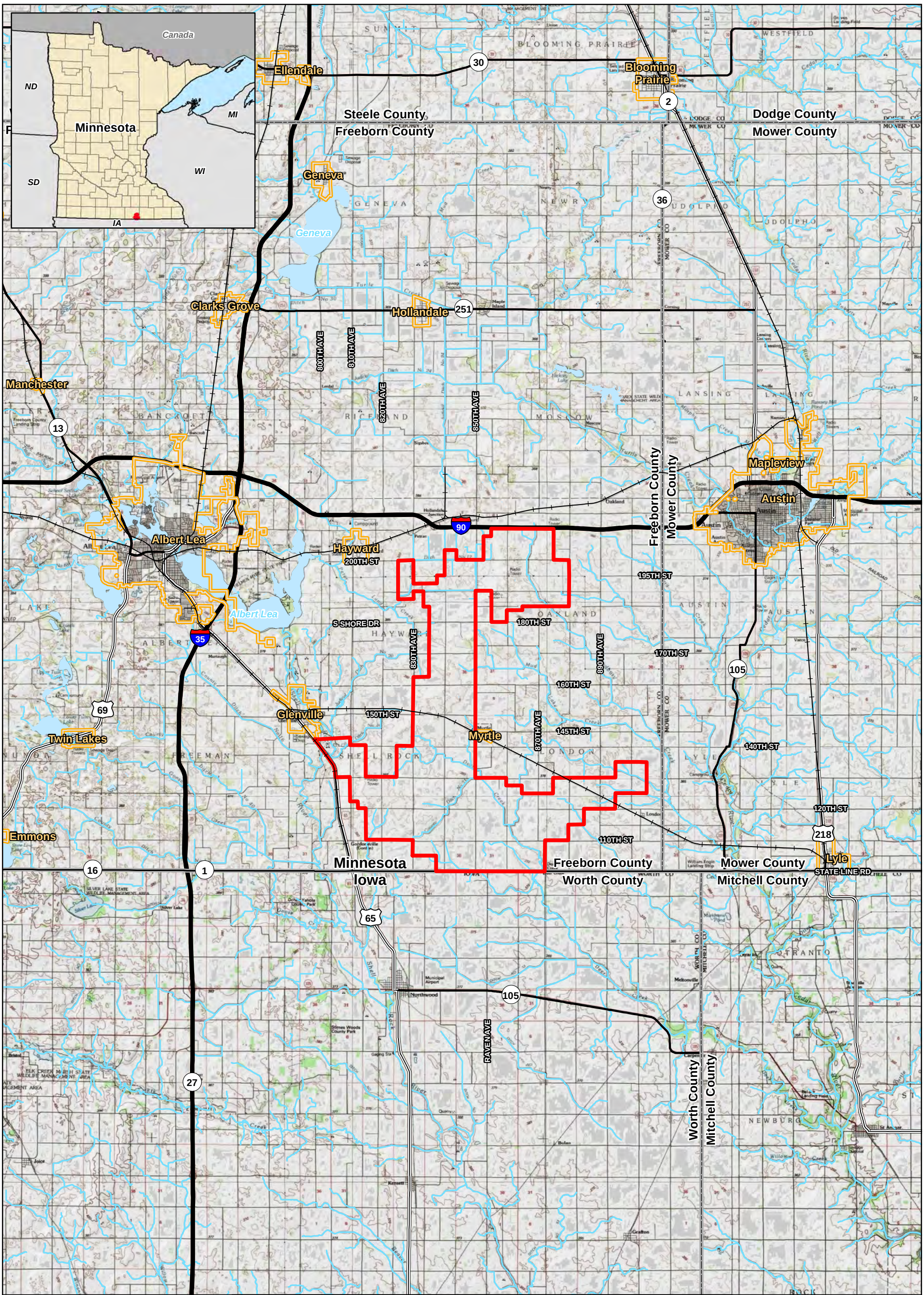
Figures



FREEBORN WIND FARM

merjent

0 1.5 3 Miles

1 inch = 3 miles

N

Imagery Source: 2013 USA Topo
Data Source: Invenergy, MN DNR, Census, MN DOT

For Environmental Review Purposes Only

Figure 1
Project Location

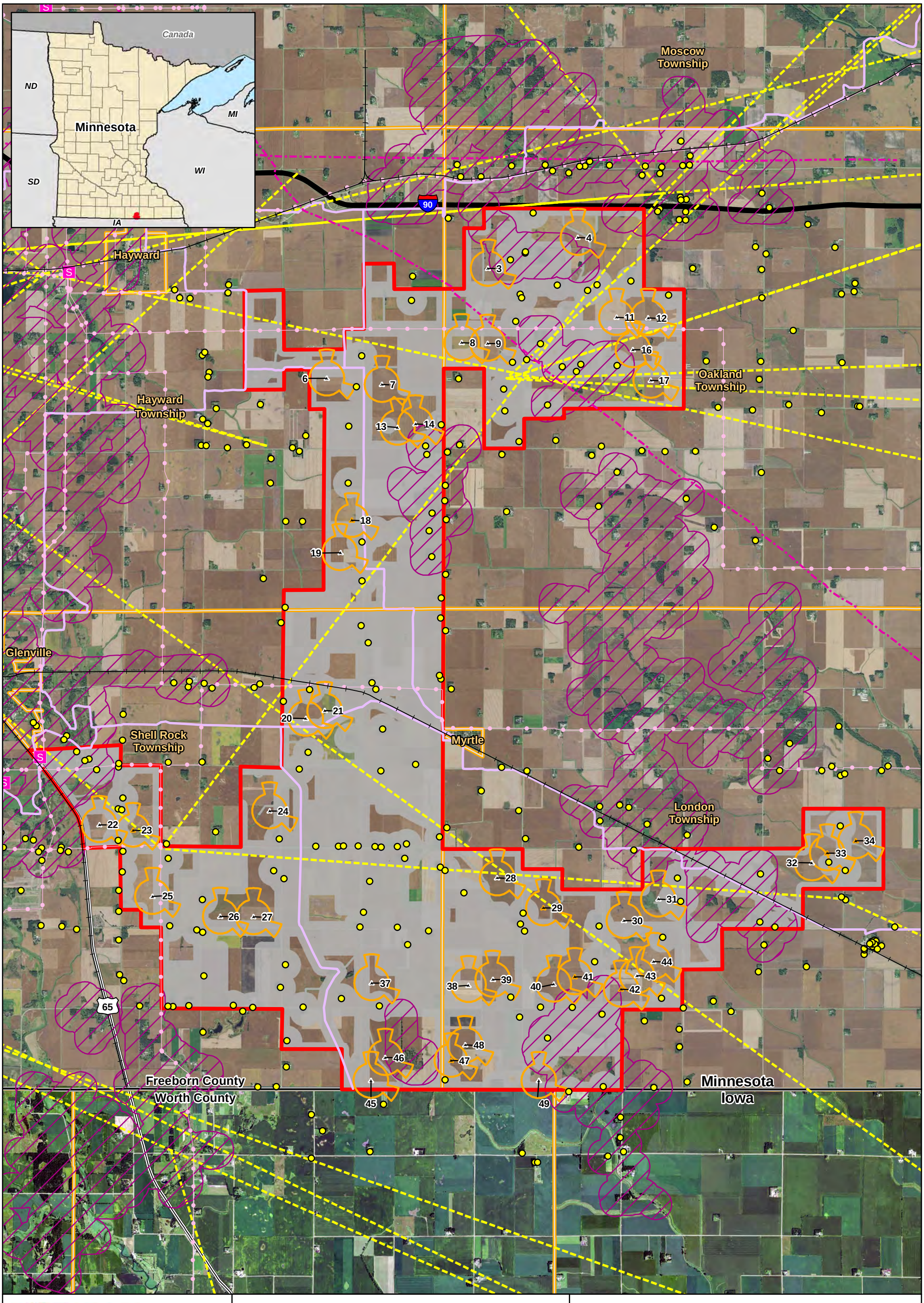
Freeborn Wind Farm
Freeborn County, MN

- Project Boundary
- County Boundary
- Municipal Boundary
- Stream or Ditch
- Lake, Pond or Reservoir

Document Path: Z:\Clients\I_L\Invenergy\Freeborn_Wind_Farm_Project\Permitting\State\PUC_Site_Permit\Mapping\Vestas_V116\Figure_1_Project_Location.mxd

Date: (6/1/2017)

Source:



FREEBORN WIND FARM

merjent

0 0.5 1 Miles

1 inch = 1 miles

N

Imagery Source: 2015 Color FSA
Data Source: Invenergy, MN DNR, MN DOT, Census, NPMS, Comseach

