

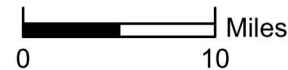
Data Source(s): Westwood (2016); ESRI (2012); MNDNR (2010).

**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



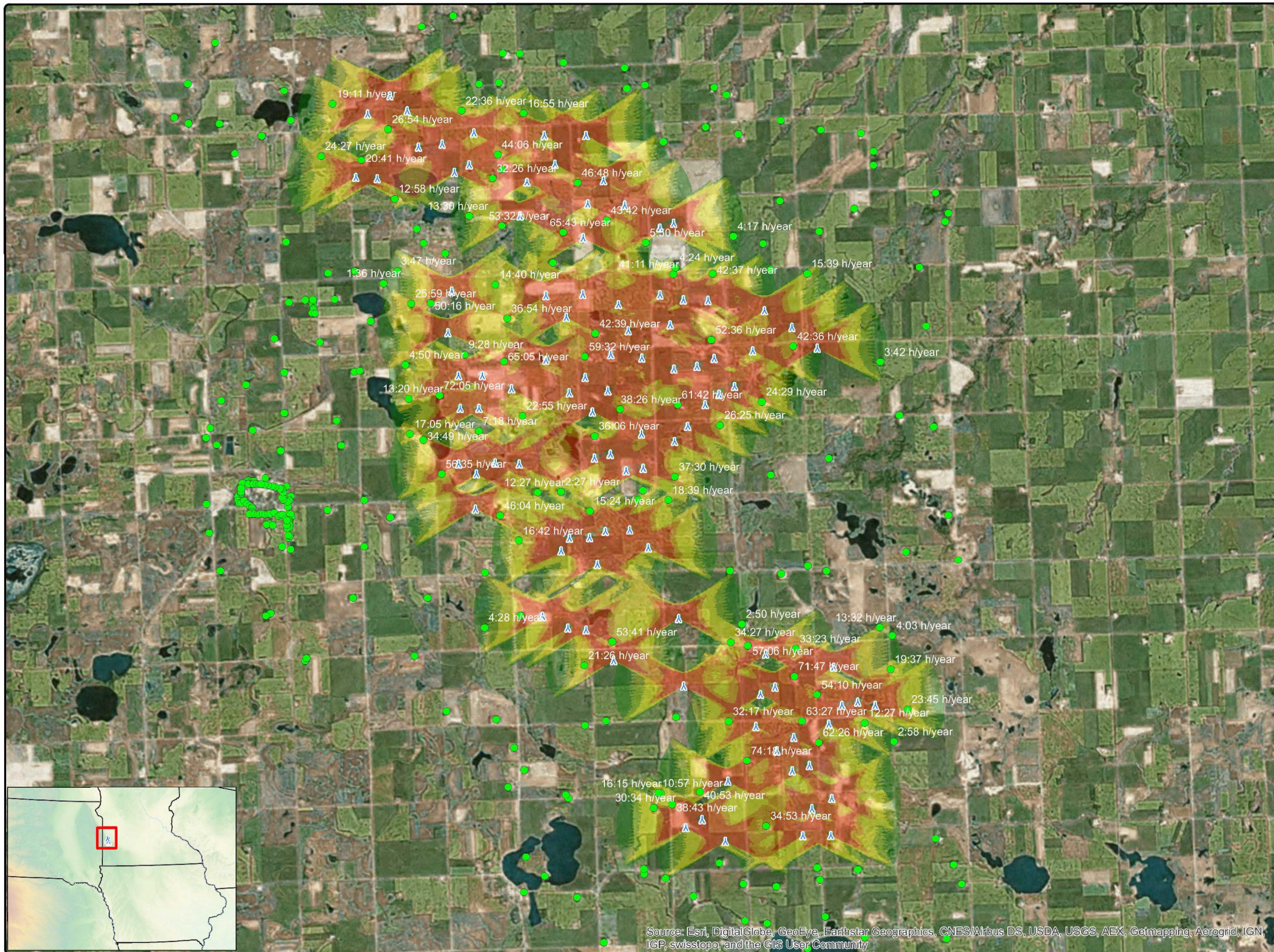
**Red Pine Wind Project**

Lincoln County, Minnesota

Existing Wind Turbine Locations

**Westwood**

Toll Free (888) 937-5150 westwoodps.com  
Westwood Professional Services, Inc.



**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*


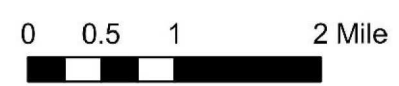
- ▲ V100\_80m HH v26
- Occupied Residences (hrs/yr)

