | | | |
|--------------------------|------------------|------------|-----------------|--|
| Proposed Turbine (V100) | Highway | School | Microwave Tower | Existing Substation (Location Approximate) |
| Dwelling | Major Road | Church | Fresnel Zone | Existing Transmission Line (Location Approximate) |
| Current Project Boundary | Minor Road | Gravel Pit | Well Location | Existing Natural Gas Pipeline (Location Approximate) |
| Municipal Boundary | Railroad | Cemetery | | |
| County Boundary | Snowmobile Trail | Airport | | |
| PLS Township Boundary | Drainage Ditch | | | |
| PLS Section Boundary | NHD Flowline | | | |
| | NHD Waterbody | | | |

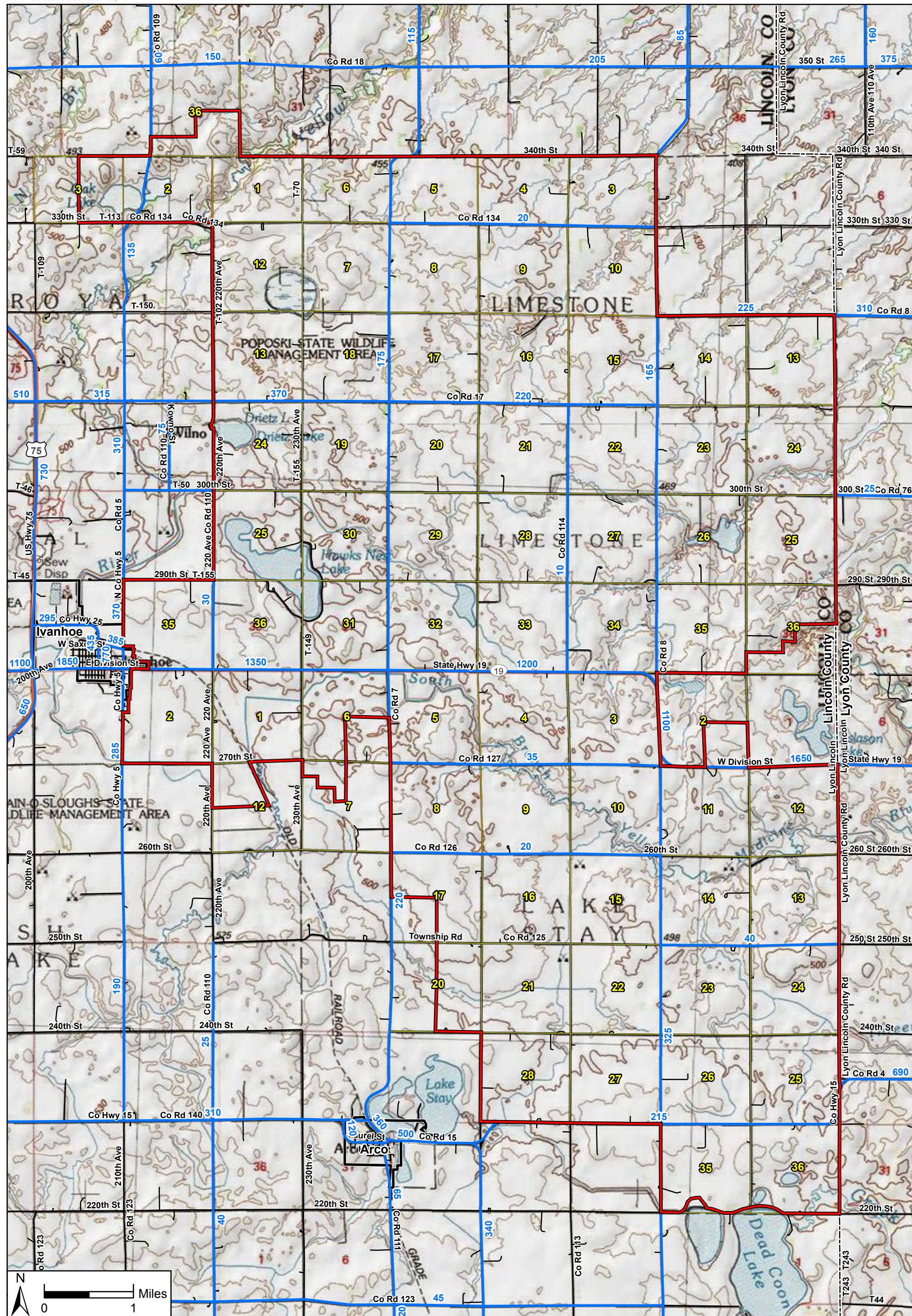
Red Pine Wind Project

Lincoln County, Minnesota

Infrastructure

Westwood

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Westwood Professional Services, Inc.



Data Source(s): Westwood (2016); ESRI WMS USA Topo Basemap Imagery (Accessed 2016); ESRI (2012); MNDNR (2010); MNDOT (2014); Census Bureau (2015).