For Environmental Review Purposes Only

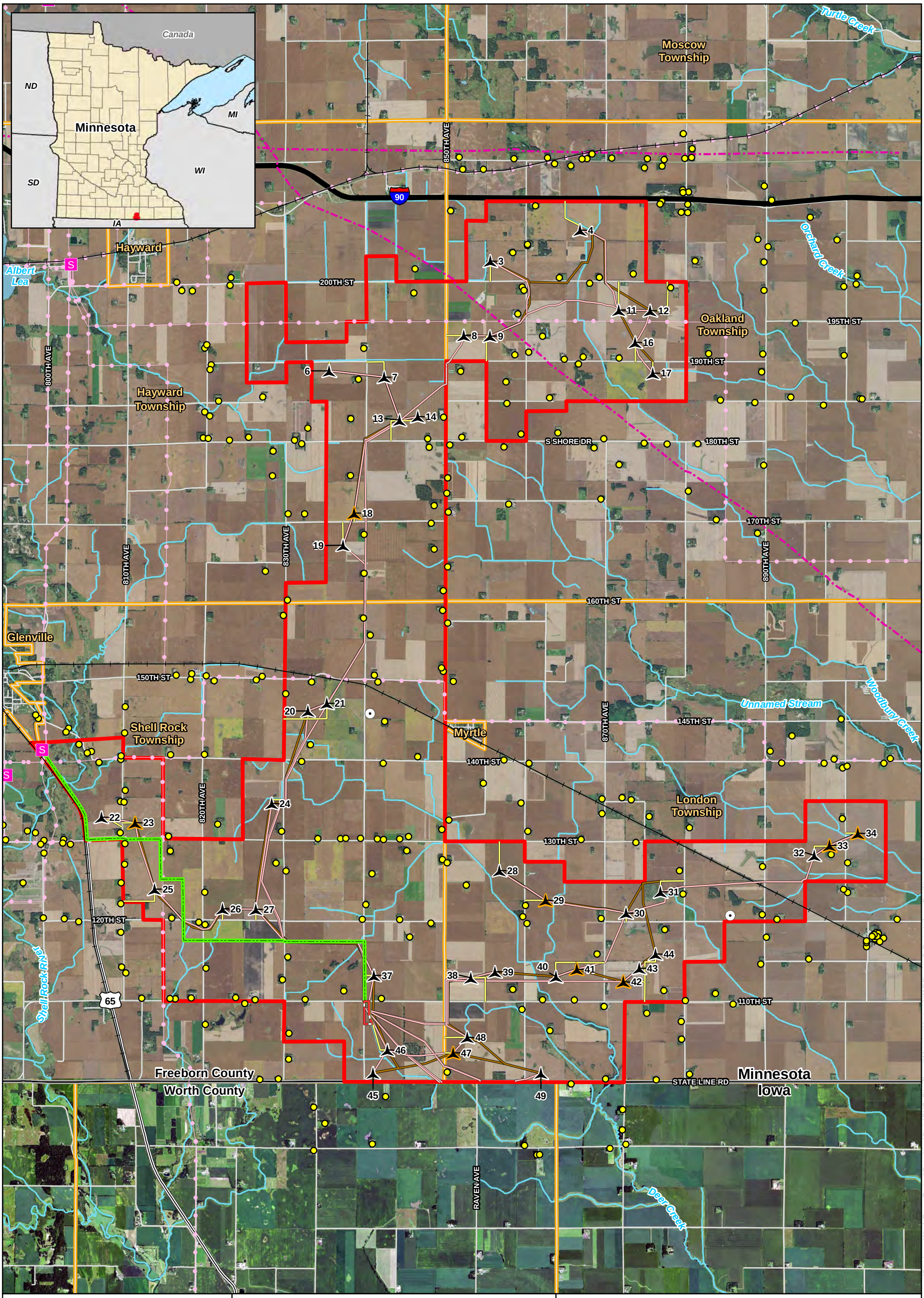
Figure 2
Turbine Layout and Constraints

Freeborn Wind Farm
Freeborn County, MN

- Vestas V110-2.0*
- Vestas V116-2.0*
- Existing Substation
- Residential Structure
- Project Boundary
- 3x5 Wind Access Buffer
- Setbacks
- 1,000 ft NLEB Habitat Buffer
- Existing Transmission Line
- Existing Pipeline
- Snowmobile Trail
- Microwave Beam Path

* Turbine Symbol Drawn to Scale

Document Path: Z:\Clients\L_L\Invenergy\Freeborn_Wind_Farm_Project\Permitting\State\PUC_Site_Permit\Mapping\Vestas_V116\Figure_2_Turbine_Layout_Constraints.mxd **Date:** (6/5/2017) **Source:**



FREEBORN WIND FARM

merjent

0 0.5 1 Miles

1 inch = 1 miles

N

Imagery Source: 2015 Color FSA
Data Source: Invenergy, MN DNR, MN DOT, NPMS, Census

For Environmental Review Purposes Only

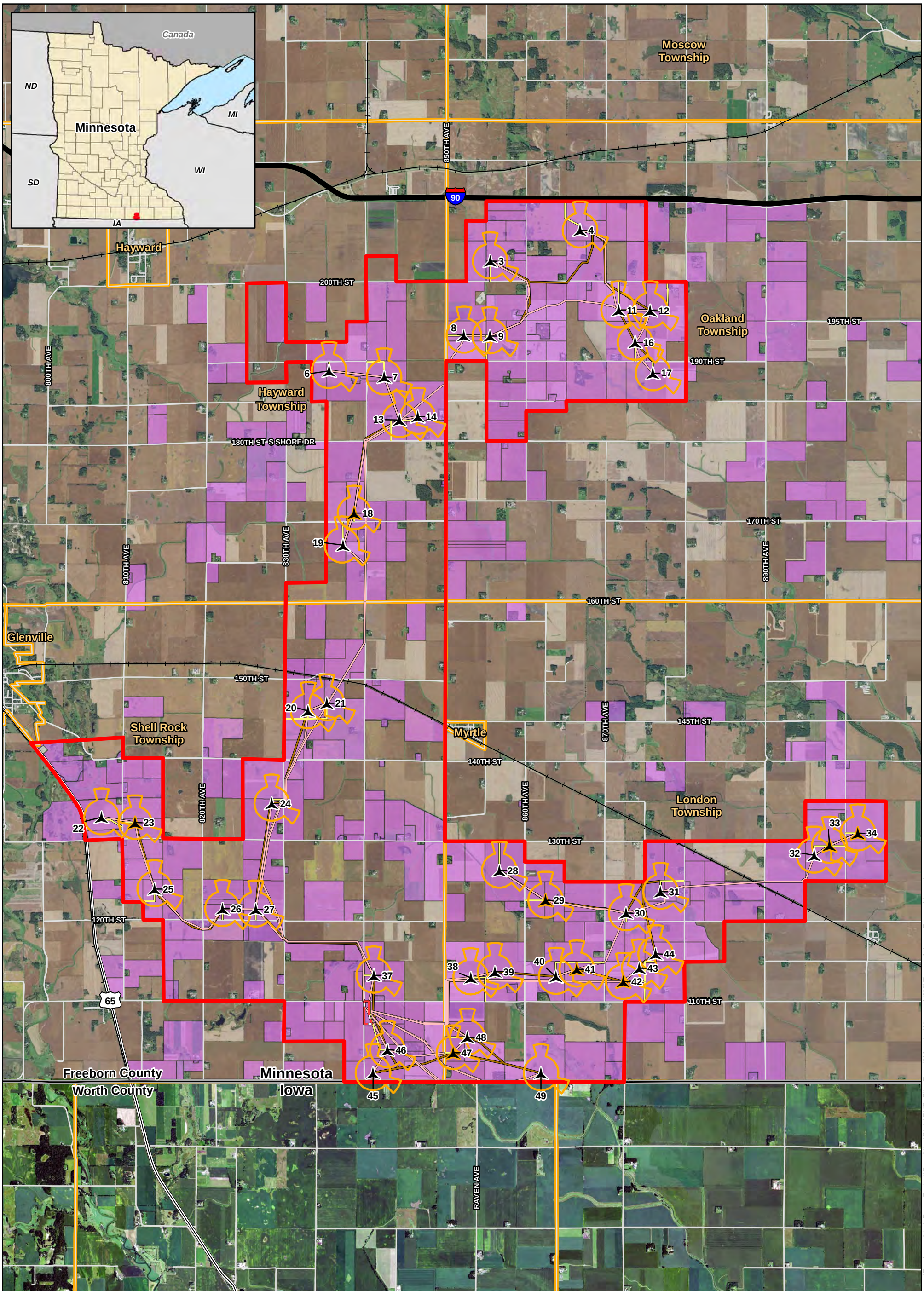
Figure 3
Project Area and Facilities

Freeborn Wind Farm
Freeborn County, MN

- Vestas V110-2.0
- Vestas V116-2.0
- Residential Structure
- Permanent Met Tower
- Project Boundary
- O&M and Project Substation
- River/Stream
- Lake, Pond or Reservoir
- Existing Substation
- Existing Pipeline
- Existing Transmission Line
- Access Road
- Collection Line
- Crane Path
- Proposed Transmission Line

Source: Z:\Clients\I_L\Invenergy\Freeborn_Wind_Farm_Project\Permitting\State\PUC_Site_Permit\Mapping\Vestas_V116\Figure_3_Project_Area_Facilities.mxd

Date: (6/5/2017)