**Shadow Flicker (hrs/yr)**

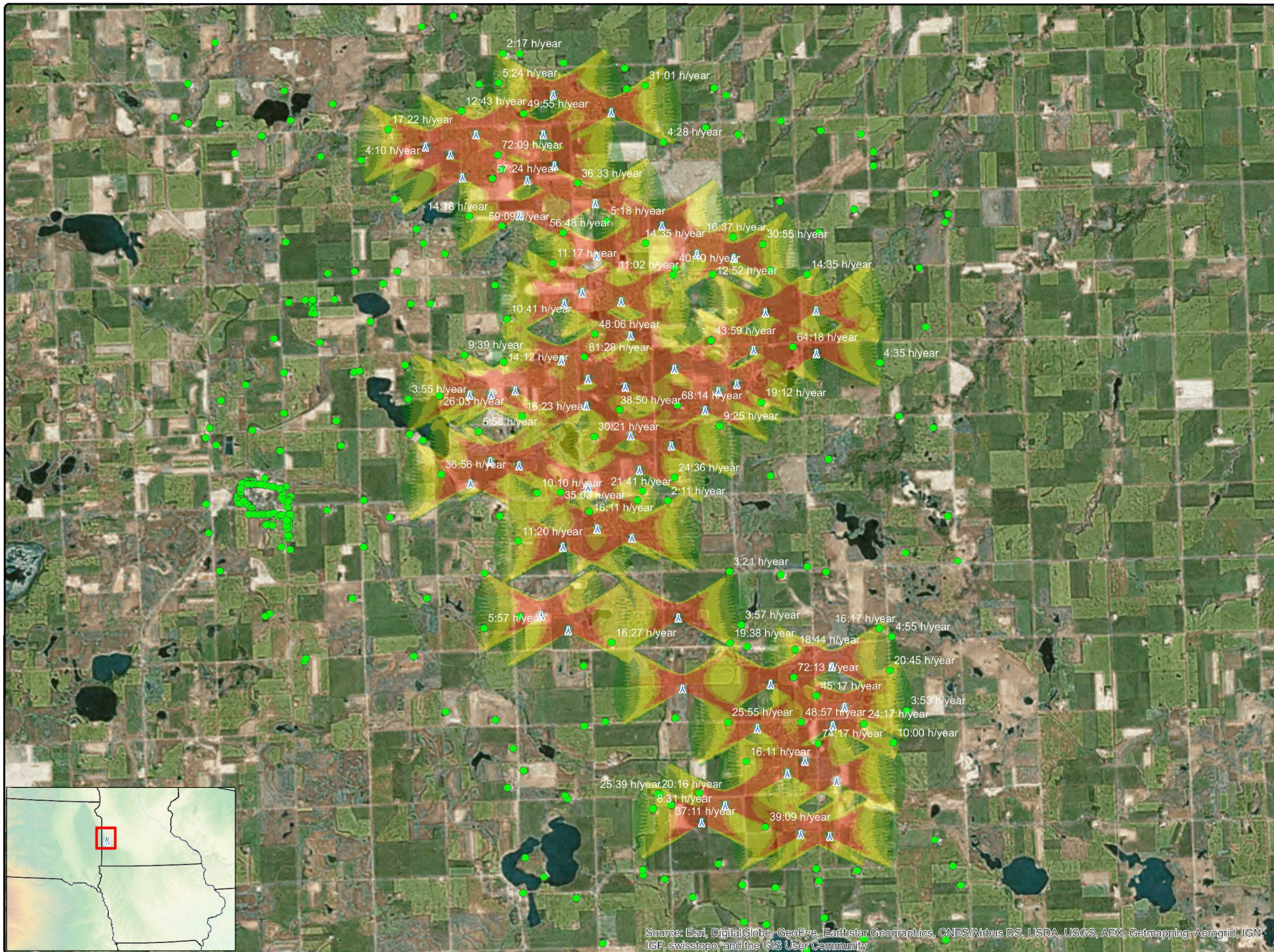
- 0 - 5
- 5 - 10
- 10 - 30
- 30 - 50
- > 50

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*


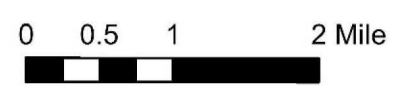
- ▲ V117 80m HH v24
- Occupied Residences (hrs/yr)