Legend

- Current Project Boundary
- Municipal Boundary
- County Boundary
- PLS Section Boundary
- AADT Count
- Highway
- Major Road
- Minor Road

Red Pine Wind Project

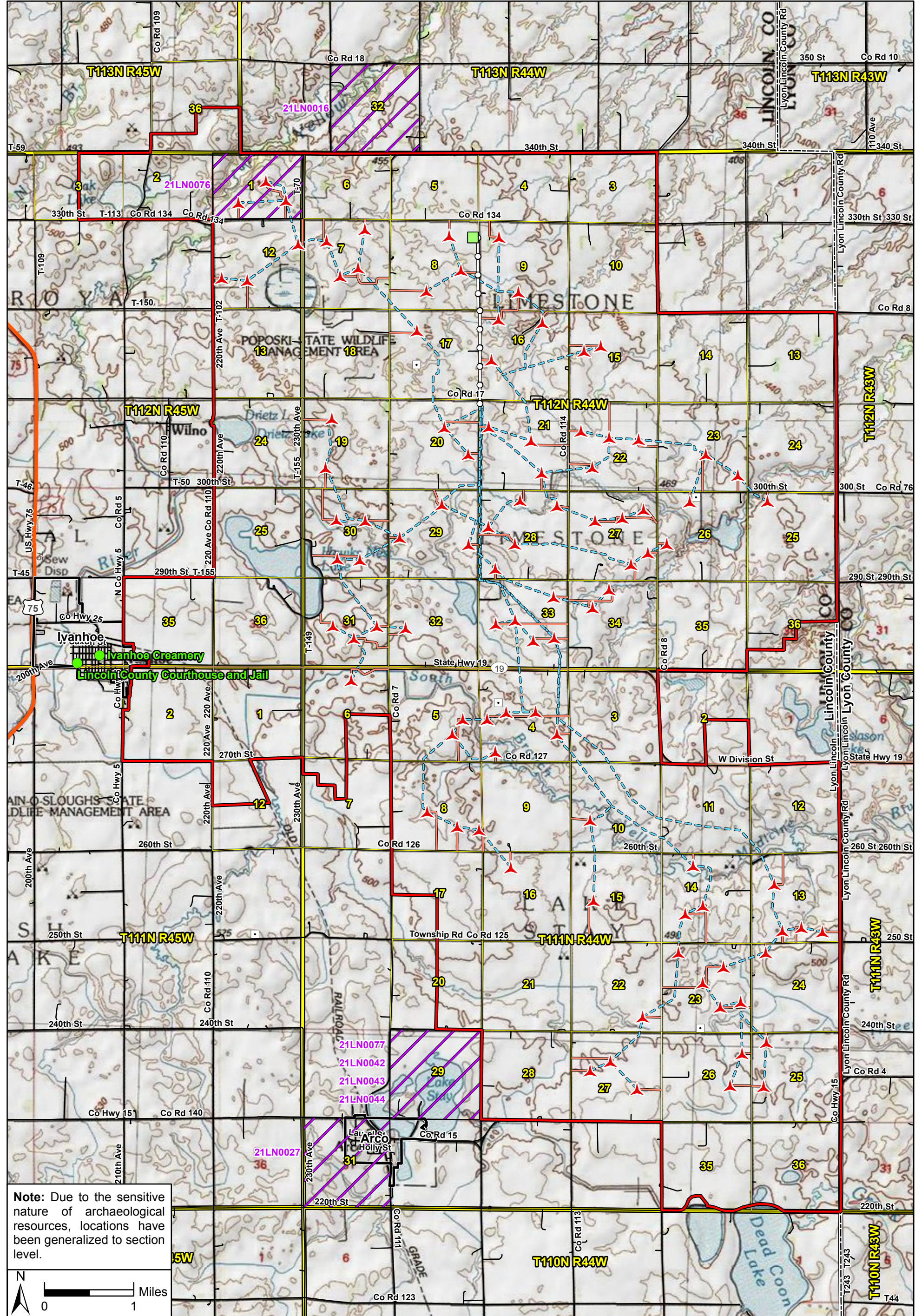
Lincoln County, Minnesota

Annual Average Daily Traffic (AADT)