FREEBORN WIND FARM

merjent

0 0.5 1 Miles

1 inch = 1 miles

N

Imagery Source: 2015 Color FSA
Data Source: Invenergy, MN DNR, USFWS, Census

For Environmental Review Purposes Only

Figure 4
Land Ownership

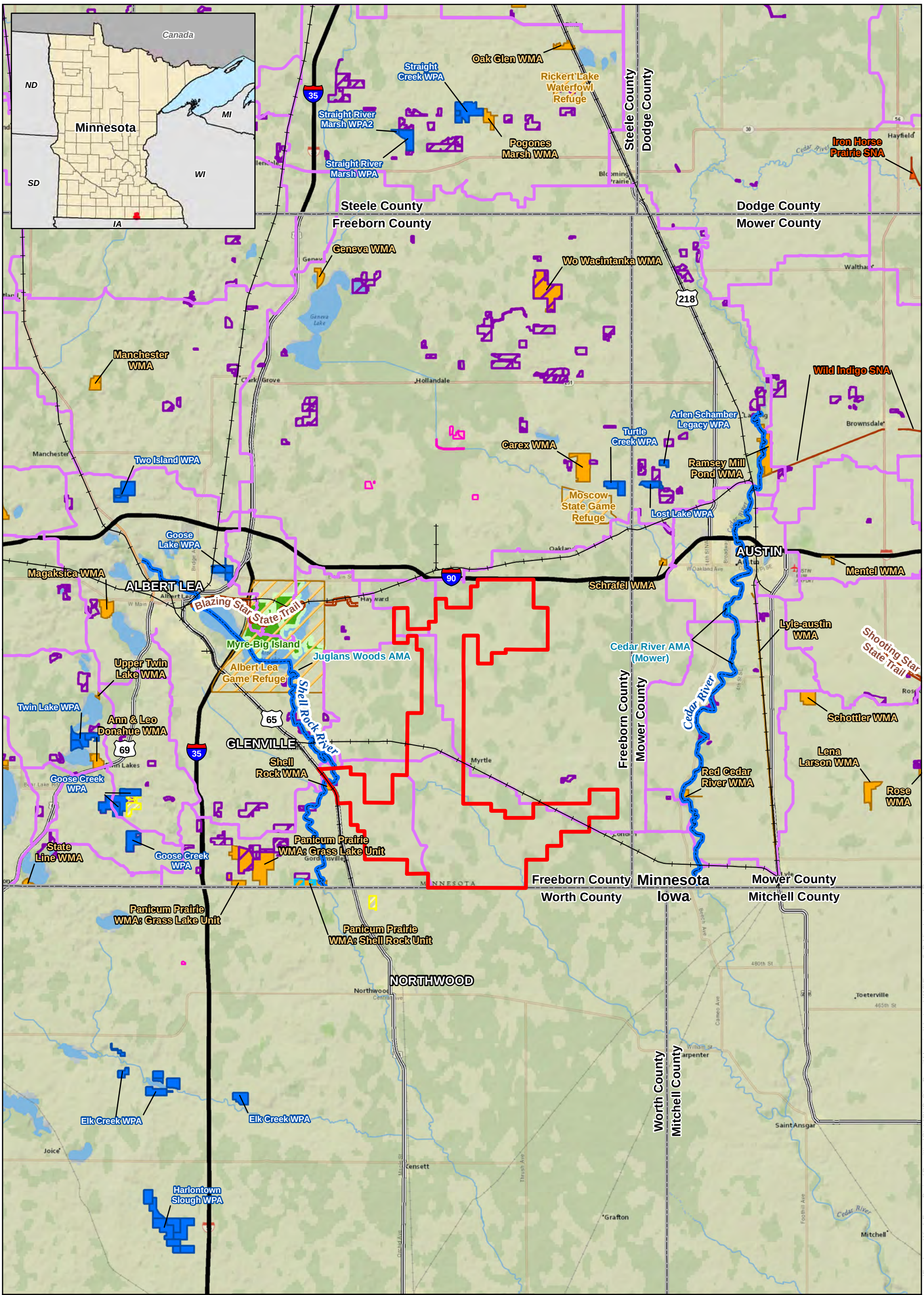
Freeborn Wind Farm
Freeborn County, MN

Vestas V110-2.0
Vestas V116-2.0
Project Boundary
O&M and Project Substation
3x5 Wind Access Buffer
Access Road
Collection Line
Crane Path

Site Control Status
Participant

Source: Z:\Clients\L_L\Invenergy\Freeborn_Wind_Farm_Project\Permitting\State\PUC_Site_Permit\Mapping\Vestas_V116\Figure_4_Land_Ownership.mxd

Date: (6/5/2017)



merjent

FREEBORN WIND FARM

0 1.5 3 Miles

1 inch = 3 miles

N

Imagery Source: National Geographic World Map
Data Source: Invenergy, MN DNR, MN DOT, MN BWSR, USFWS, Census

For Environmental Review Purposes Only

Figure 5
Public Land Ownership and Recreation

Freeborn Wind Farm
Freeborn County, MN

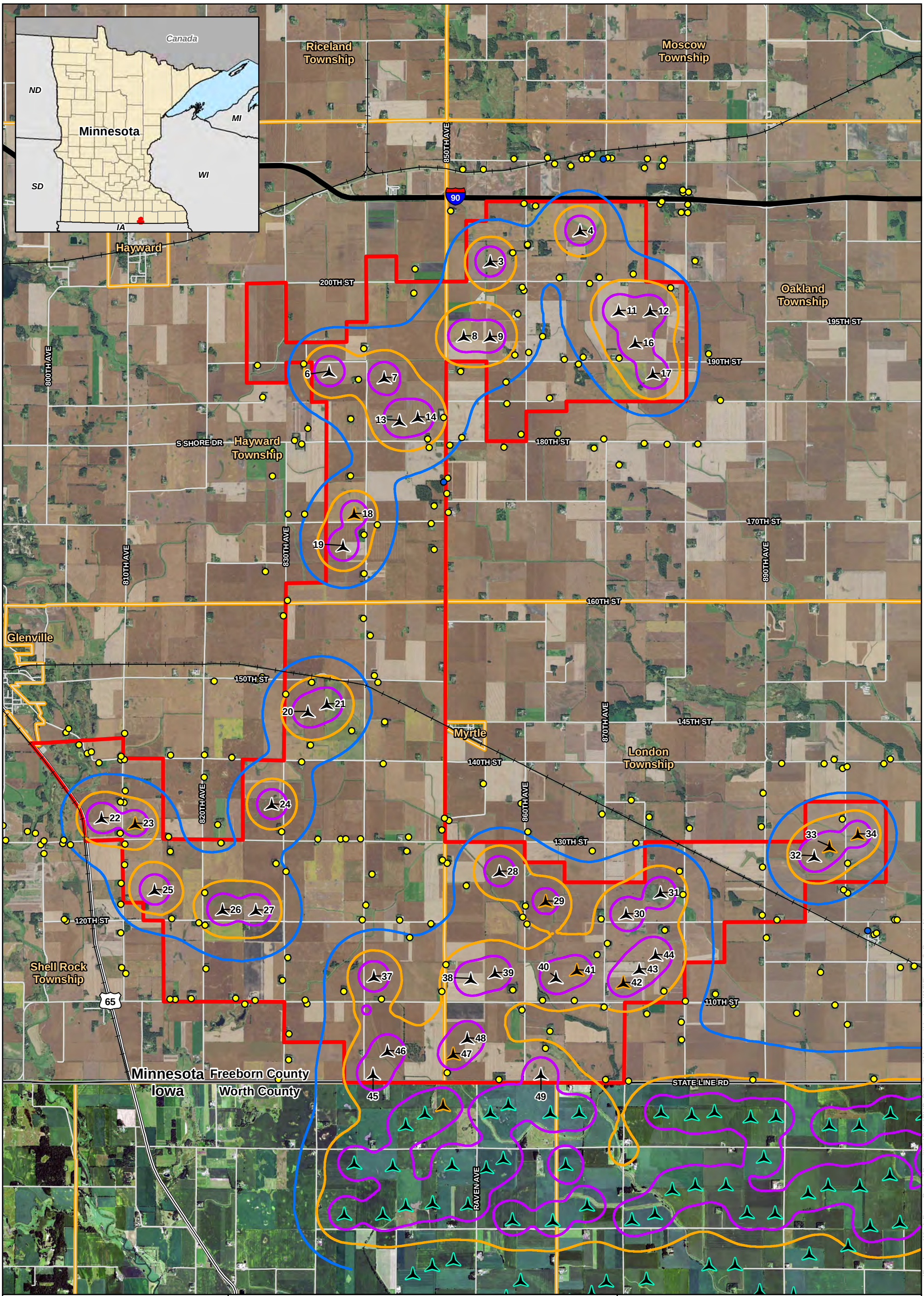
- Project Boundary
- Minnesota State Trails (MS 85.015)
- Minnesota Water Trails
- Snowmobile Trail
- State Game Refuge
- Minnesota State Park
- Reinvest in Minnesota (RIM)
- Wildlife Management Area (WMA)
- Scientific & Natural Area (SNA)
- Aquatic Management Area (AMA)

Federal Interest

- Farm Service Agency
- Grassland Easement
- Waterfowl Production Area
- Wetland Easement

Source: Z:\Clients\I_L\Invenergy\Freeborn_Wind_Farm_Project\Permitting\State\PUC_Site_Permit\Mapping\Vestas_V116\Figure_5_Public_Land_and_Recreation.mxd

Date: (6/1/2017)