**Shadow Flicker (hrs/yr)**

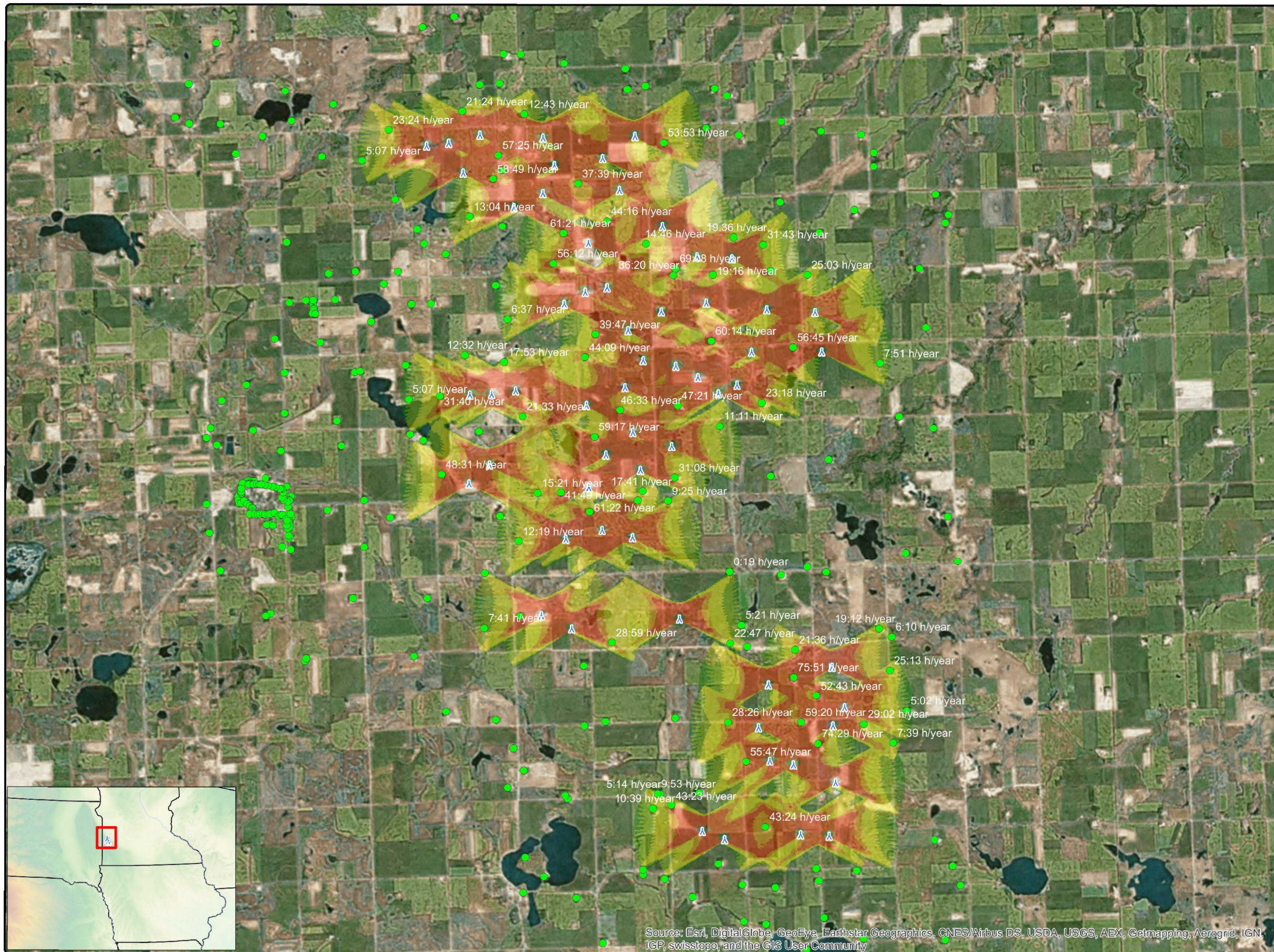
- 0 - 5
- 5 - 10
- 10 - 30
- 30 - 50
- > 50

Map 8b

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**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**


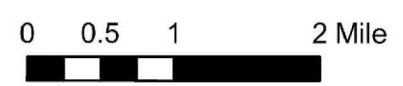
-  V126 87m HH v25
-  Occupied Residences (hrs/yr)