Map 10

Westwood

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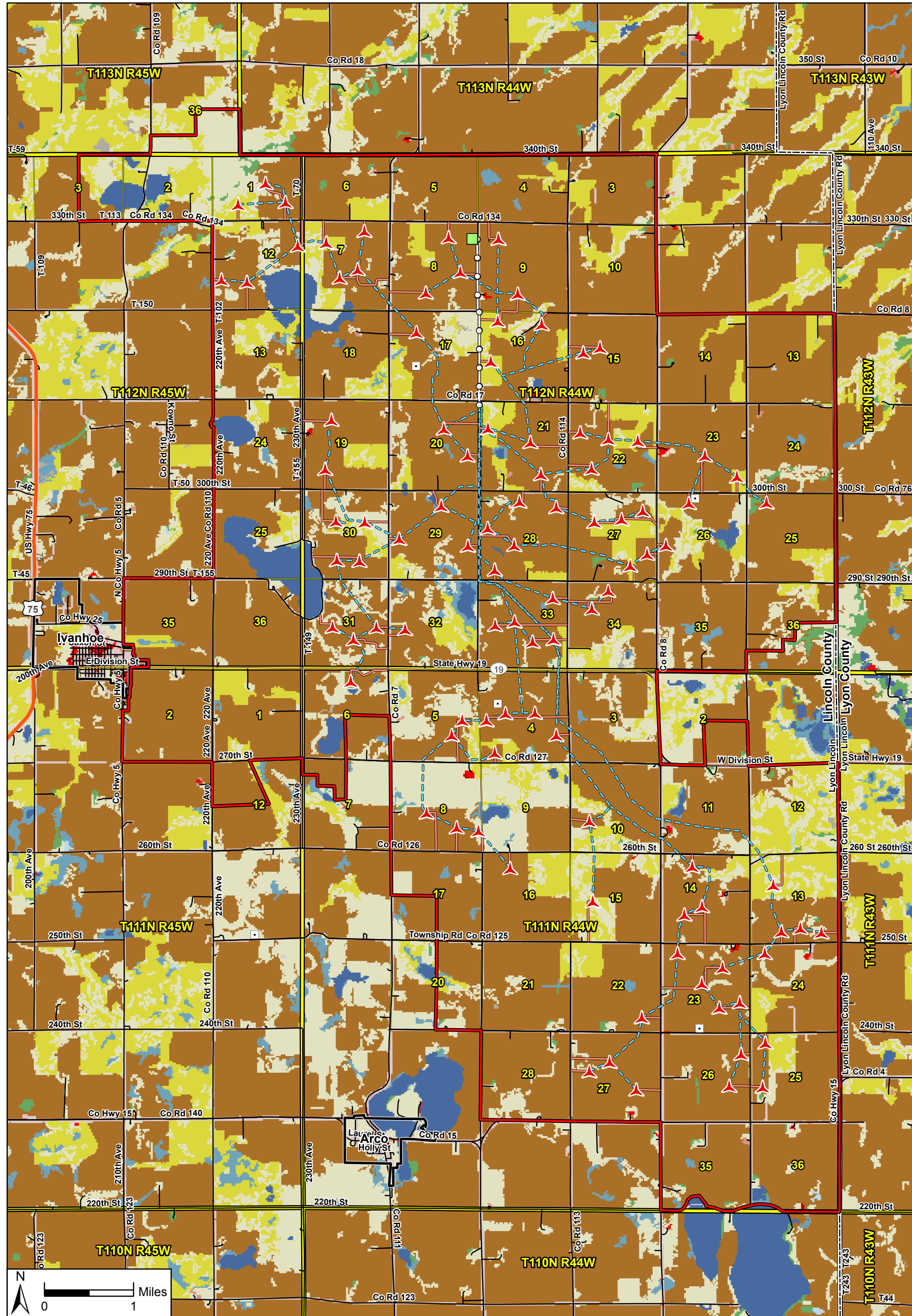
Note: Due to the sensitive nature of archaeological resources, locations have been generalized to section level.



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 Westwood Professional Services, Inc.

Legend	
	Proposed Turbine (V100)
	Met Tower
	Current Project Boundary
	NRHP Listed or Eligible Historic Structure
	PLS Section with Archaeological Site(s)
	Proposed Access Road
	Proposed Collection Line
	Proposed Substation
	Proposed Transmission Line
	Municipal Boundary
	County Boundary
	PLS Township Boundary
	PLS Section Boundary
	Highway
	Major Road
	Minor Road
	Railroad

Red Pine Wind Project
 Lincoln County, Minnesota
 Previously Recorded
 Cultural Resources
 Map 11



Data Source(s): Westwood (2016); ESRI (2012); U.S. Fish and Wildlife Service (2013); MNDNR (2010); U.S. Geological Survey (2011); Census Bureau (2015).

Legend

- Proposed Turbine (V100)
- Current Project Boundary
- Proposed Access Road
- Proposed Collection Line
- Municipal Boundary
- Met Tower
- Proposed Transmission Line
- Proposed Substation
- Highway
- Major Road
- Minor Road
- Railroad
- Open Water (2.24%)
- Developed, Open Space (4.11%)
- Developed, Low Intensity (0.25%)
- Developed, Medium Intensity (0.1%)
- Developed, High Intensity (0.01%)
- Barren Land (0.1%)
- Deciduous Forest (0.39%)
- Evergreen Forest (0%)
- Mixed Forest (0%)
- Shrub/Scrub (0%)
- Grassland/Herbaceous (11.02%)
- Pasture/Hay (9.59%)
- Cultivated Crops (71.36%)
- Woody Wetlands (0.03%)
- Emergent Herbaceous Wetlands (0.8%)

Red Pine Wind Project
Lincoln County, Minnesota

Land Cover

Westwood
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