merjent

FREEBORN WIND FARM

0 0.5 1 Miles

1 inch = 1 miles

N

Imagery Source: 2015 Color FSA
Data Source: Invenergy, MN DOT, Census

For Environmental Review Purposes Only

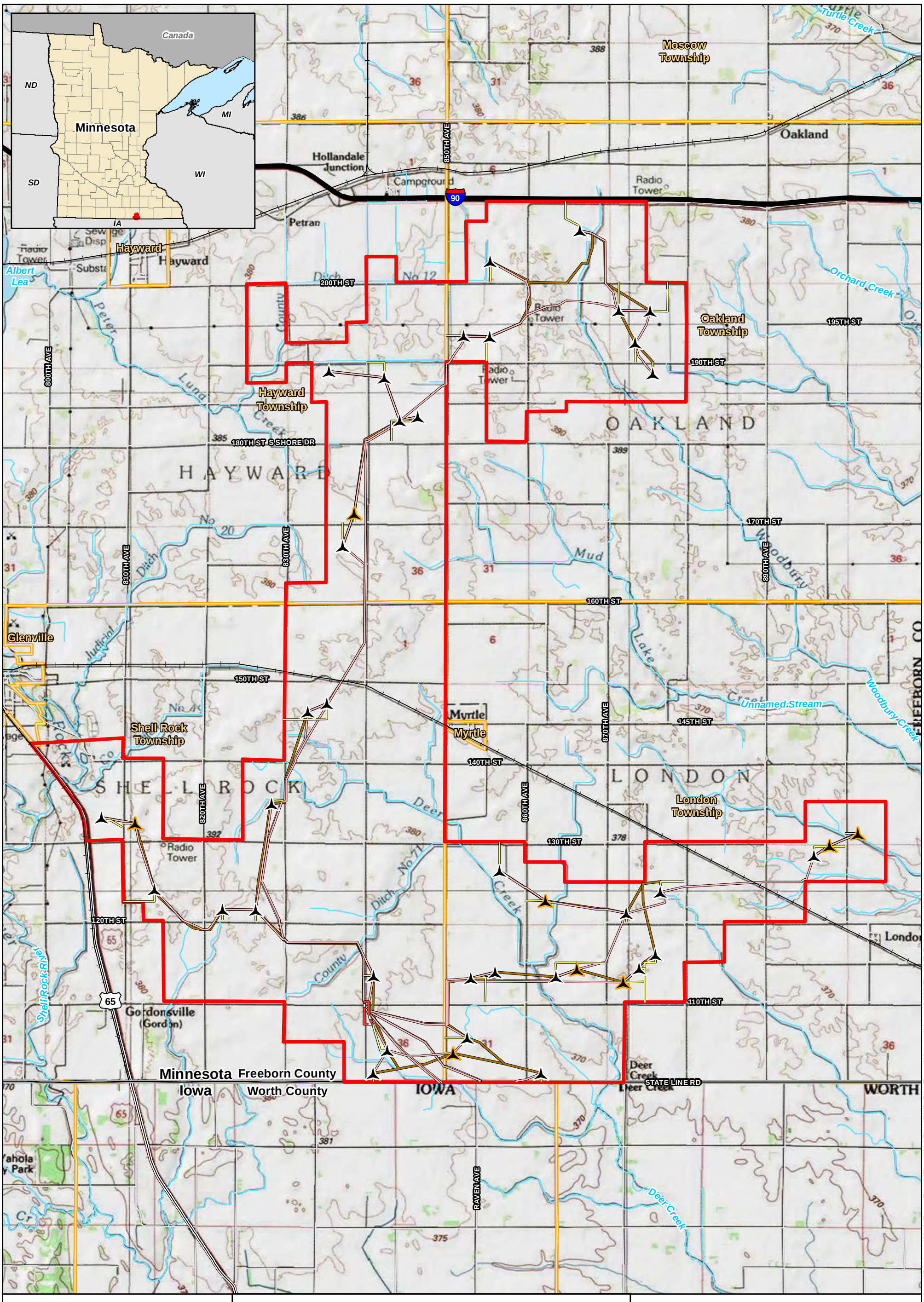
Figure 6
Sound/Noise

Freeborn Wind Farm
Freeborn County, MN

Vestas V110-2.0
Vestas V116-2.0
Modeled Iowa Turbine Location
NAC-1 Receptor
NAC-2 Receptor
Project Boundary

Noise Level Contours
40 dBA
45 dBA
50 dBA

Source: Z:\Clients_L\Invenergy\Freeborn_Wind_Farm_Project\Permitting\State\PUC_Site_Permit\Mapping\Vestas_V116\Figure_6_Sound_Noise.mxd
Date: (6/6/2017)



FREEBORN WIND FARM

merjent

0 0.5 1 Miles

1 inch = 1 miles

N

Imagery Source: 2013 USA Topo
Data Source: Invenergy, MN DNR, MN DOT, Census

For Environmental Review Purposes Only

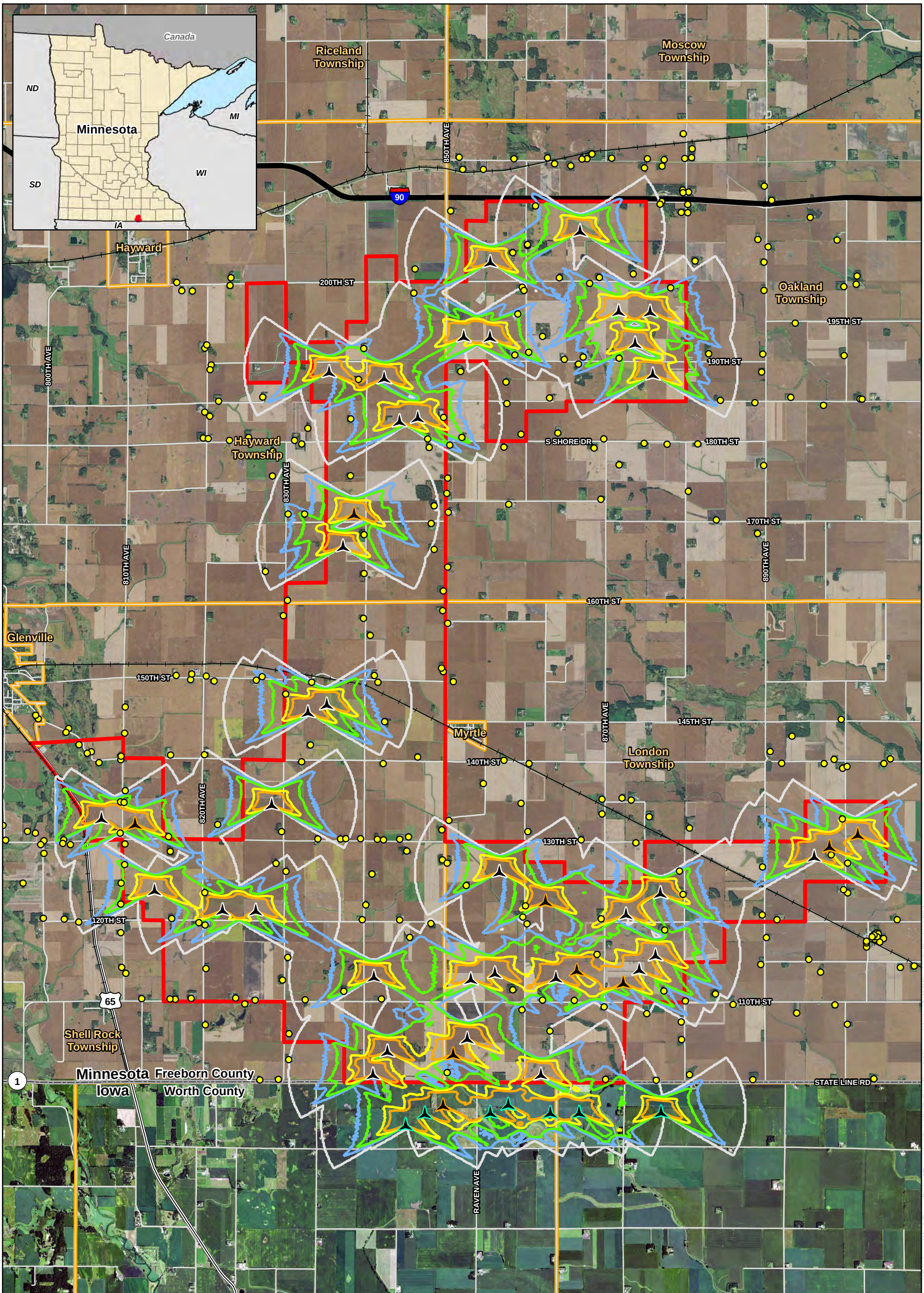
Figure 7
Topographic Map

Freeborn Wind Farm
Freeborn County, MN

- Vestas V110-2.0
- Vestas V116-2.0
- Project Boundary
- O&M and Project Substation
- Access Road
- Collection Line
- Crane Path
- River/Stream
- Lake, Pond or Reservoir

Source: Z:\Clients\I_L\Invenergy\Freeborn_Wind_Farm_Project\Permitting\State\PUC_Site_Permit\Mapping\Vestas_V116\Figure_7_Topographic_Map.mxd

Date: (6/1/2017)



FREEBORN WIND FARM

merjent

0 0.5 1 Miles

1 inch = 1 miles

N

Imagery Source: 2015 Color FSA
Data Source: Invenergy, MN DOT, Census

For Environmental Review Purposes Only

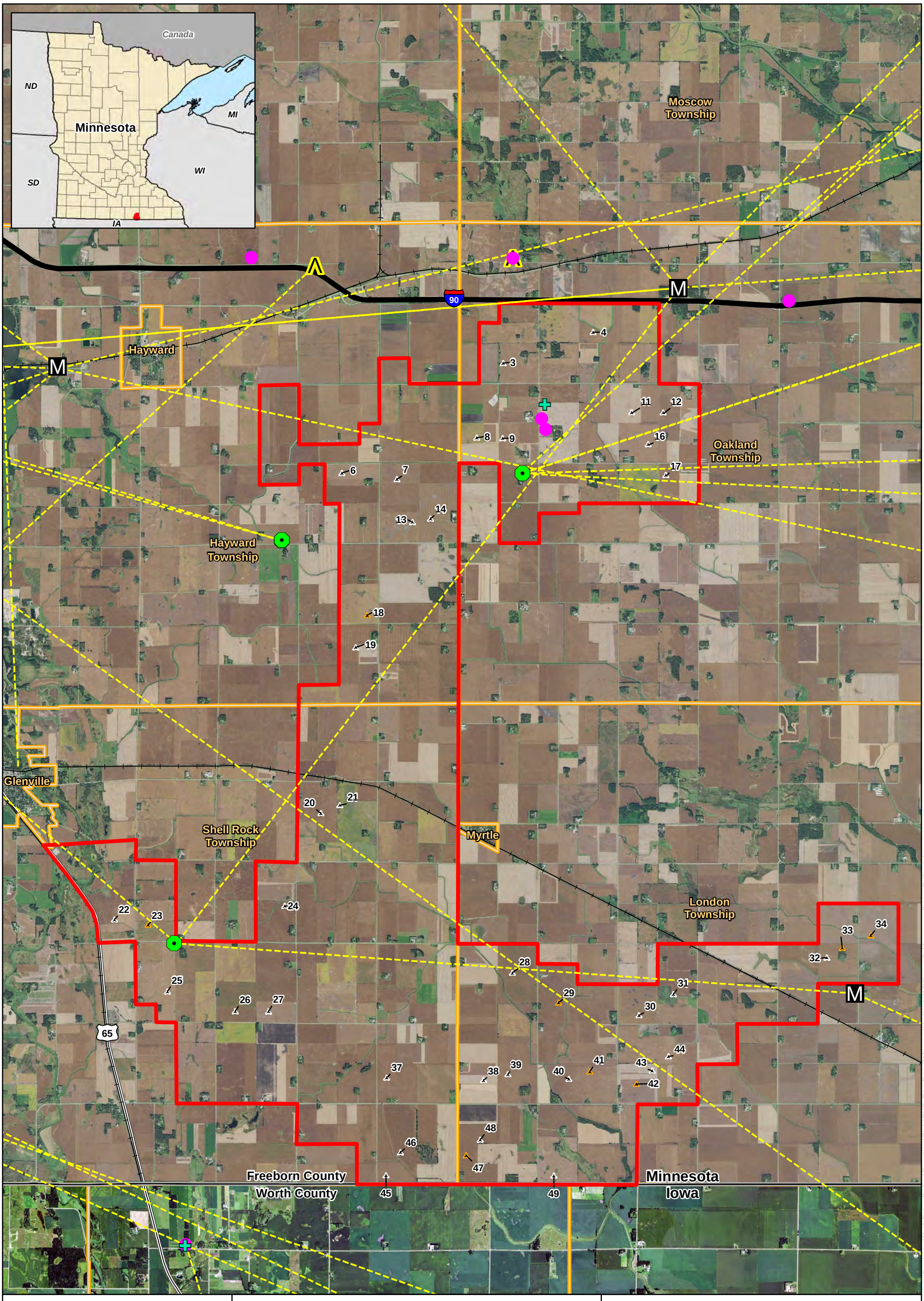
Figure 8
Shadow Flicker

Freeborn Wind Farm
Freeborn County, MN

Vestas V110-2.0
Vestas V116-2.0
Modeled Iowa Turbine Location
Residential Structure
Project Boundary