**Shadow Flicker (hrs/yr)**

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

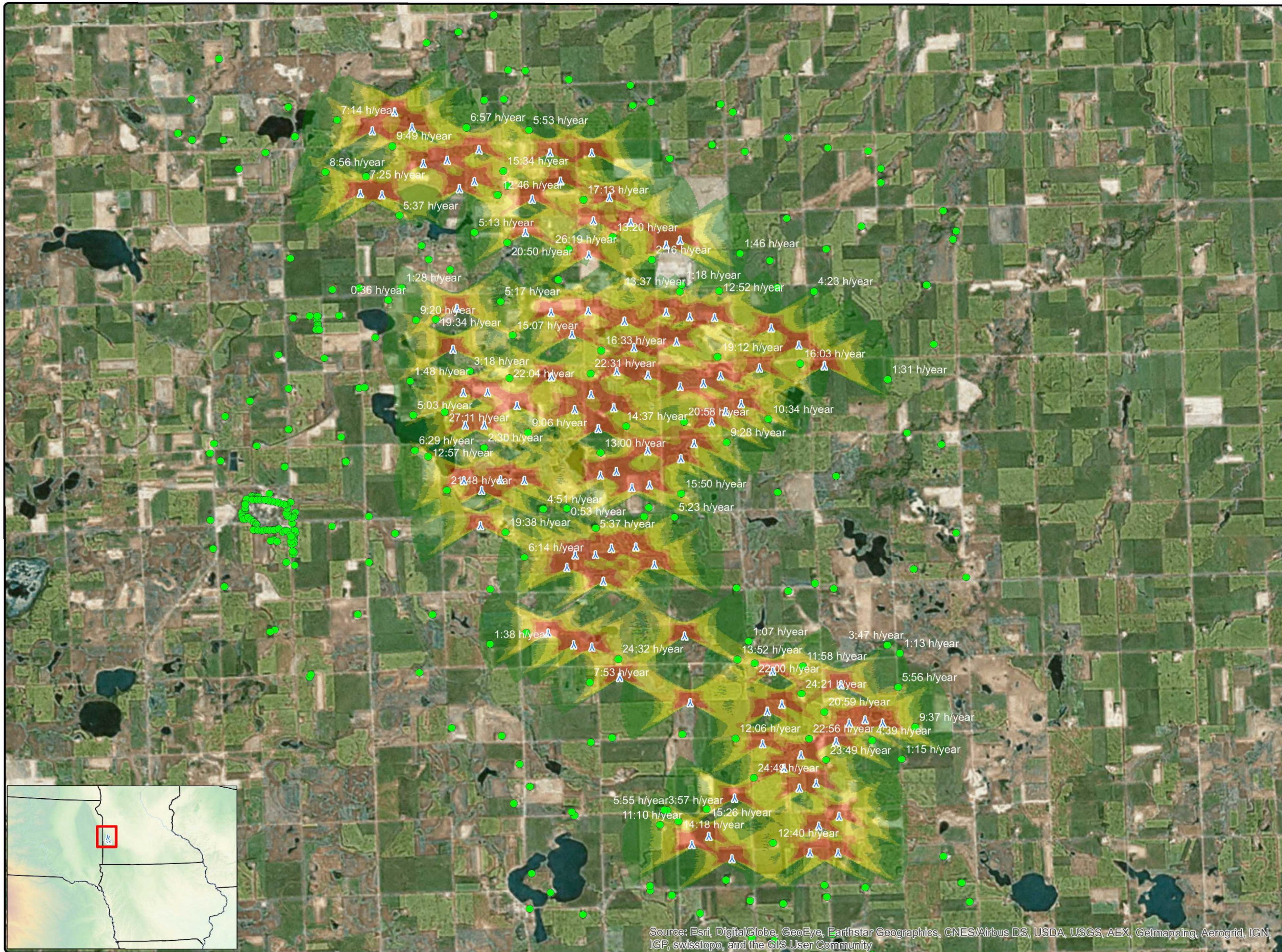
Map 8c

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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

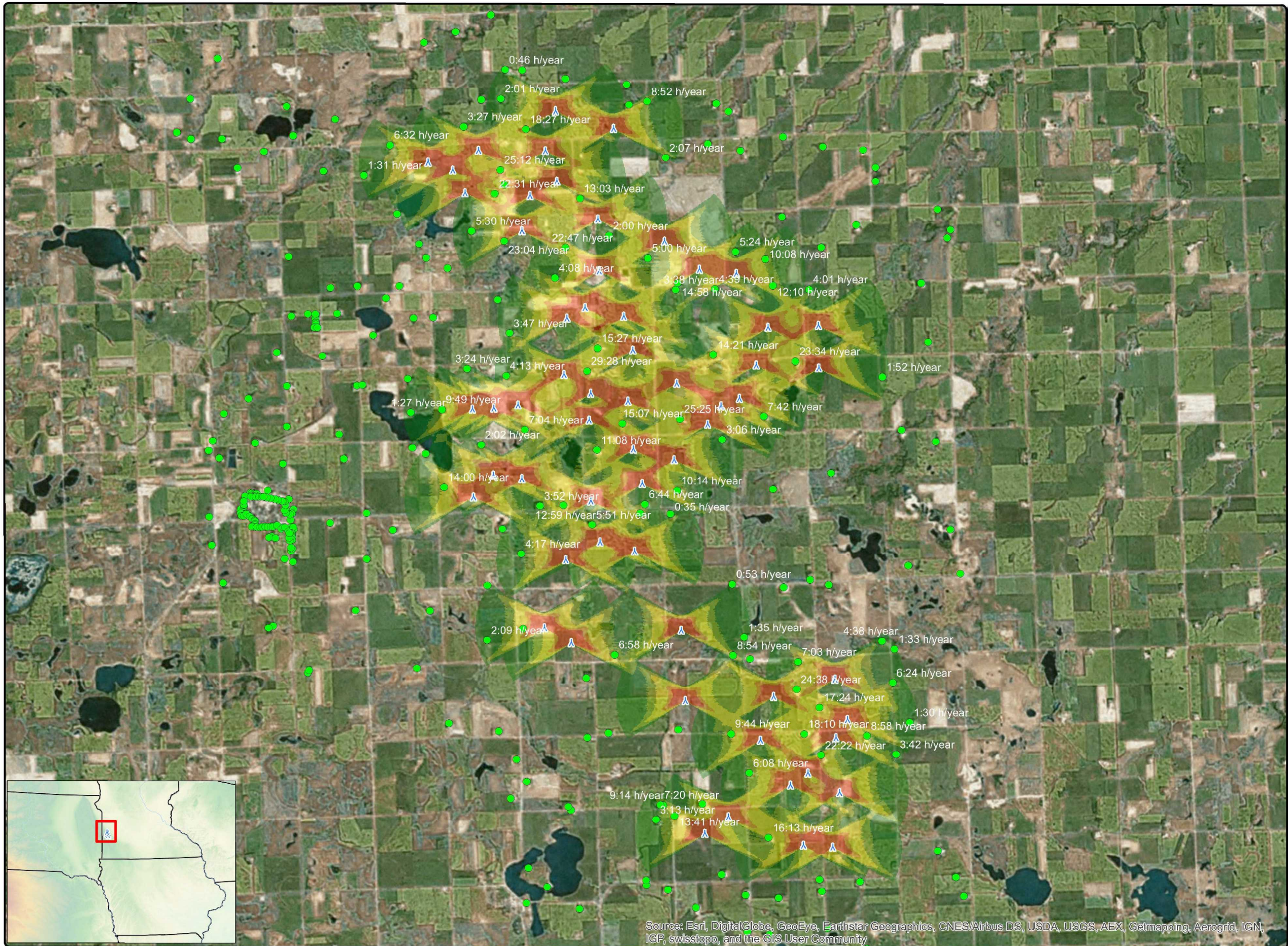
Map 8d

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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*