Shadow Hours Per Year
0
5
10
30
50

Source: Z:\Clients\I_L\Invenergy\Freeborn_Wind_Farm_Project\Permitting\State\PUC_Site_Permit\Mapping\Vestas_V116\Figure_8_Shadow_Flicker.mxd
Date: (6/6/2017)



FREEBORN WIND FARM

merjent

0 0.5 1 Miles

1 inch = 1 miles

N

Imagery Source: 2015 Color FSA
Data Source: Invenergy, MN DOT, Comsearch, Census

For Environmental Review Purposes Only

Figure 9
Microwave Beam Paths

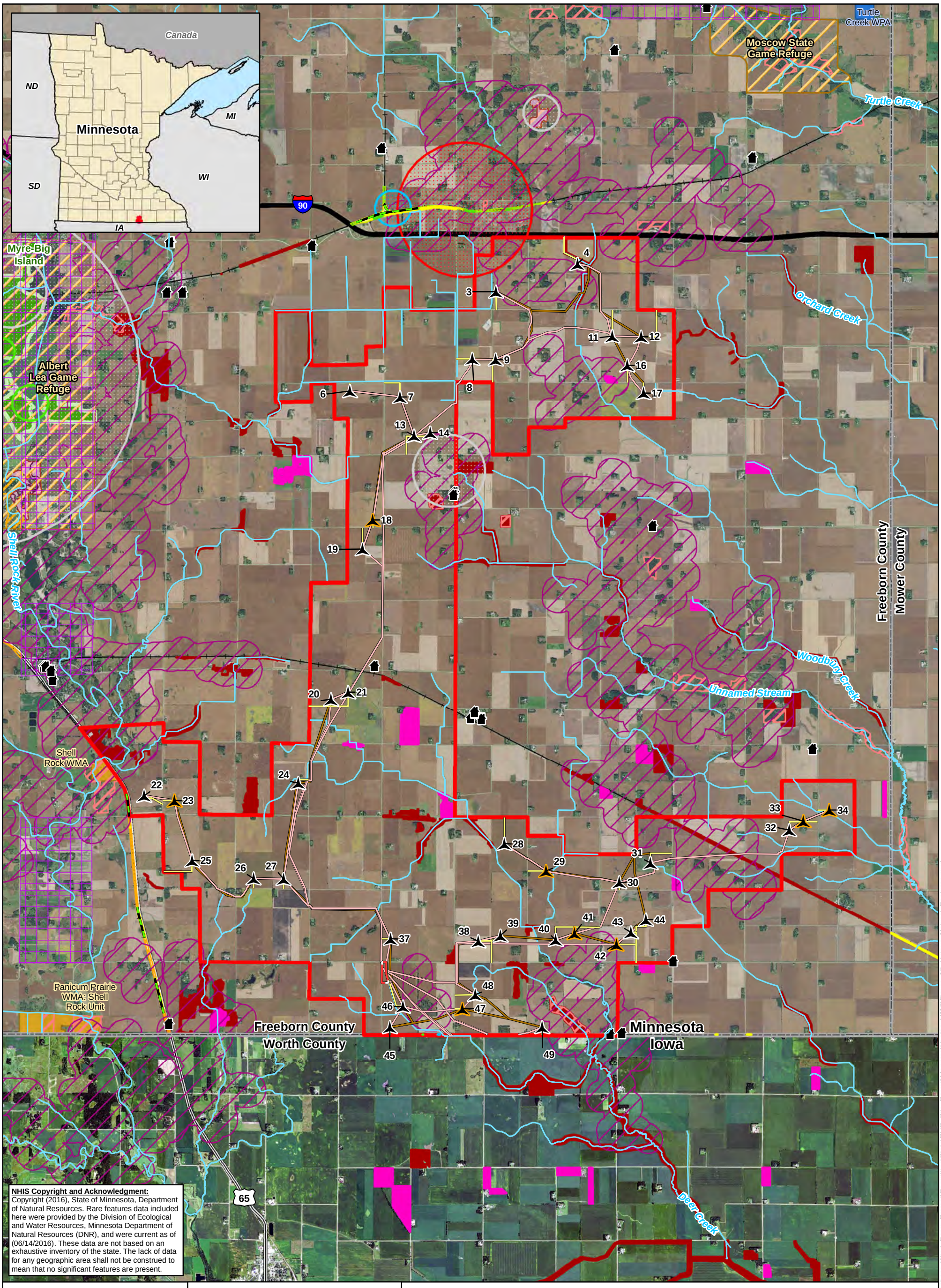
Freeborn Wind Farm
Freeborn County, MN

- Vestas V110-2.0*
- Vestas V116-2.0*
- Project Boundary
- County Boundary
- Microwave Beam Path
- FM Tower
- Communication Tower
- Microwave Tower/ FM Tower
- Microwave Tower
- Mobile Cell Tower

* Turbine Symbol Drawn to Scale

Source: Z:\Clients\I_L\Invenergy\Freeborn_Wind_Farm_Project\Permitting\State\PUC_Site_Permit\Mapping\Vestas_V116\Figure_9_Microwave_Beam_Path.mxd

Date: (6/5/2017)



NHIS Copyright and Acknowledgment:
Copyright (2016), State of Minnesota, Department of Natural Resources. Rare features data included here were provided by the Division of Ecological and Water Resources, Minnesota Department of Natural Resources (DNR), and were current as of (06/14/2016). These data are not based on an exhaustive inventory of the state. The lack of data for any geographic area shall not be construed to mean that no significant features are present.

FREEBORN WIND FARM
merjent

0 0.5 1 Miles
1 inch = 1 miles

Imagery Source: 2015 Color FSA
Data Source: Invenergy, MN DNR, MN DOT, SHPO, USFWS, Census
For Environmental Review Purposes Only

Figure 10
Unique Natural Features

Freeborn Wind Farm
Freeborn County, MN

- Vestas V110-2.0
- Vestas V116-2.0
- Project Boundary
- O&M and Project Substation
- Access Road
- Collection Line
- Crane Path
- River/Stream
- MN DNR Railroad ROW Prairies
- State Game Refuge
- Minnesota State Park
- 1,000 ft NLEB Habitat Buffer

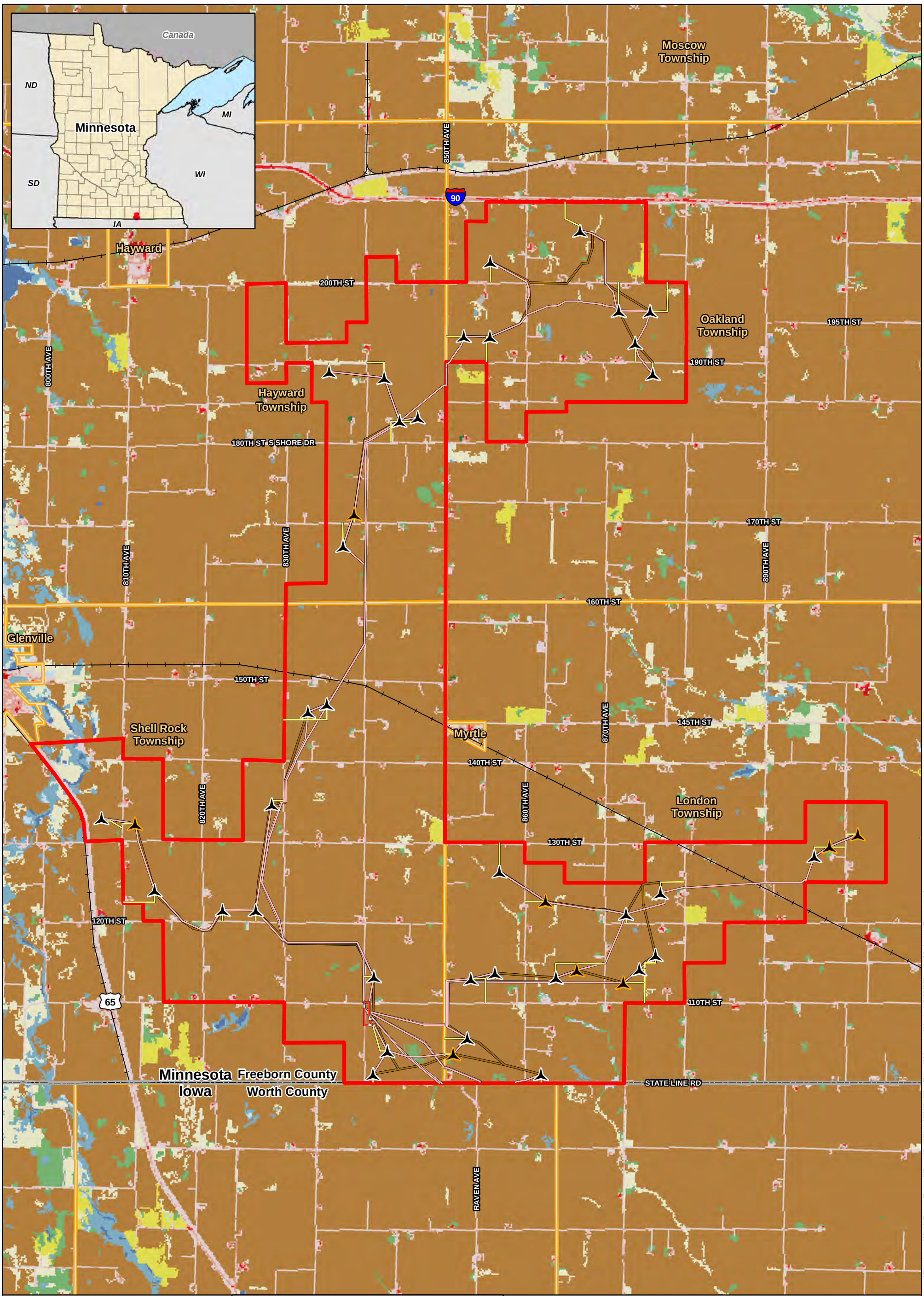
Sites of Biodiversity Significance
- High
- Moderate
- Below