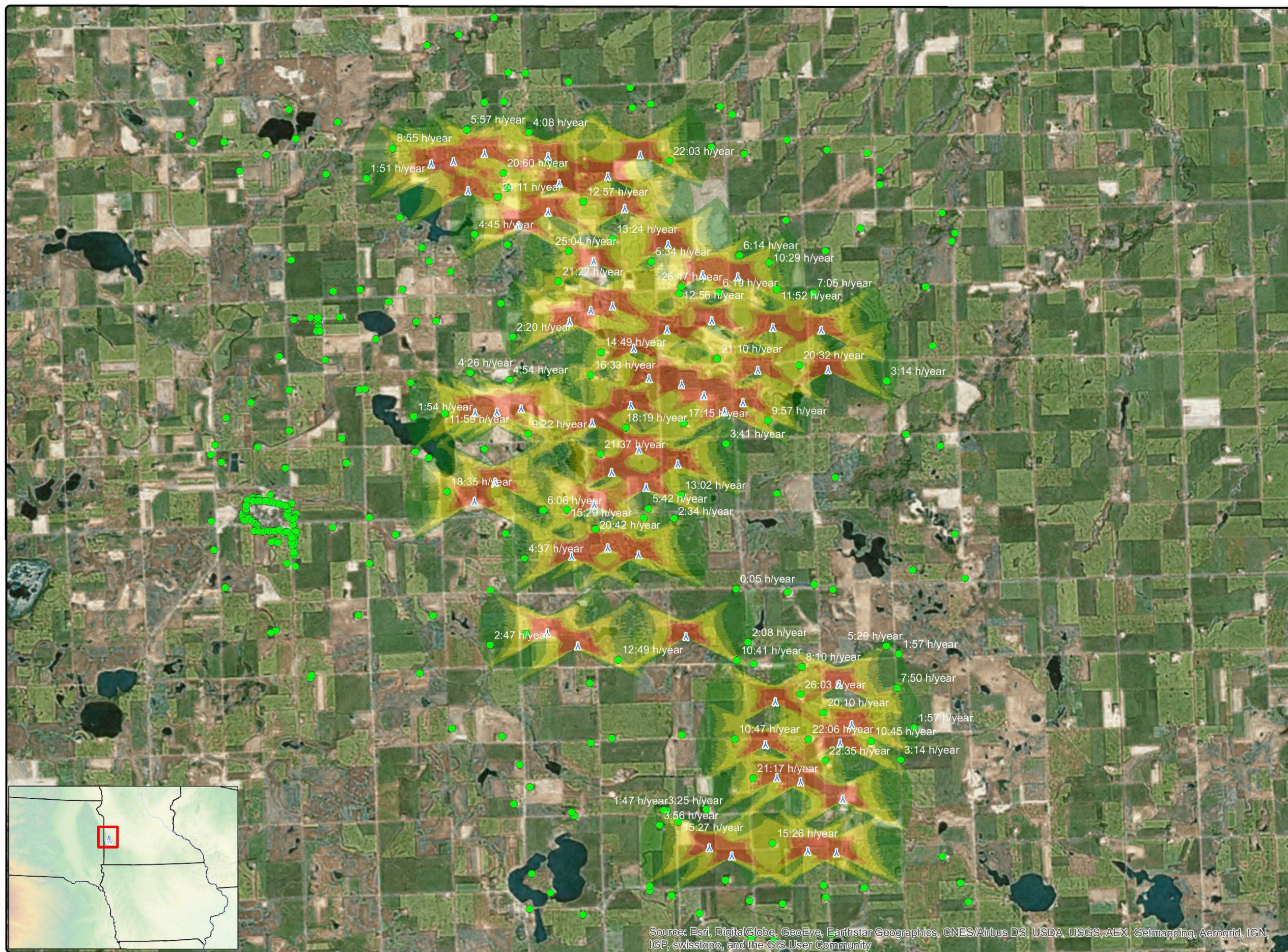
*Issue Dates*

#	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



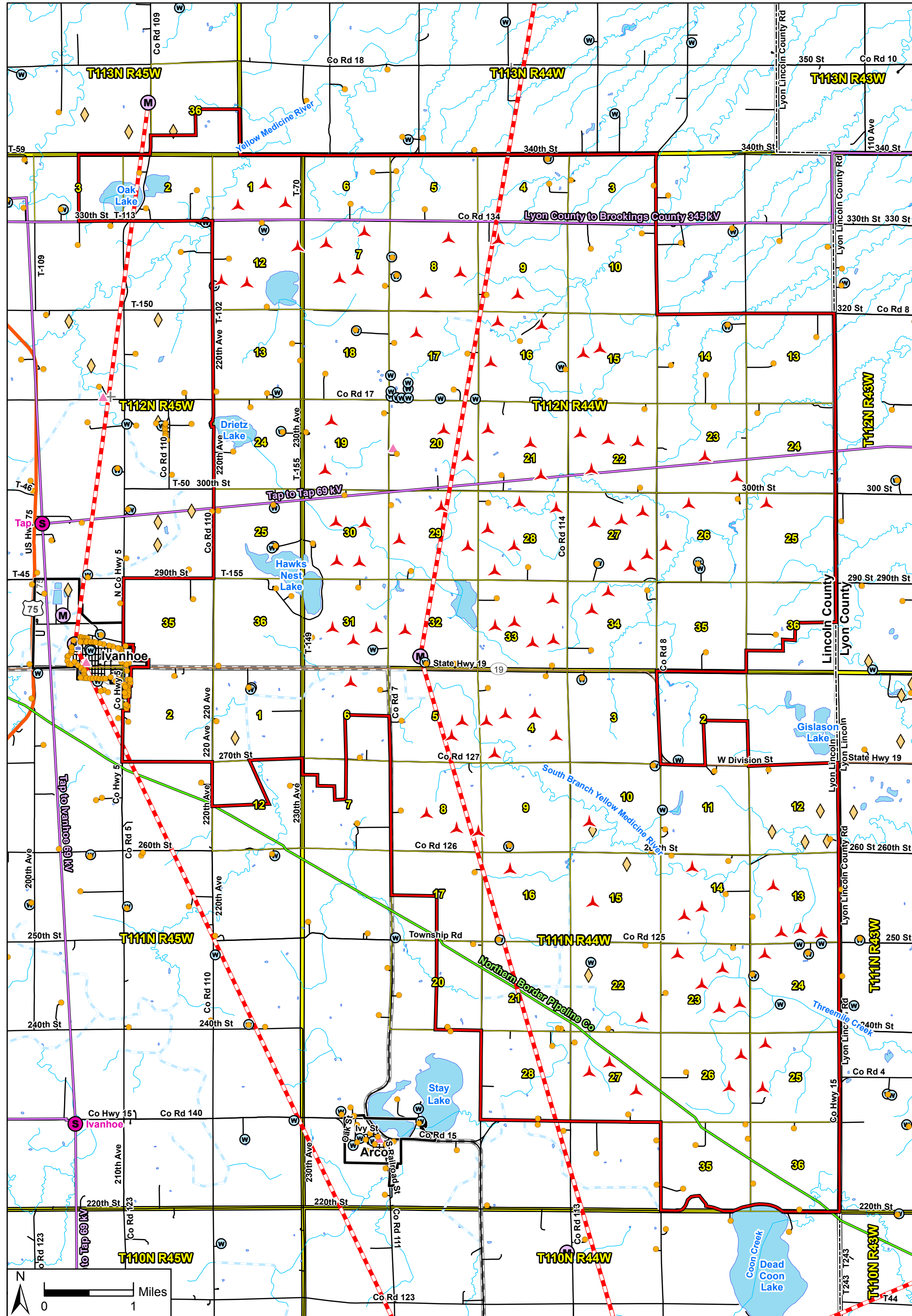
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

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    |            |                 |  |

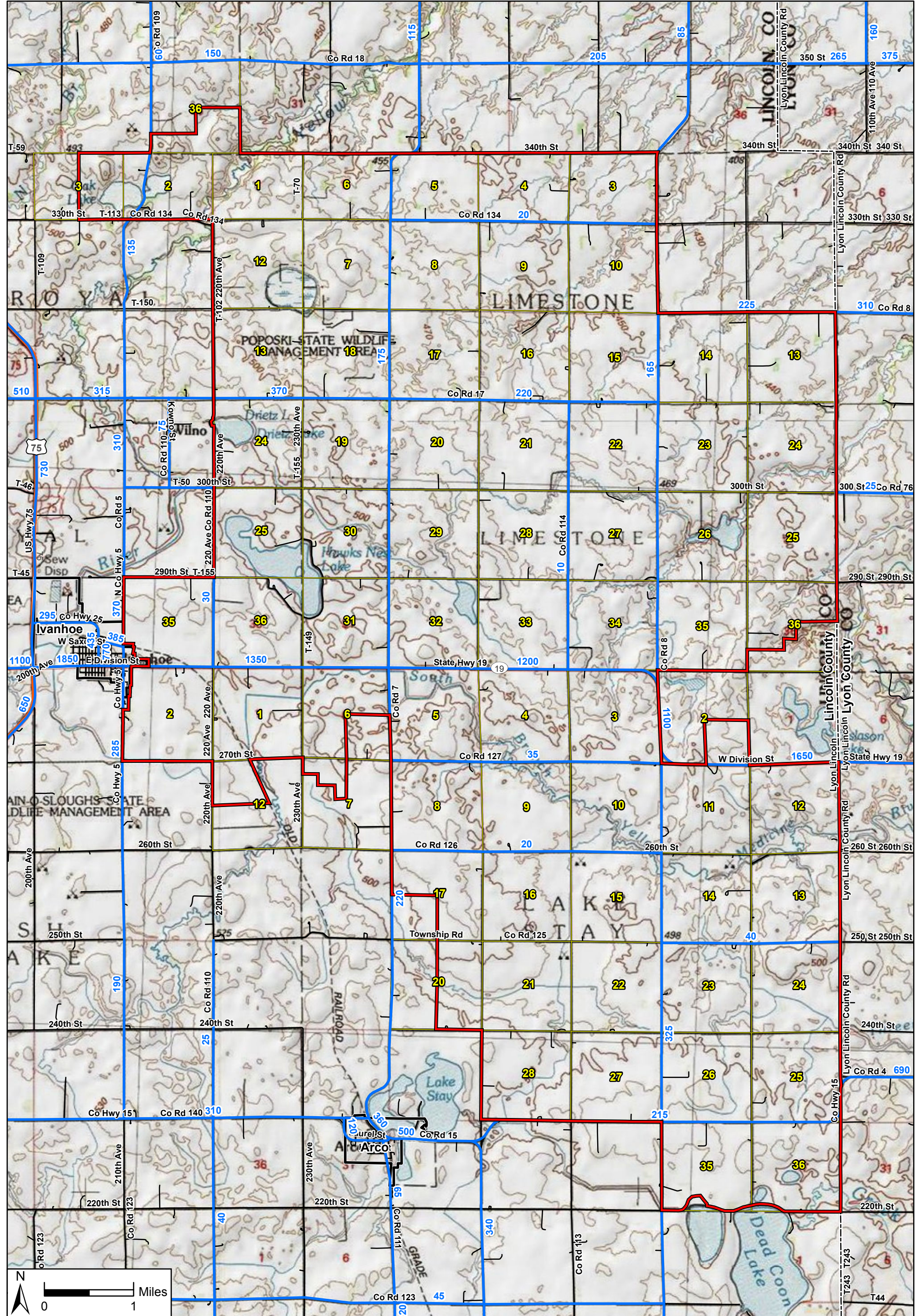
# Red Pine Wind Project

Lincoln County, Minnesota

Infrastructure

**Westwood**  
 Toll Free (888) 937-5150 westwoodps.com  
 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

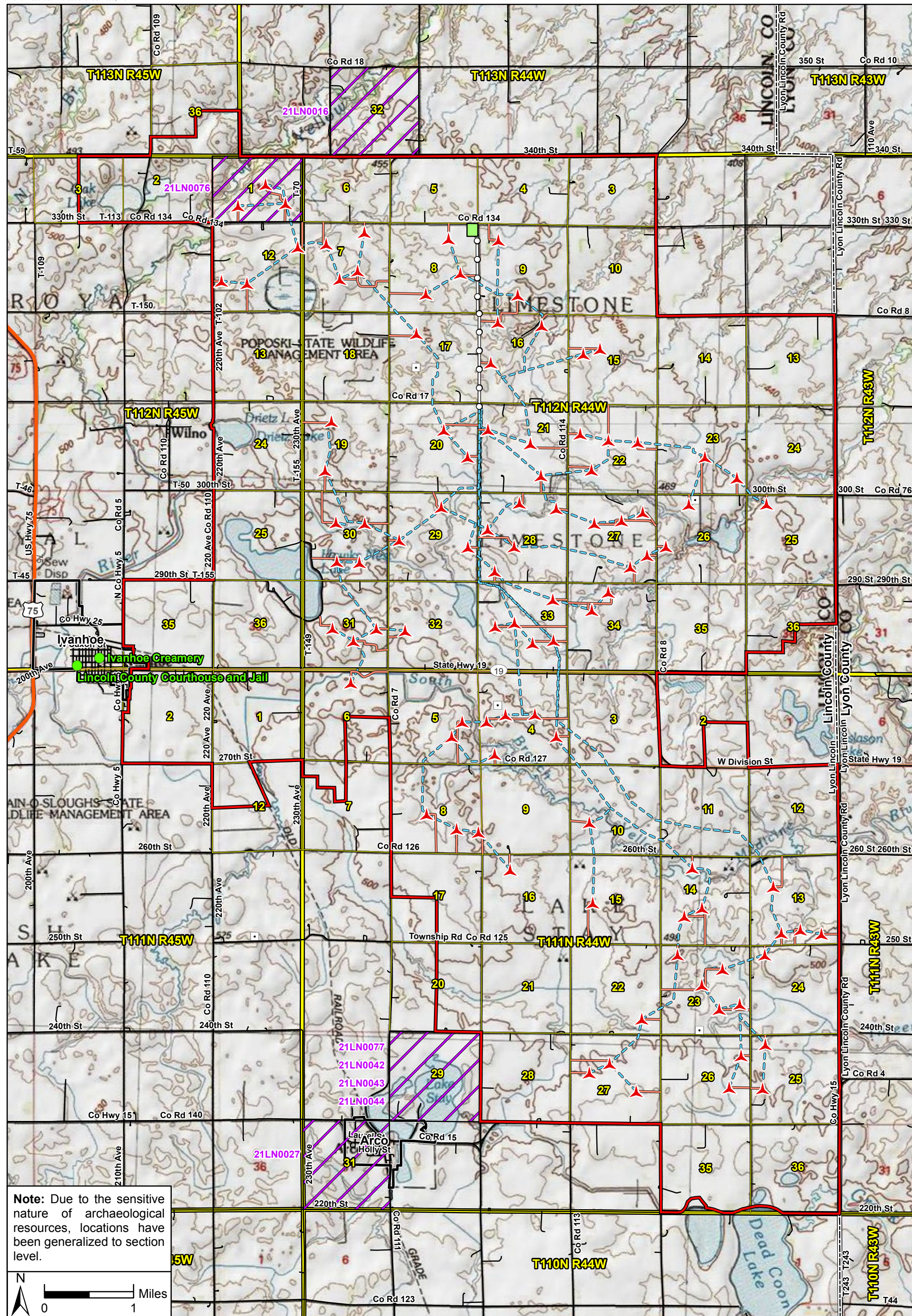
**Red Pine Wind Project**

Lincoln County, Minnesota

Annual Average Daily Traffic (AADT)