Natural Heritage Inventory System (NHIS)
- Endangered
- Threatened
- Special Concern
- Watchlist
- N/A

- MN DNR Native Prairie
- MN DNR Native Plant Community
- Waterfowl Production Area (WPA)
- Wildlife Management Area (WMA)
- Aquatic Management Area (AMA)
- Architectural/Historic Resource
- Archaeological Site in Section

Delineated Native Prairie
- Potentially Native Prairie (Not Previously Plowed)
- Potentially Not Native Prairie (Previously Plowed)

Source: Z:\Clients\I_L\Invenergy\Freeborn_Wind_Farm_Project\Permitting\State\PUC_Site_Permit\Mapping\Vestas_V116\Figure_10_Unique_Natural_Features.mxd
Date: (6/5/2017)



merjent

FREEBORN WIND FARM

0 0.5 1 Miles

1 inch = 1 miles

N

Data Source: Invenergy, MN DOT, NLCD, Census

For Environmental Review Purposes Only

Figure 11
Land Cover

Freeborn Wind Farm
Freeborn County, MN

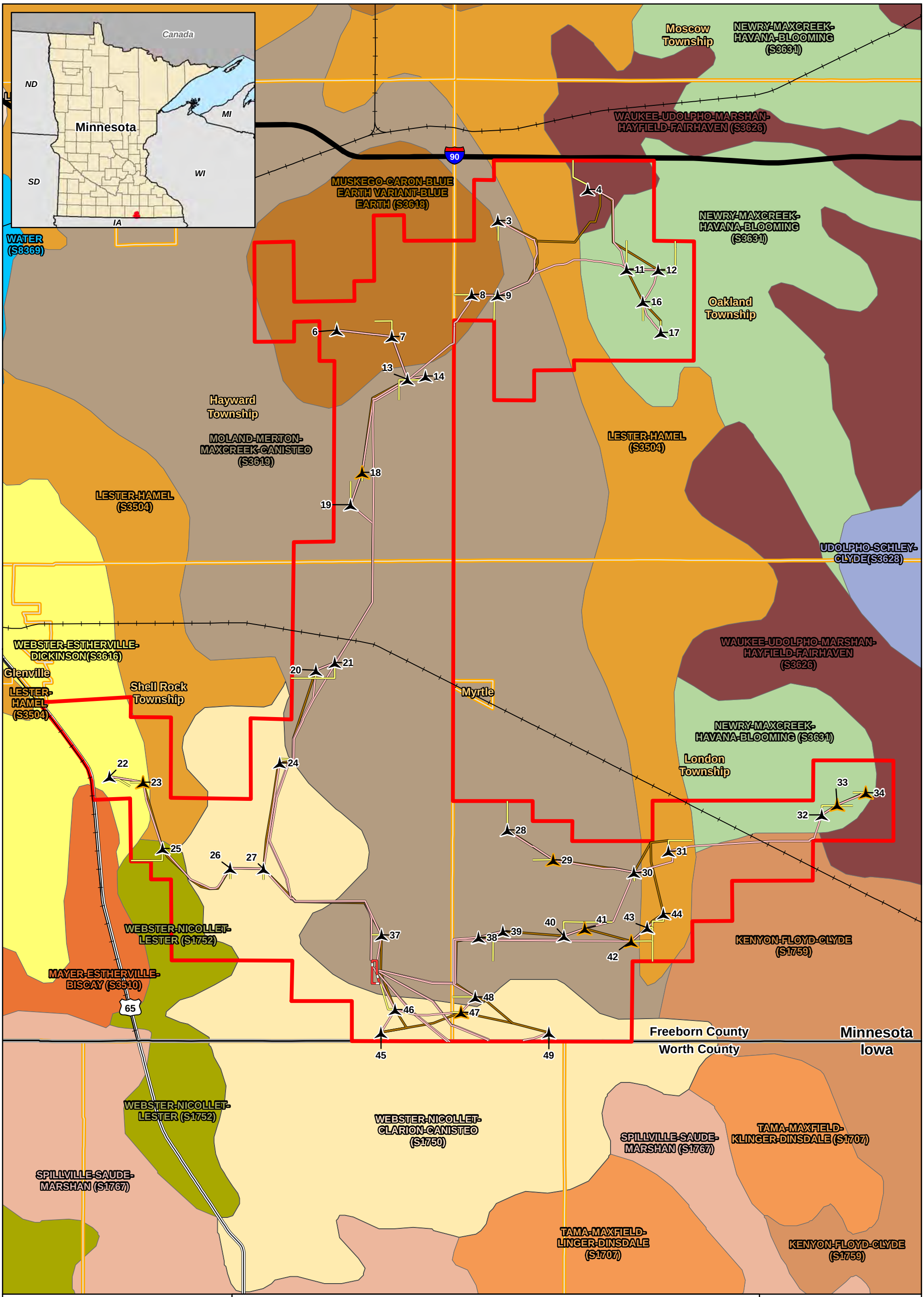
- Vestas V110-2.0
- Vestas V116-2.0
- Project Boundary
- O&M and Project Substation
- Access Road
- Collection Line
- Crane Path

NLCD Land Cover

- Open Water
- Developed, Open Space
- Developed, Low Intensity
- Developed, Medium Intensity
- Developed, High Intensity
- Barren Land
- Deciduous Forest
- Evergreen Forest
- Grassland/Herbaceous
- Hay/Pasture
- Cultivated Crops
- Woody Wetlands
- Emergent Herbaceous Wetlands

Source: Z:\Clients\I_L\Invenergy\Freeborn_Wind_Farm_Project\Permitting\State\PUC_Site_Permit\Mapping\Vestas_V116\Figure_11_Land_Cover.mxd

Date: (6/1/2017)



FREEBORN WIND FARM

merjent

0 0.5 1 Miles

1 inch = 1 miles

N

Data Source: Invenergy, MN DOT, SSURGO, Census

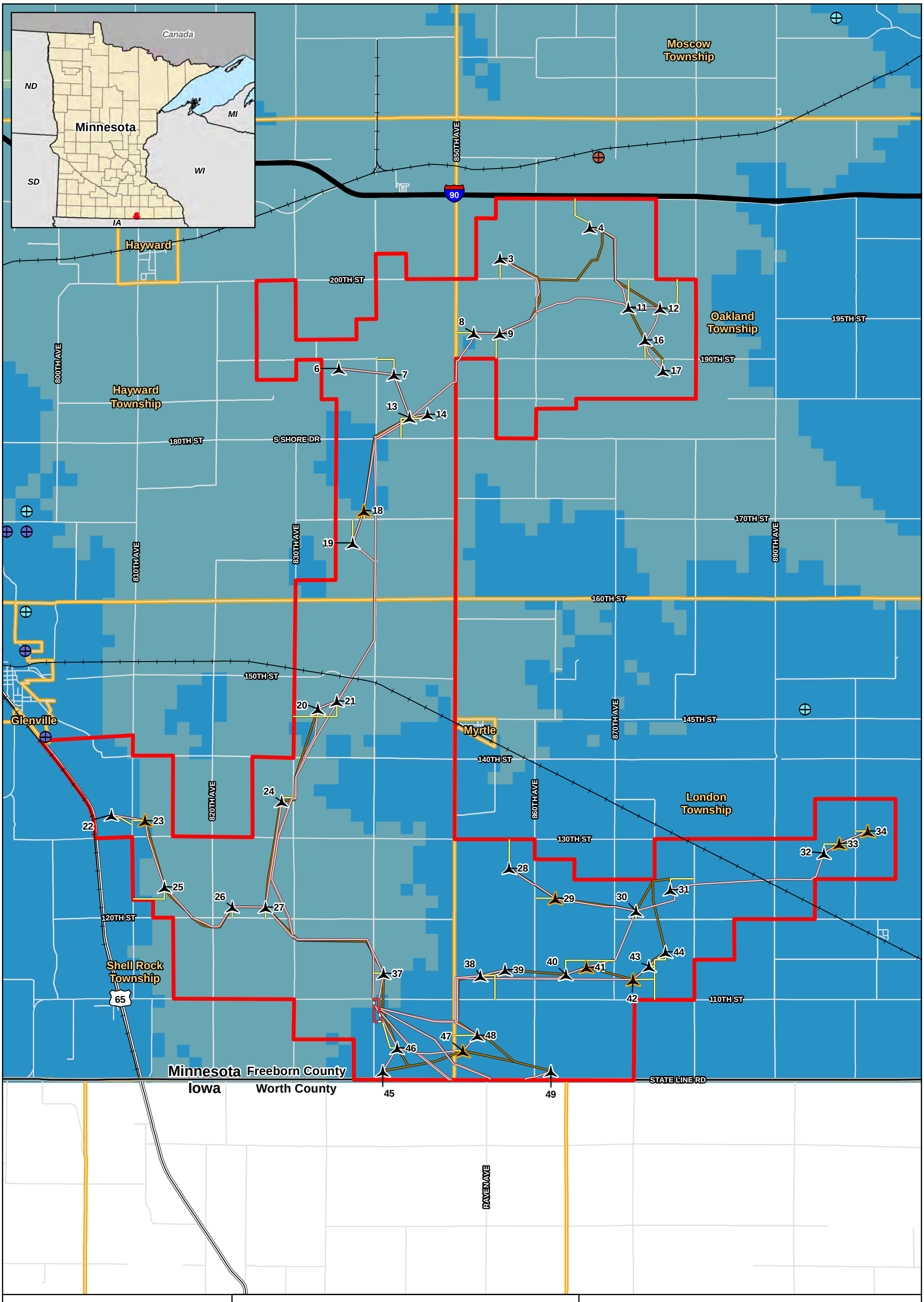
For Environmental Review Purposes Only

Figure 12
Soils

Freeborn Wind Farm
Freeborn County, MN

- Vestas V110-2.0
- Vestas V116-2.0
- Project Boundary
- O&M and Project Substation
- Access Road
- Collection Line
- Crane Path

Document Path: **Date:** (6/5/2017) **Source:** Z:\Clients_L\Invenergy\Freeborn_Wind_Farm_Project\Permitting\State\PUC_Site_Permit\Mapping\Vestas_V116\Figure_12_Soils.mxd



FREEBORN WIND FARM

merjent

0 0.5 1 Miles

1 inch = 1 miles

N

Data Source: Invenergy, MGS, MN DOT, Census

For Environmental Review Purposes Only

Figure 13
Site Geology and Depth to Bedrock

Freeborn Wind Farm
Freeborn County, MN

Vestas V110-2.0

Vestas V116-2.0

Project Boundary

O&M and Project Substation

Access Road

Collection Line

Crane Path

Gravel Pits

Commercial Aggregate

Aggregate Pit (Other)

Aggregate Pit (Prospected)

Depth to Bedrock (feet)

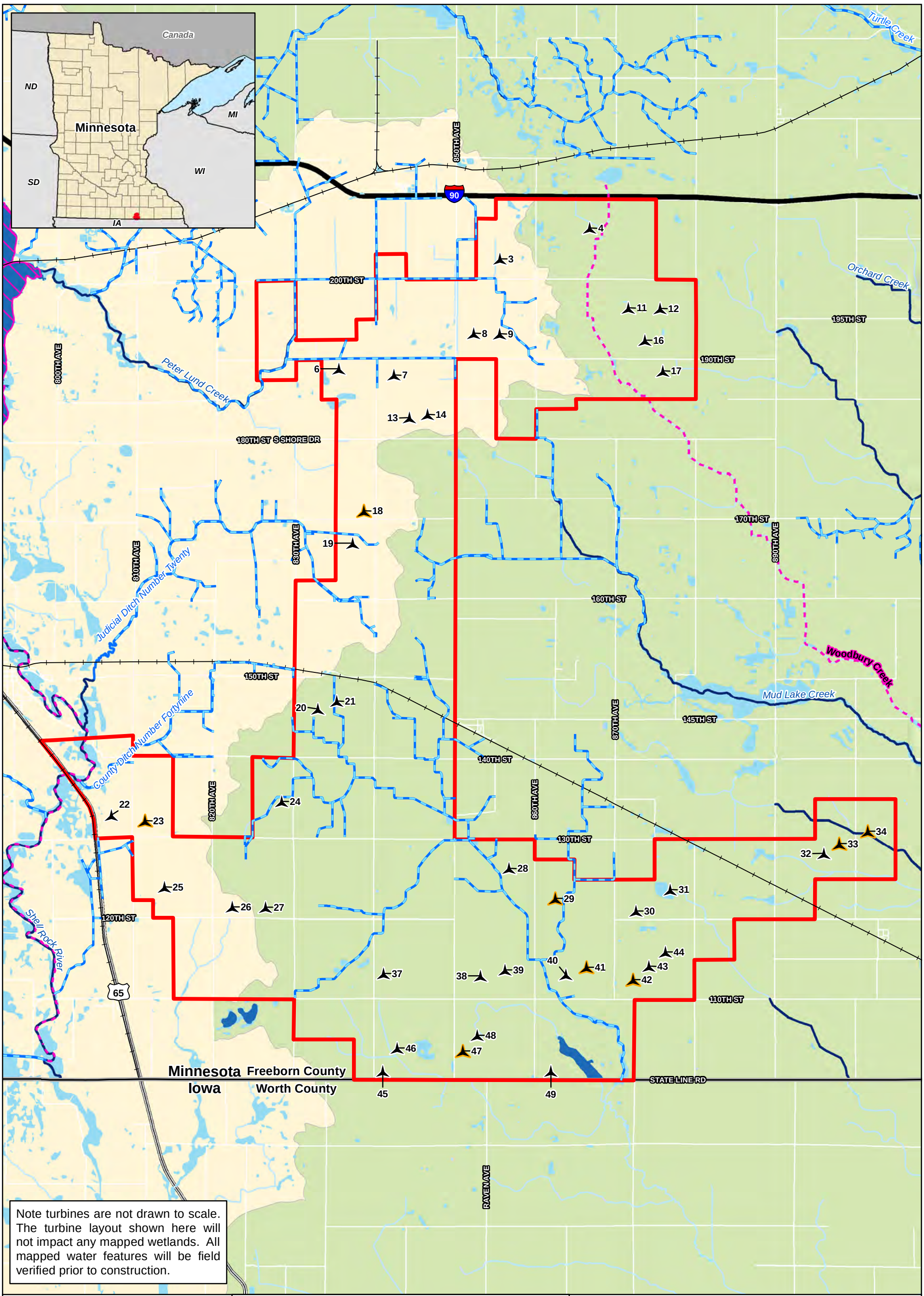
0 - 100

100 - 200

200 - 300

Source: Z:\Clients\I_L\Invenergy\Freeborn_Wind_Farm_Project\Permitting\State\PUC_Site_Permit\Mapping\Vestas_V116\Figure_13_Site_Geology_and_Depth_to_Bedrock.mxd

Document Path: Date: (6/5/2017)



Note turbines are not drawn to scale. The turbine layout shown here will not impact any mapped wetlands. All mapped water features will be field verified prior to construction.

FREEBORN WIND FARM

merjent

0 0.5 1 Miles

1 inch = 1 miles

N

Data Source: Invenergy, MN DNR, USGS, MN DOT, MN PCA, Census, Freeborn County

For Environmental Review Purposes Only

Figure 14
Surface Waters

Freeborn Wind Farm
Freeborn County, MN

- Vestas V110-2.0
- Vestas V116-2.0
- Project Boundary
- Impaired Stream
- Impaired Lakes
- Stream or Ditch
- NWI Wetland
- County and Judicial Ditch

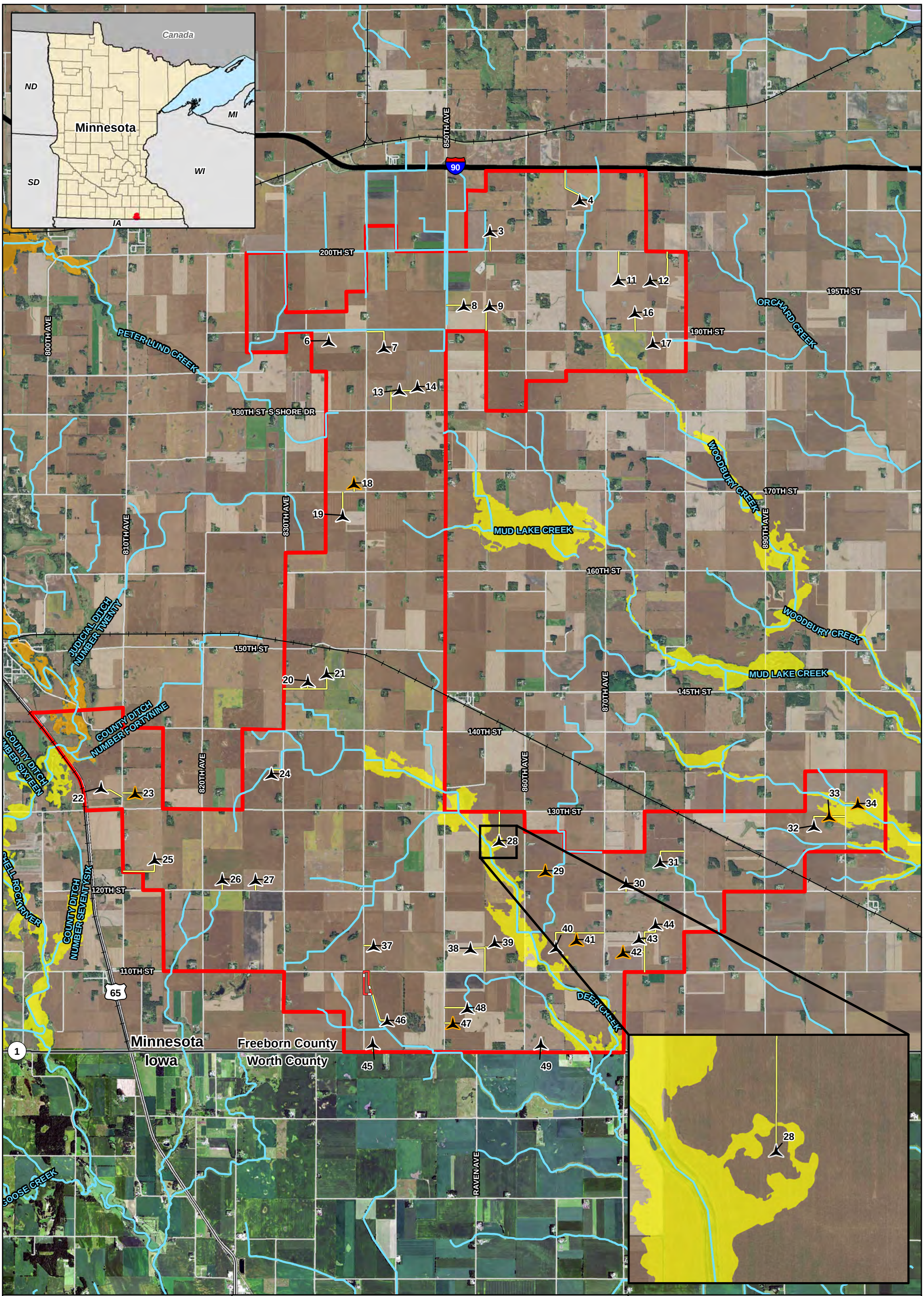
Public Waters Inventory

- Public Ditch/Altered Natural Watercourse
- Public Water Watercourse
- Public Water Wetland