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Westwood Professional Services, Inc.



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



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

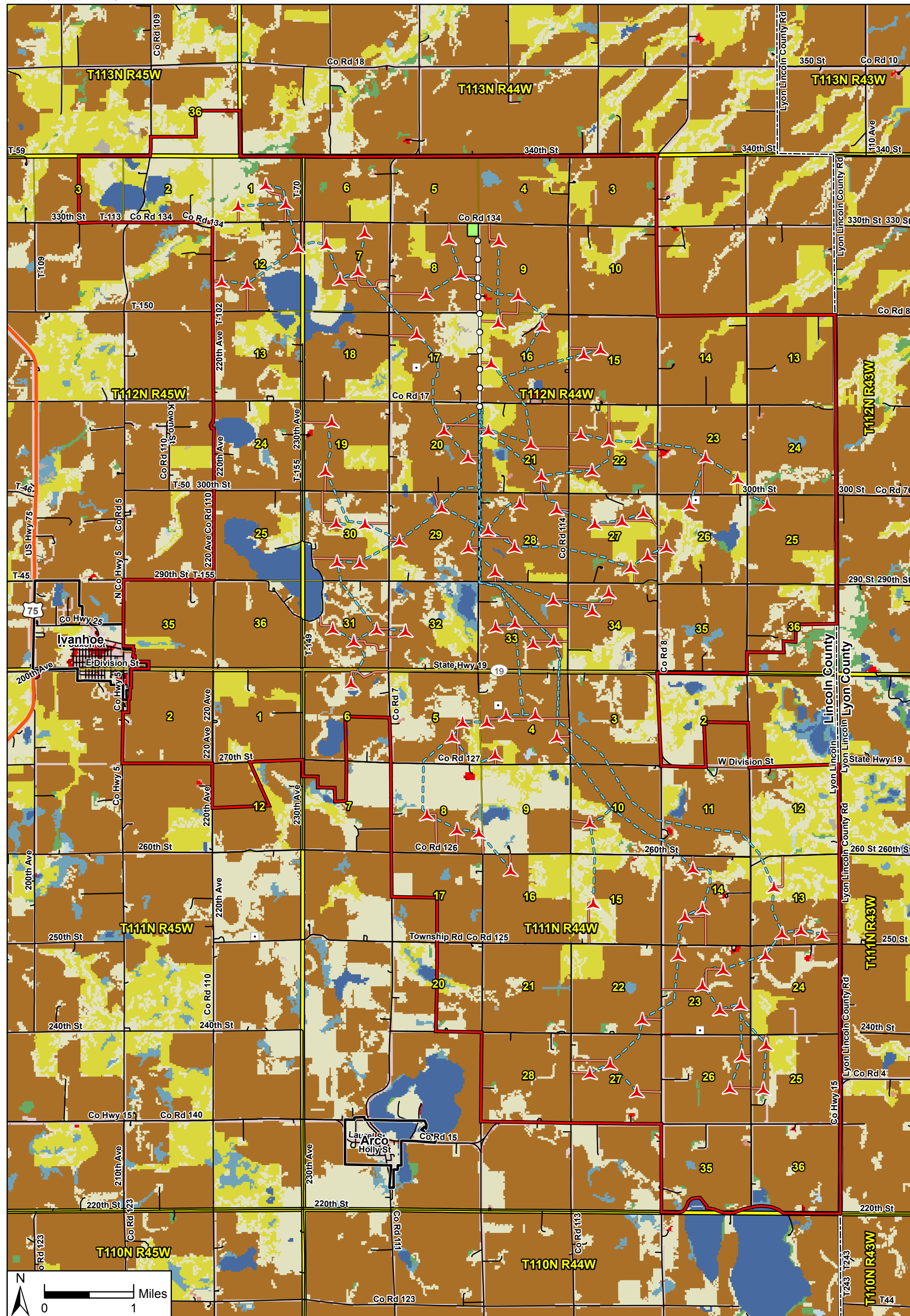
**Legend**

- 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



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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