HUC 8

- Shell Rock Watershed
- Upper Cedar Watershed

Document Path: Z:\Clients\I_L\Invenergy\Freeborn_Wind_Farm_Project\Permitting\State\PUC_Site_Permit\Mapping\Vestas_V116\Figure_14_Surface_Waters.mxd Date: (6/5/2017) Source:



merjent

FREEBORN WIND FARM

0 0.5 1 Miles

1 inch = 1 miles

N

Imagery Source: 2015 Color FSA
Data Source: Invenergy, MN DOT, USGS, FEMA, Census
For Environmental Review Purposes Only

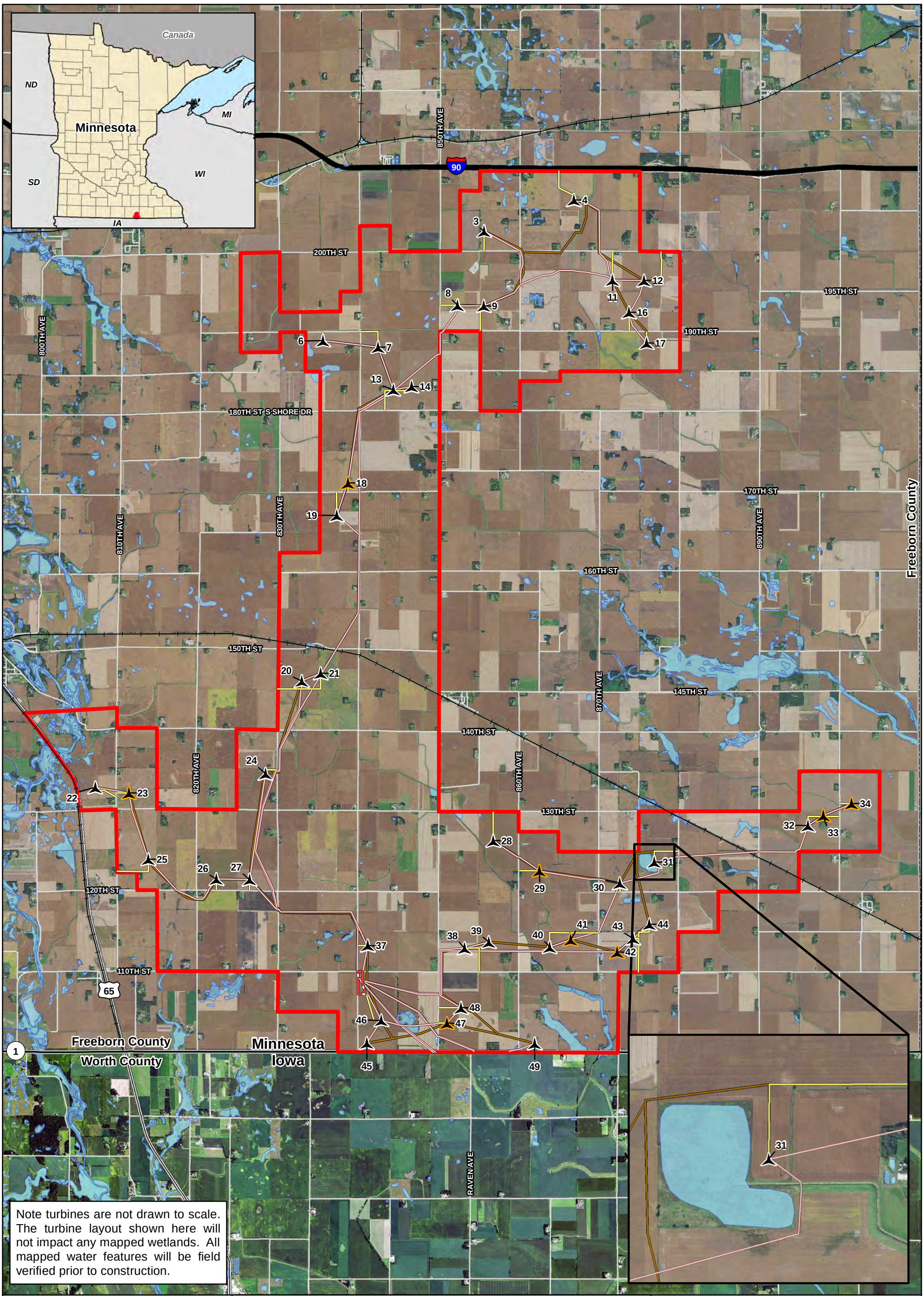
Figure 15
FEMA Floodplains

Freeborn Wind Farm
Freeborn County, MN

Vestas V110-2.0
Vestas V116-2.0
Project Boundary
O&M and Project Substation
Access Road
Stream or Ditch

FEMA Floodzone
Zone A
Zone AE

Source: Z:\Clients_L\Invenergy\Freeborn_Wind_Farm_Project\Permitting\State\PUC_Site_Permit\Mapping\Vestas_V116\Figure_15_FEMA_Floodplains.mxd
Document Path: Date: (6/6/2017)



FREEBORN WIND FARM

Emerjent

0 0.5 1 Miles

1 inch = 1 miles

N

Imagery Source: 2015 Color FSA
Data Source: Invenergy, MN DNR, MN DOT, Census

For Environmental Review Purposes Only

Figure 16
Wetlands Inventory

Freeborn Wind Farm
Freeborn County, MN

- Vestas V110-2.0
- Vestas V116-2.0
- Project Boundary
- O&M and Project Substation
- Access Road
- Collection Line
- Crane Path
- NWI Wetland

Source: Z:\Clients\I_L\Invenergy\Freeborn_Wind_Farm_Project\Permitting\State\PUC_Site_Permit\Mapping\Vestas_V116\Figure_16_Wetlands_Inventory.mxd

Document Path: Date: (6/6/2017)

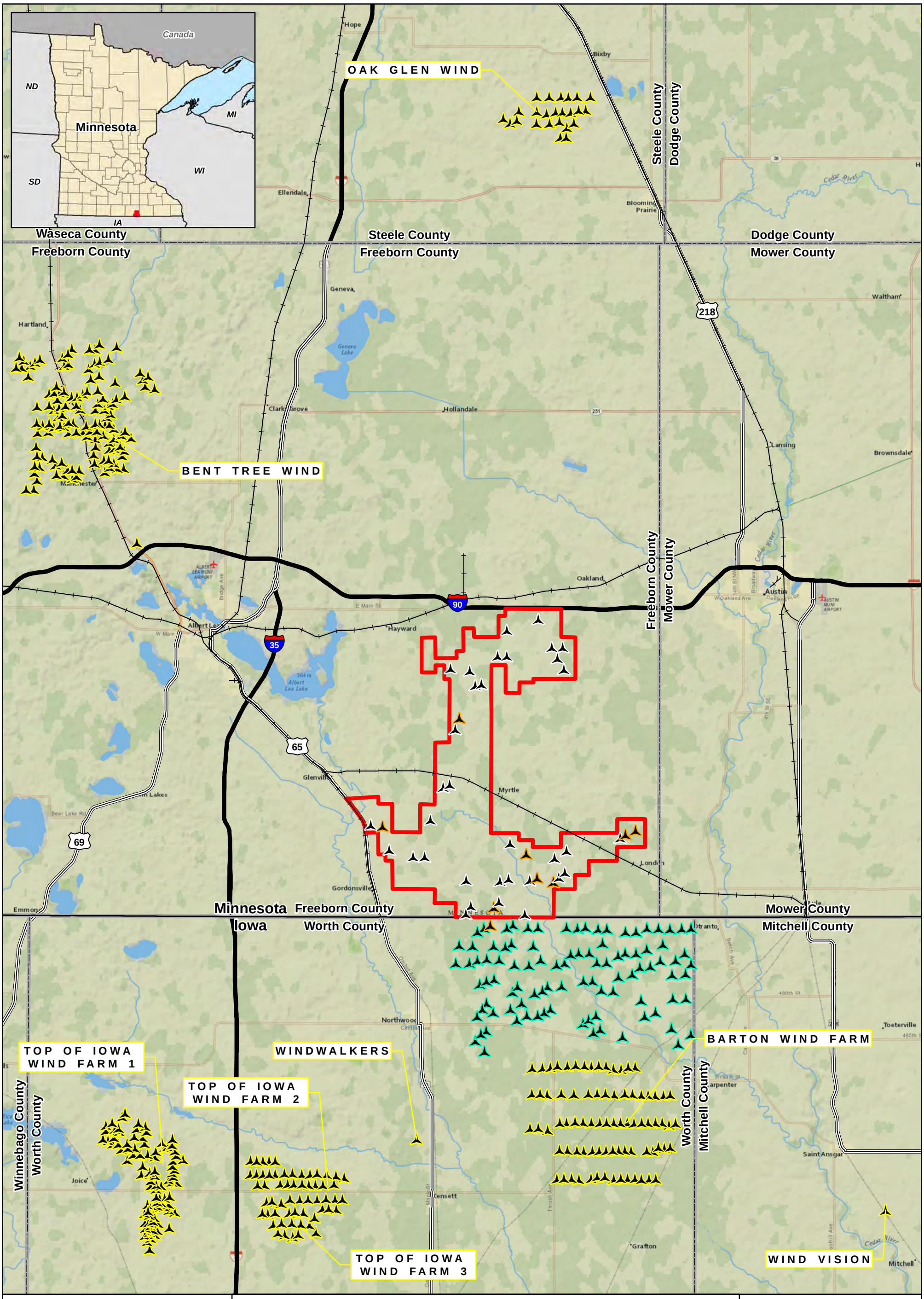


Figure 17
Existing Turbine Locations

Freeborn Wind Farm
Freeborn County, MN

Source: Z:\Clients\I_L\Invenergy\Freeborn_Wind_Farm_Project\Permitting\State\PUC_Site_Permit\Mapping\Vestas_V116\Figure_17_Existing_Wind_Turbine_Locations.mxd
Document Path: Date: (6/6/2017)